The seven-factor hybrid model of PTSD and its relation to MDD and GAD

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ABSTRACT
The relation between posttraumatic stress disorder (PTSD), major depressive disorder (MDD), and generalized anxiety disorder (GAD) has been extensively examined. However, few studies have examined this relation in the context of the seven-factor hybrid model of PTSD. We examined whether specific factors of the hybrid model relate to affective depression, somatic depression, and GAD in a nonclinical student sample. Results show that the hybrid model was superior to the DSM-5 model. Also, affective depression related mostly to two PTSD factors: negative affect and anhedonia. There were no reliable finding concerning somatic depression and GAD in relation to PTSD.

Keywords
Posttraumatic stress disorder, seven-factor model, hybrid model, dsm-5 model, major depressive disorder, generalized anxiety disorder

INTRODUCTION
Among Dutch adults with posttraumatic stress disorder (PTSD), 84.4% has comorbid major depressive disorder (MDD; Spinhowen, Penninx, Van Hemert, De Rooij, & Elzinga, 2014). Also, despite the relation between PTSD and generalized anxiety disorder (GAD) is less examined relative to MDD, prevalence of GAD ranges from 11.1% (Bryant et al., 2010) to 31.6% (Grant, Beck, Marques, Palyo, & Clapp, 2008) within trauma-exposed samples. These high comorbidity rates might be explained by latent factors. To get more information about how and why these comorbidity are so high, we examined the latent structure of PTSD, MDD, and GAD.

Since the introduction of the four-factor DSM-5 model of PTSD, containing re-experiencing, avoidance, numbing, and hyperarousal (American Psychiatric Association, 2013), researchers have suggested new models of PTSD that include more factors. Recently, a seven-factor hybrid model of PTSD was proposed (Armour et al., 2015). Item mapping for the DSM-5 model and hybrid model could be found in Table 1. The hybrid model is based on three important findings: 1) items of the hyperarousal factor of the DSM-5 model should be divided into depression-oriented items and anxiety-oriented items (Watson, 2005), 2) positive and negative affect require their own construct (Watson, Clark, & Stasik, 2011), and 3) externalizing behavior has a different nature than other PTSD symptoms and should have its own construct (Roberton, Daffern, & Bucks, 2012). This resulted in the hybrid model containing the following constructs: re-experiencing, avoidance, dysphoric arousal, anxious arousal, anhedonia, negative affect, and externalizing behaviors. The hybrid model appeared to be superior to other models in several samples (e.g., Armour et al, 2015; Seligowski & Orcutt, 2016).

To learn more about the comorbidity between PTSD and MDD, this relationship should be studied in terms of latent structure. Research indicated that MDD consists of two constructs resembling affective and somatic symptoms, rather than one construct. (Richardson & Richards, 2008). Affective depression was found to correlate most with numbing, while the DSM-5 model was used. (Price & Van Stolk-Cooke, 2015). Moreover, when the four-factor Dysphoria model was used (Simms et al., 2002), affective disorder correlated most strongly with the dysphoria factor (Contractor et al., 2014; Elhai et al., 2015). Notably, negative affect and anhedonia of the hybrid model are combined in the numbing factor of the DSM-5 model and cover most of the dysphoria factor of the Dysphoria model. This could indicate that splitting the NACM factor into negative affect and anhedonia is not relevant regarding symptom outcomes in relation to MDD.

In empirical research in Chinese trauma-exposed adolescents, the relation between constructs of the hybrid model and MDD (one factor) was examined (Liu, Wang, Coa, Qing, & Armour, 2016). This research found that MDD correlated mostly with dysphoric arousal. Additionally, when using two factors of MDD and the DSM-5 model of PTSD, somatic depression correlated most strongly with hyperarousal (Price & Van Stolk-Cooke, 2015). Dysphoric arousal of the hybrid model is included in hyperarousal of the DSM-5 model. Conceivably, dysphoric arousal is the driving force in the relation between PTSD and somatic depression.

<table>
<thead>
<tr>
<th>Item mapping for the PTSD models (as adapted from Armour et al., 2015)</th>
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<tbody>
<tr>
<td>DSM-5 symptoms</td>
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<td>------------------------</td>
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<tr>
<td>1. Intrusive thoughts</td>
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<td>2. Nightmares</td>
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<td>3. Flashbacks</td>
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<td>4. Emotional cue reactivity</td>
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<td>11. Negative trauma-related emotions</td>
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<td>12. Loss of interest</td>
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<td>13. Detachment</td>
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<td>14. Restricted affect</td>
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<tr>
<td>15. Irritability / anger</td>
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<td>16. Self-destructive / reckless behavior</td>
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<td>17. Hypervigilance</td>
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<td>18. Exaggerated startle response</td>
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<tr>
<td>19. Difficulty concentrating</td>
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<td>20. Sleep disturbance</td>
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Note. R = re-experiencing; A = avoidance; NA = negative affect; An = anhedonia; EB = externalizing behaviors; AA = anxious arousal; DA = dysphoric arousal; NACM = negative alterations in cognitions and mood / numbing; AR = alterations in arousal and reactivity / hyperarousal
As far as our knowledge goes, there are only two studies that examined the latent structure of PTSD in relation to GAD. GAD appeared to have the strongest correlation with hyperarousal when the DSM-5 model was used (Price & Van Stolk-Cooke, 2015). When using the four-factor Dysphoria model of PTSD (Simms et al. 2002), it was found that the dysphoria factor (consisting of items 8, 9, 10, 11, 12, 13, 14, 15, 19 and 20 as seen in Table 1) had the strongest correlation with GAD (Durham et al., 2015). Both of these factors include the items irritability/anger, difficulty concentrating, and sleep disturbance. In the seven-factor model, both difficulty concentrating and sleep disturbance can be found in dysphoric arousal. Possibly, the dysphoric arousal factor contributes to a large extent to the comorbidity between PTSD and GAD. The hybrid model has not yet been used in research that examines the comorbidity with GAD.

In this study, we examined the hybrid model of PTSD in relation to affective and somatic depression in a nonclinical trauma-exposed student sample. Based on previous literature we expected the hybrid model to fit better than the DSM-5 model (hypothesis 1). Also, negative affect and anhedonia were expected to be equivalent in relation to affective depression (hypothesis 2). Dysphoric arousal was expected to correlate mostly with somatic depression (hypothesis 3) and GAD (hypothesis 4). Information about the latent structure of these disorders could be beneficial in diagnosing and treating both PTSD and MDD, and contribute to our understanding about their comorbidity.

**METHOD**

**Respondents**

Respondents were non-clinical Dutch students who had experienced one or more events that would meet Criterion A for the DSM-5 PTSD diagnosis (APA, 2013). Those who did not speak Dutch, non-students, respondents below the age of 18, and respondents without any traumatic exposure were excluded. In total, 355 respondents were included, of which 82% (n = 291) was female. According to the diagnostic thresholds, 16.3% (n = 58) likely had PTSD, 15.2% (n = 54) possibly had GAD, and 6.5% (n = 23) possibly had MDD.

**Procedure**

Respondents were asked to complete an online survey concerning demography, family history, stressful life-events, PTSD-related symptoms, depression and anxiety symptoms, positive and negative affect, anger, resilience and stigmatization. For this study, only a few questionnaires were used for analyses. This study is ethically approved by the ethical committee of the Institute of Psychology of Leiden University.

**Measures**

The severity of traumatic exposure was measured with a Dutch version of the Life events checklist-5 (LEC-5; Weathers et al., 2013; Boeschoten, Bakker, Jongedijk, & Olff, 2014a). Symptoms of PTSD were measured with a 20-item self-report questionnaire: the PTSD checklist-5 (PCL-5; Weathers et al., 2013; Boeschoten et al., 2014b). Both the Dutch versions of the LEC-5 and PCL-5 have not yet been tested for psychometric qualities.

To measure the extent to which respondents experience symptoms of depression, the Patient health questionnaire-9 was used (PHQ-9; Kroenke, Spitzer, & Williams, 2001; Huijbregts et al., 2013). The Dutch version the PHQ-9 showed a sensitivity of 0.49 and specificity of 0.95 at the cut-off score of 10 points (Zuithoff et al., 2010). To assess anxiety, the Dutch version of the Generalized anxiety disorder-7 was used (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006; Donker, Van Straten, Marks, & Cuijpers, 2011). In a Dutch validation study, the cut-off point of 10 points on the GAD-7 suggested a sensitivity of 87% and a specificity of 50% (Donker et al., 2011).

**Statistical analyses**

For the primary analysis Mplus 7.11 (Muthen & Muthen, 2012) was used. Using a polychoric covariance matrix, robust weighted least squares estimation with mean-and-variance adjusted chi-square (WLSMV), and probit regression coefficients, models were estimated (Flora & Curran, 2004). Fit of the model was assessed using the guidelines of Hu and Bentler (1999). An excellent fit was met when the comparative fit index (CFI) and Tucker Lewis index (TLI) ≥0.95, and when a root mean square error of approximation (RMSEA) value ≤0.06. An adequate fit was met when the CFI and TLI ≥0.90, and when a RMSEA value ≤0.10. Because information about model comparisons for categorical variables cannot be obtained with WLSMV, this was administered using the Bayesian Information Criterion (BIC). When the model with the smallest BIC value has a BIC value at least 10 points less than the other model, this means that there is very strong support that the model with the lower BIC value fits best (Kass & Raftery, 1995).

Several confirmatory factor analyses (CFAs) were performed, starting with evaluating the fit of the factor structure of the seven-factor hybrid model and the four-factor DSM-5 model. A second CFA was conducted to make sure MDD has a two-factor structure (somatic and affective) versus a one-factor structure. Another CFA judged the fit of the one-factor model of GAD. With a Wald chi-square test it is possible to test the latent level of a relationship. A significant result would suggest that the relationship differs, while a non-significant result would suggest that the relation between the two latent variables is equivalent. To analyze the latent-level relation between the two MDD factors and the seven PTSD factors, and between the one GAD factor and the seven PTSD factors, a Wald chi-square test was used. A corrected alpha of 0.005 was used to protect against Type 1 errors.

**RESULTS**

To check if the seven-factor hybrid model of PTSD fits the data best (hypothesis 1), we examined the fit of the hybrid model and the DSM-5 model by conducting CFAs. As Table 2 shows, both models provided excellent fit. As expected, the hybrid model appeared to be superior to the DSM-5 model. Hereby, our first hypothesis was confirmed. This indicates that PTSD would better be explained by seven rather than four factors. These results are similar to findings reported in earlier studies (Armour et al., 2015; Seligowski & Orcutt, 2016).

For our main analyses, we explored the comorbidity between PTSD and depression in terms of latent-level relations between the seven factors of the hybrid model of PTSD and affective and somatic depression. First, we tested if PTSD’s negative affect and anhedonia were equivalent in relation to affective depression (hypothesis 2). As can be seen in Table 3, affective depression had the strongest correlation with negative affect and anhedonia. To compare the latent-level relationships of the seven factors with affective depression, we used a Wald chi-square test. In relation to affective depression, all factors differed from negative affect as well as anhedonia. The only exceptions were negative
DISCUSSION AND CONCLUSION

Our main finding is that PTSD’s negative affect and anhedonia were equivalent in relation to affective depression. Moreover, they both had the strongest correlation with affective depression. Therefore, negative affect and anhedonia might account for the comorbidity between PTSD and affective depression. These findings are consistent with a study in which the NACM factor of the DSM-5 model (consisting of negative affect and anhedonia) had the strongest correlation with affective depression (Price & Van Stolk-Cooke, 2015). Another study in which the hybrid model was used in relation to general depression found that negative affect and anhedonia equivalently related to depression as well (Liu et al., 2016). However, they also found that negative affect and anhedonia did not relate most strongly to depression; dysphoric arousal did. Our results, taken together with the findings of previous research, give rise to the question if the separation between negative affect and anhedonia is necessary in symptom outcomes in relation to MDD. Therefore, it is important to examine these relations in a clinical sample.

We found that dysphoric arousal was most strongly related to somatic depression. However, this relationship did not significantly differ from other factors of PTSD. Therefore, our third hypothesis could not be confirmed. Neither did this study support the hypothesis that dysphoric arousal was most strongly related to GAD. Therefore, the relation between PTSD and somatic depression, and PTSD and GAD could not be explained by this research. However, this study might encourage researchers to look into these relationships in a clinical sample, in which these samples might be better observable.

Lastly, we found that the hybrid model of PTSD appeared to be superior to the DSM-5 model of PTSD. This suggests that PTSD can be explained better by seven rather than four factors. This finding is in line with other research (e.g., Armour et al., 2015).

Concerning limitations, our sample only contained participants that were not clinically diagnosed. Therefore, this study was based on PTSD symptoms rather than the actual PTSD diagnosis. Still, all participants did experience at least one trauma in their life and we assume that these findings will be reproducible in a clinical sample as well. Additionally, the high amount of female respondents could have influenced the results.

Before these results could be implicated in the mental healthy industry, they should be replicated in clinical samples. If the results could be reproduced in such a clinical sample, this could lead to more efficient treatment. It could help clinicians to identify comorbidity faster if we gain more knowledge about the latent-level relationship between PTSD and depression. For example, scoring high on affective depression could indicate comorbid PTSD with more symptoms in the factors negative affect and anhedonia, and vice versa. Therefore, the diagnostic procedure could become more efficient and treatment could focus on the needs of the individual, which is the ultimate goal of the mental health industry.

ROLE OF THE STUDENT

Fleur Helmink was an undergraduate student at Leiden University working under the supervision of Joanne Mouthaan when the research in this report was performed. The broader topic of PTSD was proposed by the supervisor. The more specific focus on the hybrid model of PTSD in
relation to MDD and GAD was suggested by the student. Data collection, data analysis, and the writing were done by the student. This project was completed on January 3rd, 2017.

REFERENCES


