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## Understanding the Relationship Between Co-occurring PTSD and MDD: Symptom Severity and Affect

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### Abstract

How to best understand theoretically the nature of the relationship between co-occurring PTSD and MDD (PTSD+MDD) is unclear. In a sample of 173 individuals with chronic PTSD, we examined whether the data were more consistent with current co-occurring MDD as a separate construct or as a marker of posttraumatic stress severity, and whether the relationship between PTSD and MDD is a function of shared symptom clusters and affect components. Results showed that the more severe depressive symptoms found in PTSD+MDD as compared to PTSD remained after controlling for PTSD symptom severity. Additionally, depressive symptom severity significantly predicted co-occurring MDD even when controlling for PTSD severity. In comparison to PTSD, PTSD+MDD had elevated dysphoria and re-experiencing – but not avoidance and hyperarousal – PTSD symptom cluster scores, higher levels of negative affect, and lower levels of positive affect. These findings provide support for PTSD and MDD as two distinct constructs with overlapping distress components.

### Keywords

posttraumatic stress disorder; major depressive disorder; co-occurrence; comorbidity; positive affect; negative affect

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A large body of evidence suggests that posttraumatic stress disorder (PTSD) and major depressive disorder (MDD) commonly co-occur (Breslau, Davis, Andreski, & Peterson, 1991; Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Davidson, Hughes, Blazer, & George, 1991; Helzer, Robins, & McEvoy, 1987; Kessler, Berglund, Demler, Jin, & Walters, 2005; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Indeed, the National Comorbidity Survey-Revised (NCS-R) showed a .50 correlation between lifetime PTSD and lifetime MDD (Kessler, Berglund et al., 2005). Large-scale studies of civilian and veteran samples show that as many as 51% to 82% of individuals with current PTSD also endorse

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current co-occurring MDD (Hankin, Spiro, Miller, & Kazis, 1999; Shore, Vollmer, & Tatum, 1989). PTSD has also been shown to increase the risk for first onset of MDD (Breslau, Davis, Peterson, & Schultz, 1997; Kessler et al., 1995).

The co-occurrence of PTSD and MDD is associated with greater disorder severity (e.g., Kessler, Chiu, Demler, & Walters, 2005). Individuals with co-occurring PTSD and MDD tend to display more anxiety, depression, and PTSD symptoms, lower global functioning (Blanchard, Buckley, Hickling, & Taylor, 1998; Momartin, Silove, Manicavasagar, & Steel, 2004; Nixon, Resick, & Nishith, 2004; Shalev et al., 1998), and increased health service utilization (Kramer, Booth, Han, & Williams, 2003; Stapleton, Asmundson, Woods, Taylor, & Stein, 2006) than individuals with either PTSD or MDD alone. Co-occurring PTSD and MDD has associated negative correlates and outcomes including increased risk for attempted suicide (Oquendo et al., 2005), a more chronic course of impairment and psychopathology (Breslau et al., 1991), and attenuated treatment response (Green et al., 2006). Overall, it is clear that MDD is jointly involved in the presentation of PTSD and that the co-occurrence is related to a more severe symptom presentation and disorder course.

What is not clear, however, is how to best understand theoretically the nature of the relationship between the constructs of PTSD and MDD. Such an understanding would lead to a clearer explanation of the high rates of co-occurrence and related greater symptom severity and impairment and, ultimately, could inform diagnostic classification and enhance treatment effectiveness. Symptom level analyses are a useful method in the development of a better theoretical understanding. In an attempt to reach a clearer understanding of the nature of this relationship, two key questions must be considered. The first question is whether or not PTSD and MDD are indeed separate constructs in response to trauma exposure. Following trauma, co-occurring PTSD and MDD may be best conceptualized as either two distinct constructs or a single general traumatic stress response. The second related question is whether the relationship between PTSD and MDD following trauma exposure is solely a function of shared symptoms. If PTSD and MDD are best represented as two distinct constructs, their co-occurrence may be the result of overlap between the constructs due to shared disorder features. Consideration of these two questions is an important step in moving towards a better understanding of the shared and unique trait and symptom dimensions driving the high rates of PTSD and MDD co-occurrence and related disorder severity.

With regard to the first question, to our knowledge, three studies have specifically examined whether PTSD and MDD represent two distinct responses to trauma or a general traumatic stress response (Blanchard et al., 1998; Grant, Beck, Marques, Palyo, & Clapp, 2008; O'Donnell, Creamer, & Pattison, 2004). Among samples of individuals who met diagnostic criteria for PTSD alone, MDD alone, or co-occurring PTSD and MDD, two studies using factor analyses evaluated and compared a single-factor model of posttraumatic stress symptoms (a unitary general traumatic stress response factor) to a two-factor (PTSD and MDD factors) or three-factor (PTSD, MDD, and generalized anxiety disorder factors) model of posttraumatic stress symptoms. The results of these studies suggested that PTSD and MDD might be best conceptualized as two independent, yet highly overlapping factors (Blanchard et al., 1998; Grant et al., 2008). In contrast, when exploring predictors of PTSD versus co-occurring PTSD and MDD, O'Donnell and colleagues (2004) found nearly identical sets of predictor variables for each, suggesting that PTSD and co-occurring PTSD and MDD may be essentially the same construct and that their separation may be an arbitrary distinction. Interestingly though, a different set of predictors differentiated MDD from both PTSD and co-occurring PTSD and MDD in the first few months post trauma. Such results argue that depression may exist as a distinct construct separate from a more general traumatic stress construct shortly after a traumatic event (O'Donnell et al., 2004).

If PTSD and MDD are separate constructs in response to trauma exposure, their co-occurrence may be a function of shared symptoms. Prior research has approached this question in different ways. Examining PTSD and MDD diagnostic criteria, researchers have generally found that overlapping symptoms (e.g., insomnia, impaired concentration, anhedonia) are an insufficient explanation for the high rates of co-occurrence because the high rates of clinically significant co-occurring depression remain even after accounting for overlapping symptom items (e.g., Blanchard et al., 1998; Bleich, Koslowsky, Dolev, & Lerer, 1997; Elhai, Grubaugh, Kashdan, & Frueh, 2008; Taft, Resick, Watkins, & Panuzio, 2009).

It is possible that the relationship between PTSD and MDD in response to trauma exposure is a function of shared dysphoria symptoms. Numerous studies have investigated the underlying structure of PTSD symptoms partly in response to the questioned validity of the three-cluster symptom structure specified by the DSM-IV (i.e., re-experiencing, avoidance-numbing, and hyperarousal; Simms, Watson, & Doebbeling, 2002). Drawing on evidence that the anxiety and mood disorders share a general distress component, Simms and colleagues (2002) developed a PTSD symptoms structural model consisting of dysphoria, re-experiencing, avoidance, and hyperarousal factors. The dysphoria factor is composed of the inability to recall aspects of trauma, loss of interest, detachment, restricted affect, sense of foreshortened future, sleep disturbance, irritability, and difficulty concentrating. This four-factor model has since gained extensive empirical support (e.g., Baschnagel, O'Connor, Colder, & Hawk, 2005; Elhai, Ford, Ruggiero, & Frueh, 2009; Elklit & Shevlin, 2007; Krause, Kaltman, Goodman, & Dutton, 2007; Palmieri, Weathers, Difede, & King, 2007). Further, studies examining associations among the four PTSD symptom factors and measures of depression have revealed that the depression measures are more strongly correlated with the dysphoria factor than with the other PTSD symptom factors (e.g., Elklit & Shevlin, 2007; Palmieri et al., 2007; Simms et al., 2002). Thus, the dysphoria factor may partly explain the shared PTSD and MDD constructs.

From a broader perspective, a negative affect component (NA), present at varying levels in anxiety and mood disorders, has been shown to contribute to the overlap among these disorders (Brown, Chorpita, & Barlow, 1998; Brown & McNiff, 2009; Mineka, Watson, & Clark, 1998). In addition, low positive affect (PA) has been shown to be a specific feature of depression that distinguishes MDD from the majority of the anxiety disorders (Brown et al., 1998; Mineka et al., 1998). In line with the dysphoria factor findings stated above, these specific affect components (NA and PA) may play differential roles in the co-occurring PTSD and MDD relationship. More specifically, negative affect may contribute to the overlap between the disorder constructs, while low positive affect may distinguish them. Indeed, a study examining mood and anxiety disorders in relation to higher order personality traits among a sample of Gulf War veterans found that negative temperament had the strongest associations with both MDD and PTSD and that positive temperament had a stronger negative correlation with MDD than with PTSD (Gamez, Watson, & Doebbeling, 2007).

To better understand the relationship between co-occurring PTSD and MDD after trauma exposure, the present study examined whether data were more consistent with the possibility that PTSD and MDD are separate constructs and the extent to which the relationship between PTSD and MDD is a function of shared symptoms. We approached the first question by examining the effects of co-occurring MDD on disorder symptoms and impairment. More specifically, we examined whether the co-occurrence of PTSD and MDD would be associated with more severe PTSD and depressive symptoms and functional impairment than PTSD alone. We hypothesized that (1a) individuals with co-occurring PTSD and MDD would display more severe PTSD and depressive symptoms and functional

impairment than individuals with PTSD alone. We also examined whether MDD is a separate, additional response to trauma exposure, rather than MDD symptoms simply being a marker of more severe posttraumatic stress symptoms. In this examination, we reasoned that if more severe depressive symptoms and functional impairment in co-occurring PTSD and MDD remained after holding PTSD constant, this would be consistent with MDD as a separate construct. We hypothesized that (1b) after controlling for PTSD severity, the co-occurrence of PTSD and MDD would still be associated with more severe depressive symptoms and functional impairment than PTSD alone. In testing this hypothesis, we controlled for interviewer-rated PTSD when comparing groups on interviewer-rated measures, and controlled for self-reported PTSD when comparing groups on self-report measures. This was done in order to control for shared error variance. Additionally, interview ratings may be more conservative in that they provide a tighter assessment of the construct of interest than self-report ratings. Finally, consistent results between analyses using interview and self-report ratings lend stronger support to study findings. Additionally, we further approached the first question by examining the roles of PTSD and depressive symptom severity and impairment in the prediction of co-occurring MDD. We hypothesized that (1c) depressive symptom severity would add to the prediction of co-occurring MDD beyond that of PTSD symptom severity and impairment.

We approached the second question by comparing the empirically-derived PTSD four symptom cluster solution (i.e., dysphoria, re-experiencing, avoidance, and hyperarousal; Simms et al., 2002) and levels of negative and positive affect between individuals with co-occurring PTSD and MDD and individuals with PTSD alone. We hypothesized that (2a) individuals with co-occurring PTSD and MDD would display elevated severity on only the dysphoria symptom cluster, as opposed to broader overlap across all symptom clusters, than those with PTSD alone and that (2b) individuals with co-occurring PTSD and MDD would display higher levels of negative affect and lower levels of positive affect than those with PTSD alone.

## 1. Method

### 1.1. Participants

The sample consisted of 173 treatment-seeking women (78%,  $n = 135$ ) and men (22%,  $n = 38$ ) between the ages of 18 and 65 with a primary diagnosis of chronic PTSD. Of the 173 participants, 92 (53.2%) were diagnosed with current co-occurring MDD. Participants were recruited via referrals and advertisements. Exclusion criteria included: a) current psychosis, unstable bipolar disorder, current substance dependence, or high suicide risk and b) in assault cases, an ongoing relationship with the perpetrator. On average, participants were 37.16 ( $SD = 11.09$ ) years old. The average time since trauma was 11.58 ( $SD = 12.22$ ) years. See Table 1 for sample characteristics.

### 1.2. Measures

Both interviewer-rated and self-report measures of PTSD, depression, and functional impairment were utilized because the inclusion of interviewer ratings decreases the bias that occurs with using self-report measures exclusively. Thus, the use of multiple measures allowed for a more comprehensive assessment of PTSD and co-occurring MDD diagnoses and symptom severity to be used in analyses to better understand the relationship between PTSD and MDD in response to trauma.

**PTSD Symptom Scale – Interview (PSS-I)**—The PSS-I (Foa, Riggs, Dancu, & Rothbaum, 1993) is a semi-structured interview assessing PTSD diagnosis and severity and was used in this study to obtain both a diagnosis of primary chronic PTSD and to determine

PTSD severity. The measure consists of 17 items corresponding to the DSM-IV PTSD symptoms. Items are rated on a 0 to 3 scale for combined frequency and severity in the past two weeks (0 = *not at all*, 3 = *5 or more times per week/very much*). The PSS-I has good convergent validity with other PTSD interview measures (Foa & Tolin, 2000). Inter-rater reliability for PTSD diagnosis ( $\kappa = .91$ ) and overall severity ( $r = .97$ ) ratings are excellent (Foa et al., 1993). In the present study, over 10% of cases were rerated for inter-rater reliability. Reliability based on consistency was high for PTSD severity scores ( $ICC = .95$ ) and PTSD diagnosis ( $\kappa = 1.00$ ).

In the present study, the PSS-I symptom items were also arranged to form the empirically-derived dysphoria, re-experiencing, avoidance, and hyperarousal symptom clusters as proposed by Simms and colleagues (2002). The dysphoria symptom cluster consists of inability to recall aspects of trauma, loss of interest, detachment, restricted affect, sense of foreshortened future, sleep disturbance, irritability, and difficulty concentrating; the re-experiencing symptom cluster consists of intrusive thoughts of trauma, recurrent dreams of trauma, flashbacks, emotional reactivity to trauma cues, and physiological reactivity to trauma cues; the avoidance symptom cluster consists of avoiding thoughts of trauma and avoiding reminders of trauma; the hyperarousal symptom cluster consists of hypervigilance and exaggerated startle response.

**Hamilton Rating Scale for Depression – 24 Items (HRSD<sub>24</sub>)**—The HRSD<sub>24</sub> (Hamilton, 1960) is an interviewer-rated depressive symptom scale consisting of 24 items measuring the severity of cognitive, behavioral, and somatic symptoms of depression in the past week. Items are scored on either a 0 to 2 or 0 to 4 spectrum, with higher scores indicating greater severity. The HRSD has excellent inter-rater reliability ( $r = .90$ ) and good internal consistency ( $\alpha = .76$ ; Rehm & O'Hara, 1985), and adequate convergent validity with a wide range of depression measures (Bagby, Ryder, Schuller, & Marshall, 2004). The total HRSD<sub>24</sub> score was included in this study as a measure of overall depression severity. In the present study, reliability for HRSD<sub>24</sub> overall severity scores was good ( $ICC = .89$ ) based on the 10% of cases that were rerated for reliability.

**Structured Clinical Interview for DSM-IV Axis I (SCID-I)**—The SCID-I (First, Spitzer, Gibbon, & Williams, 2001) is a diagnostic interview used to acquire information about DSM-IV Axis I disorder criteria. The SCID-I has acceptable joint interview inter-rater reliability with kappas between .57 and 1.0 (Zanarini et al., 2000). In this study, it was used to obtain a diagnosis of current MDD. In the present study, over 10% of the cases were rerated for diagnostic reliability. Overall, reliability was high with good diagnostic agreement for current MDD ( $\kappa = .73$ ).

**Social Adjustment Scale (SAS)**—The SAS (Weissman & Paykel, 1974) is a semi-structured interview used to assess an individual's functioning in eight specific areas (e.g., work, family unit) over the past two weeks. Individual and global items are measured on a scale ranging from 1 to 7, with higher scores indicating more severe maladjustment. In this study, the overall adjustment score of global functioning was used to assess impairment in functioning. The SAS has good inter-rater reliability ( $r = .80$ ; Weissman, Paykel, Siegel, & Klerman, 1971). In this study, reliability for global functioning scores was adequate ( $ICC = .62$ ) based on the 10% of cases that were rerated for reliability.

**PTSD Symptom Scale – Self-Report (PSS-SR)**—The PSS-SR (Foa et al., 1993) is a 17-item version of the Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997), assessing the severity of DSM-IV PTSD symptoms. Each symptom is rated on a 4-point scale from 0 (*not at all*) to 3 (*very much*), with higher scores indicating more severe PTSD symptoms. This measure has high internal consistency ( $\alpha = .91$ ), excellent

inter-rater reliability for PTSD diagnosis ( $\kappa = .91$ ) and overall severity ( $r = .97$ ), and good test-retest reliability for the total score ( $r = .83$ ; Foa et al., 1993).

**Beck Depression Inventory (BDI)**—The BDI (Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) is a 21-item self-report inventory measuring depression severity over the past week. Each item consists of statements scored 0 to 3, with increasing scores indicating greater severity of depression. The BDI has a split-half reliability of .93 (Beck et al., 1961) and correlates strongly with clinical ratings of depression ( $r = .55$  to  $.96$ ; Beck, Steer, & Carbin, 1988).

**Positive and Negative Affect Schedule – Trait Version (PANAS)**—The PANAS (Watson, Clark, & Tellegen, 1988) consists of two 10-item scales measuring the two primary dimensions of mood, positive and negative affect. Participants rate on a 5-point scale (1 = *very slightly or not at all*, 5 = *extremely*) to what extent they experience each mood state in general (i.e., trait). The PANAS scales are stable over a 2-month time period ( $\alpha = .47$  to  $.68$  for PA and  $.39$  to  $.71$  for NA), highly internally consistent ( $\alpha = .86$  to  $.90$  for PA and  $.84$  to  $.87$  for NA), and largely uncorrelated ( $r = -.12$  to  $-.23$ ; Watson et al., 1988). The PANAS has high convergent validity with lengthier measures of mood ( $r = -.19$  to  $-.36$  for PA and  $.51$  to  $.74$  for NA; Watson et al., 1988).

**Sheehan Disability Scale (SDS)**—The SDS (Sheehan, 1983) is a 3-item self-report scale of impairment. The items are scored on a 0 to 10 scale with increasing scores indicating greater impairment, and address the impact of symptomatology on three areas of functioning: work, social, and family. The total impairment score is the unweighted sum of the 3 items. In this study, the total impairment score was used to assess impairment in functioning. The instrument has adequate reliability ( $\alpha = .56$  to  $.86$ ) and construct validity as evaluated by examining the sensitivity of the instrument to change (Cohen's  $d = .79$  to  $1.46$ ; Leon, Shear, Portera, & Klerman, 1992).

## 2. Results

### 2.1. Preliminary Analyses

Comparisons between the co-occurring PTSD and MDD (PTSD+MDD) group and the PTSD group on demographics were performed using the chi-square test for the categorical variables (i.e., sex, trauma type, education level, income, and ethnicity) and the independent-samples  $t$ -test for the continuous variables age and time since trauma. There was a significant difference in age between the groups. Individuals with PTSD+MDD ( $M = 39.41$ ,  $SD = 11.09$ ) were older than those with PTSD alone ( $M = 34.59$ ,  $SD = 10.58$ ),  $t(171) = -2.91$ ,  $p < .01$ ,  $d = .44$ . No other significant differences in demographics emerged. The demographic variable age was evaluated as a potential covariate for the subsequent analyses of covariance and is reported in the text if findings were altered by its inclusion.

### 2.2. PTSD and Depressive Symptom Severity and Functional Impairment between PTSD +MDD and PTSD Alone

Independent-samples  $t$ -tests were conducted to test the hypothesis that (1a) individuals with PTSD+MDD would display more severe PTSD and depressive symptoms and functional impairment than individuals with PTSD alone. As seen in Table 2, across all symptom severity and functioning measures, individuals with PTSD+MDD were more severe than those with PTSD alone.

### 2.3. Controlling of PTSD Severity: Depressive Symptom Severity and Functional Impairment between PTSD+MDD and PTSD Alone

In order to test the hypothesis that (1b) after controlling for PTSD severity, PTSD+MDD would continue to be associated with more severe depressive symptoms and functional impairment than PTSD alone, one-way between-group analyses of covariance (ANCOVAs) were conducted to compare depressive symptom severity and functional impairment between PTSD+MDD and PTSD alone after adjusting for PTSD symptom severity. After adjusting for interviewer-rated PTSD symptom severity scores (PSS-I), individuals with PTSD+MDD ( $M_{adjusted} = 27.11$ ,  $SE = .802$ ) still had higher interviewer-rated depressive symptom severity scores on the HRSD<sub>24</sub> than PTSD ( $M_{adjusted} = 20.05$ ,  $SE = .860$ ),  $F(1, 170) = 32.90$ ,  $p < .001$ ,  $d = .88$ . Similarly, after adjusting for self-reported PTSD symptom severity scores (PSS-SR), individuals with PTSD+MDD ( $M_{adjusted} = 26.35$ ,  $SE = .804$ ) had significantly higher self-reported depressive symptom severity scores on the BDI than those with PTSD alone ( $M_{adjusted} = 23.22$ ,  $SE = .851$ ),  $F(1, 168) = 6.64$ ,  $p < .05$ ,  $d = .39$ .

In contrast to depression severity, for interviewer-rated global functioning (SAS), after controlling for PTSD severity (PSS-I), there was no difference between those with PTSD+MDD ( $M_{adjusted} = 3.84$ ,  $SE = .104$ ) and those with PTSD alone ( $M_{adjusted} = 3.78$ ,  $SE = .112$ ),  $F(1, 170) = .15$ , *ns*. Similarly, for self-reported total impairment (SDS), after controlling for both PTSD severity (PSS-SR) and age, there was no difference between those with PTSD+MDD ( $M_{adjusted} = 19.22$ ,  $SE = .612$ ) and those with PTSD alone ( $M_{adjusted} = 18.00$ ,  $SE = .656$ ),  $F(1, 169) = 1.68$ , *ns*.

For further exploration, hierarchical multiple regression was used to assess how much of the variance in functional impairment was explained by PTSD symptom severity, depressive symptom severity, and the overlap between the two. For both interviewer-rated and self-report measures, two separate hierarchical multiple regression analyses were conducted. The first examined the percentage of the variance in impaired functioning explained by depressive symptom severity after controlling for the effect of PTSD symptom severity. The second examined the percentage of the variance in impaired functioning explained by PTSD symptom severity after controlling for the effect of depressive symptom severity. In order to examine the percentage of the variance in impaired functioning that was shared between PTSD symptom severity and depressive symptom severity, the PTSD symptom severity unique variance and depressive symptom severity unique variance were summed and that total was subtracted from the total variance explained by the model as a whole. The detailed results of the hierarchical multiple regression analyses for interviewer-rated and self-report measures can be seen in Table 3. In examining overlap between PTSD and depressive symptom severity, 17.3% of the variance in interviewer-rated functional impairment (SAS) was shared between PTSD symptom severity (PSS-I) and depressive symptom severity (HRSD<sub>24</sub>). The total variance shared between PTSD symptom severity (PSS-SR) and depressive symptom severity (BDI) in self-reported functional impairment (SDS) was 26.7%. Overall, the overlap between PTSD and depressive symptom severity appears to explain a larger percentage of the variance in functional impairment than either PTSD symptom severity or depressive symptom severity.

### 2.4. PTSD and Depressive Symptom Severity and Functional Impairment in the Prediction of Co-occurring MDD

Sequential logistic regressions were conducted in order to test the hypothesis that (1c) depressive symptom severity would add to the prediction of co-occurring MDD beyond that of PTSD symptom severity, functional impairment, and age. The two measures of PTSD symptom severity, the PSS-I and PSS-SR, were centered for the analyses. Interviewer-rated PTSD symptom severity (PSS-I), functional impairment (SAS), and age were entered in

block 1 and interviewer-rated depressive symptom severity (HRSD<sub>24</sub>) was entered in block 2. The first block resulted in a significant model  $\chi^2(3, N = 173) = 41.49, p < .001$ . The HRSD<sub>24</sub> significantly added to prediction of co-occurring MDD above that afforded by PSS-I, SAS, and age,  $\chi^2(1, N = 173) = 28.52, p < .001$ . With all of the predictors included (i.e., PSS-I, SAS, age, and HRSD<sub>24</sub>), according to the Wald criterion, only the HRSD<sub>24</sub> ( $z = 22.90, p < .001, OR = 1.14$ ) and age ( $z = 4.77, p < .05, OR = 1.04$ ) reliably predicted co-occurring MDD. In the second regression, self-reported PTSD symptom severity (PSS-SR), functional impairment (SDS), and age were entered in block 1 and self-reported depressive symptom severity (BDI) was entered in block 2. The first block resulted in a significant model  $\chi^2(3, N = 171) = 34.30, p < .001$ . The BDI significantly added to prediction of co-occurring MDD above that afforded by PSS-SR, SDS, and age,  $\chi^2(1, N = 171) = 4.43, p < .05$ . With all of the predictors included (i.e., PSS-SR, SDS, age, and BDI), the PSS-SR ( $z = 4.58, p < .05, OR = 1.06$ ), age ( $z = 4.20, p < .05, OR = 1.03$ ), and the BDI ( $z = 4.34, p < .05, OR = 1.06$ ) reliably predicted co-occurring MDD. Overall, these results show that depressive symptoms play a unique role in the presence of co-occurring MDD.

### 2.5. PTSD Symptom Clusters and Affective Components Comparisons between PTSD +MDD and PTSD Alone

To examine the hypothesis that (2a) individuals with PTSD+MDD would display elevated severity on the dysphoria PTSD symptom cluster only as compared to those with PTSD alone, independent-samples *t*-tests were conducted to compare the severity of the four empirically-derived symptom clusters (i.e., dysphoria, re-experiencing, avoidance, and hyperarousal; Simms et al., 2002) for PTSD+MDD and PTSD alone. As expected and as can be seen in Table 4, individuals with PTSD+MDD had more severe symptoms on the dysphoria symptom cluster than those with PTSD alone ( $d = 1.12$ ). An unexpected finding was that this was also the case for the re-experiencing symptom cluster, though a much smaller effect ( $d = .41$ ). Consistent with fear-based symptoms being characteristic of PTSD, no significant differences between the two groups were seen on the avoidance symptom cluster or hyperarousal symptom cluster severity.

Finally, consistent with our hypothesis (2b) regarding levels of affect, as seen in Table 4, levels of NA were significantly higher and levels of PA were significantly lower for individuals with PTSD+MDD compared to those with PTSD alone.

## 3. Discussion

Across measures, the nature of the relationship between PTSD and MDD in response to trauma exposure was more consistent with a model of two separate, yet overlapping constructs than a single general traumatic stress response. The investigations of PTSD and MDD symptom severity and functional impairment suggest that PTSD and MDD co-occurrence may be more than simply a marker of posttraumatic stress severity. The comparisons between individuals with co-occurring PTSD and MDD and individuals with PTSD alone on levels of trauma-related symptom clusters and affect suggest that shared symptoms may be a partial explanation for the PTSD and MDD co-occurrence. Taken together, PTSD and MDD following trauma may be two separate constructs contributing to greater symptom severity with their co-occurrence being a function of shared symptom and affective components.

Individuals with co-occurring PTSD and MDD reported more severe PTSD, depressive symptoms, and functional impairment than individuals with PTSD alone. The co-occurrence of PTSD and MDD was associated with more depressive symptom severity even after controlling for PTSD severity. Thus, MDD appears to uniquely impact posttraumatic depressive symptom severity among individuals diagnosed with co-occurring PTSD and



MDD. Further, depressive symptom severity added to the prediction of co-occurring MDD beyond that of PTSD symptom severity, functional impairment, and age, suggesting that depressive symptoms play an important role in the presence of co-occurring MDD. In line with previous studies (Blanchard et al., 1998; Grant et al., 2008), these findings lend support to the idea that PTSD and MDD may indeed be separate constructs.

Interestingly, when holding PTSD severity constant, the more severe functional impairment, as measured by social functioning and disability, found among individuals with co-occurring PTSD and MDD was no longer present, possibly suggesting that PTSD symptom severity may be partly responsible for the worse functional impairment when PTSD and MDD co-occur. Indeed, the amount of variance in functional impairment explained by PTSD symptom severity and depressive symptom severity was similar and the shared variance between the two was even higher. This result is in line with previous work finding that PTSD contributed substantially to impaired functioning and diminished quality of life even after adjusting for co-occurring depression (Zatzick et al., 1997). Additionally, the lack of difference in functioning between individuals with co-occurring PTSD and MDD and individuals with PTSD alone after controlling for PTSD symptom severity further supports the idea that MDD as a separate construct uniquely impacts posttraumatic depressive symptom severity because the more severe depressive symptoms are not solely a function of general functional impairment.

Notably, the relationship between PTSD and MDD appears to be partly a function of shared dysphoria or general distress symptoms. Individuals with co-occurring PTSD and MDD displayed elevated severity on the dysphoria symptom cluster, but not on the more fear-based trauma-related avoidance and hyperarousal symptom clusters, suggesting that the dysphoria symptoms of the PTSD construct may be shared with specific symptoms of the MDD construct (Palmieri et al., 2007; Simms et al., 2002). No significant difference between individuals with co-occurring PTSD and MDD and individuals with PTSD alone on avoidance and hyperarousal symptom cluster severity suggests that the PTSD construct contains anxiety disorder specific fear-based symptom components that may help distinguish the PTSD and MDD constructs. However, contrary to our predictions, individuals with co-occurring PTSD and MDD also displayed elevated severity on the re-experiencing symptom cluster, though at a more modest level than the dysphoria symptom cluster. Elevated severity on the re-experiencing symptom cluster among individuals with co-occurring PTSD and MDD may be due to the similarity between traumatic intrusions in PTSD and trauma-related rumination found in MDD (Ehring, Frank, & Ehlers, 2008). With current PTSD criteria not providing good guidance on traumatic intrusions and rumination differentiation, such as distinguishing between the intrusive cognitions of remembering the trauma (i.e., re-experiencing) and repetitively thinking about the trauma (i.e., rumination; Ehlers & Clark, 2000), the elevated re-experiencing symptoms may have resulted from rumination.

With co-occurring PTSD and MDD characterized by higher levels of negative affect and lower levels of positive affect, a shared negative affect component may also contribute to PTSD and MDD co-occurrence, while lack of positive affect may further support the idea of MDD and PTSD as separate constructs following trauma exposure. Indeed, these findings are consistent with dimensional models (Brown et al., 1998; Clark & Watson, 1991; Gamez et al., 2007; Mineka et al., 1998; Watson, 2005; 2009) that present the notion of a negative affect component as a shared feature among the anxiety and mood disorders and responsible for the high rates of co-occurrence, and a low positive affect component as a specific, distinguishing feature of depression. Further, although not examined in the current study because of an absence of specific measures, the models also include anxiety disorder specific components, such as the empirically supported physiological hyperarousal

component (Joiner et al., 1999) that may be a specific and distinguishing feature of PTSD and panic disorder (Brown & McNiff, 2009).

Given that this study was focused on individuals with a primary diagnosis of chronic PTSD, individuals with MDD without trauma exposure or MDD without PTSD, but with trauma exposure were not included. Therefore, we were unable to parse out the role of trauma exposure or MDD alone in PTSD and depressive symptom severity and levels of affect. The possibility of a lack of severity difference between MDD and co-occurring PTSD and MDD is unlikely, however, as previous studies (e.g., Shalev et al., 1998) have shown that individuals with co-occurring PTSD and MDD tend to report more symptoms and greater impairment than those with MDD alone. We also did not consider the other characteristics beyond presence and severity that may be important in understanding the underlying relationship between PTSD and MDD. It is possible that the time of onset for MDD or recurrent nature of MDD may affect the impact of specific depressive symptoms on overall co-occurring PTSD and MDD disorder severity. For example, the presence of depression before a traumatic event has been associated with more depression and PTSD symptoms across time (Shalev et al., 1998). However, studies (e.g., Blanchard et al., 1998) have shown that co-occurring PTSD and MDD has more severe symptoms even when MDD occurs at different times of onset. Rather, the inability to disengage from a negative mood state and the tendency to easily move back into that state is a more likely marker of depression (Holtzheimer & Mayberg, 2011).

A clearer understanding of the nature of the relationship between PTSD and MDD in response to trauma exposure has important clinical implications. The more severe dysphoria symptom cluster, elevated levels of negative affect, and lack of positive affect among individuals with co-occurring PTSD and MDD as compared to individuals with PTSD alone have implications for the PTSD diagnostic criteria in the DSM-V. More specifically, perhaps a dysphoria symptom cluster should be recognized in PTSD and subsequently given less diagnostic weight in relation to the fear-based symptom clusters (i.e., avoidance and hyperarousal) in order to promote differentiation from disorders with overlapping distress symptoms, such as MDD. As Watson (2009) noted, “it is not clear that it is necessary – or even desirable – to build such a strong distress component into the diagnosis of PTSD” (p. 242). Thus, in order to capture PTSD and MDD as two distinct disorders, perhaps less emphasis should be placed on the overlapping disorder features, that is, dysphoria symptoms, in comparison to the distinguishing disorder features, that is, fear-based symptoms in PTSD and low positive affect in depression.

Future theoretical work is needed to help clarify the nature of the relationship between PTSD and MDD following trauma exposure. More specifically, examination of the latent structure of PTSD and MDD within a structural model of co-occurrence will aid in determining whether PTSD and MDD are indeed distinct, yet overlapping constructs in response to trauma.

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### Highlights

- The presence of MDD is not solely a function of PTSD severity
- PTSD and MDD share dysphoria symptoms and negative affect
- PTSD and MDD may be two distinct constructs with overlapping distress components

**Table 1**

## Sample Characteristics

<b>Demographic Variable</b>	<b>Percentage</b>
Trauma Type	
Adult Sexual Assault	32.9
Adult Non-Sexual Assault	20.2
Childhood Sexual Assault	17.3
Accident (MVA, natural disaster)	13.9
Childhood Non-Sexual Assault	6.9
Death/Violence to Loved One	6.4
Combat/War	2.3
Education Level	
Not College Educated	67.6
Income	
Less than \$20,000 per year	47.4
Ethnicity	
Caucasian	68.2
African American	19.1
Other	12.7

**Table 2**  
Comparison of PTSD+MDD and PTSD on PTSD and depressive symptom severity and functional impairment

Measure	PTSD (n = 81)		PTSD+MDD (n = 92)		t	Cohen's d
	M	SD	M	SD		
Interview						
PSS-I Total	26.60	5.74	32.28	6.49	6.06***	.93
PSS-I Reexperience	7.05	2.46	8.17	2.91	2.72**	.42
PSS-I Avoidance	10.91	3.11	13.37	3.13	5.16***	.79
PSS-I Arousal	8.64	3.01	10.74	2.69	4.83***	.74
HRSD <sub>24</sub>	17.72	7.73	29.17	9.51	8.62***	1.32
SAS Global	3.56	1.01	4.03	1.08	2.98**	.45
Self-Report						
PSS-SR Total	30.44	8.54	37.06	7.37	5.47***	.83
PSS-SR Reexperience	8.03	3.15	9.67	3.16	3.40**	.52
PSS-SR Avoidance	12.55	3.85	15.77	3.67	5.63***	.86
PSS-SR Arousal	9.85	3.20	11.61	2.57	3.94***	.61
BDI	20.93	8.43	28.41	9.48	5.43***	.83
SDS	16.44	6.82	20.59	5.99	4.25***	.65

Note. PTSD = Posttraumatic Stress Disorder; PTSD+MDD = Posttraumatic Stress Disorder with Co-occurring Major Depressive Disorder; PSS-I Total = Posttraumatic Stress Disorder Symptom Scale – Interview, PTSD Total Symptom Severity; PSS-I Reexperience = Posttraumatic Stress Disorder Symptom Scale – Interview, PTSD Re-experiencing Symptom Severity; PSS-I Avoidance = Posttraumatic Stress Disorder Symptom Scale – Interview, PTSD Avoidance Symptom Severity; PSS-I Arousal = Posttraumatic Stress Disorder Symptom Scale – Interview, PTSD Arousal Symptom Severity; HRSD<sub>24</sub> = Hamilton Rating Scale for Depression - 24 Items; SAS Global = Social Adjustment Scale, Global Functional Impairment; PSS-SR Total = Posttraumatic Stress Disorder Symptom Scale – Self-Report, Total Symptom Severity; PSS-SR Reexperience = Posttraumatic Stress Disorder Symptom Scale – Self-Report, Re-experiencing Symptom Severity; PSS-SR Avoidance = Posttraumatic Stress Disorder Symptom Scale – Self-Report, Avoidance Symptom Severity; PSS-SR Arousal = Posttraumatic Stress Disorder Symptom Scale – Self-Report, Arousal Symptom Severity; BDI = Beck Depression Inventory; SDS = Sheehan Disability Scale.

\*\* p < .01.

\*\*\* p < .001.



Table 3

Hierarchical Multiple Regression Analyses Predicting Functional Impairment From PTSD and Depressive Symptom Severity and Age

Predictor	SAS			SDS		
	R <sup>2</sup>	ΔR <sup>2</sup>	β	R <sup>2</sup>	ΔR <sup>2</sup>	β
Analysis 1						
PSS-I	.22		.29**			
HRSD <sub>24</sub>	.27	.05**	.28**			
Analysis 2						
HRSD <sub>24</sub>	.22		.28**			
PSS-I	.27	.05**	.29**			
Analysis 1						
Age						.18**
PSS-SR			.31	.31		.27**
BDI			.38	.07****		.36****
Analysis 2						
Age						.18**
BDI			.34	.34		.36****
PSS-SR			.38	.04**		.27**

Note. PSS-I = Posttraumatic Stress Disorder Symptom Scale – Interview; HRSD<sub>24</sub> = Hamilton Rating Scale for Depression – 24 Items; SAS = Social Adjustment Scale; PSS-SR = Posttraumatic Stress Disorder Symptom Scale – Self-Report; BDI = Beck Depression Inventory; SDS = Sheehan Disability Scale.

\*\*  
p < .01.

\*\*\*  
p < .001.

**Table 4**  
 Comparison of PTSD+MDD and PTSD on Symptom Clusters and Affect Components

Measure	PTSD (n = 81)		PTSD+MDD (n = 92)		t	Cohen's d
	M	SD	M	SD		
PTSD (PSS-1)						
Dysphoria	11.48	3.69	15.43	3.34	-7.40***	1.12
Re-experiencing	7.05	2.46	8.16	2.92	-2.69**	.41
Avoidance	4.46	1.26	4.75	1.36	-1.47	.22
Hyperarousal	3.64	1.89	3.92	1.76	-1.02	.15
Affect (PANAS)						
Negative Affect (NA)	27.01	7.80	32.55	8.29	-4.44***	.69
Positive Affect (PA)	33.38	8.23	29.91	7.42	2.86**	.44

Note. PTSD = Posttraumatic Stress Disorder; PTSD+MDD = Posttraumatic Stress Disorder with Co-occurring Major Depressive Disorder; PSS-1 = Posttraumatic Stress Disorder Symptom Scale – Interview; PANAS = Positive and Negative Affect Schedule – Trait Version.

\*\* p < .01.

\*\*\* p < .001.