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The Relationship Between a Hierarchical Transdiagnostic Model of Vulnerability Factors and Posttraumatic Stress Disorder Symptom Clusters

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Abstract
The latent structure of Post-Traumatic Stress Disorder (PTSD) symptomology is the subject of ongoing deliberation. The cognitive vulnerabilities of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty have been shown to explain symptoms clusters in multiple anxiety and mood disorders, and may be able to offer further insight to explain PTSD symptomology. Using structural equation modelling, this study examines whether a hierarchical model consisting of the general cognitive factor of Negative Affect and the transdiagnostic risk factors of Anxiety Sensitivity and Intolerance of Uncertainty can explain variability among PTSD symptom clusters as defined by the DSM-5 and/or Dysphoria models of PTSD. Anxiety Sensitivity and Intolerance of Uncertainty were tested as mid-level factors between Negative Affect and the PTSD symptom constructs. The hierarchical model fit the data well in both the DSM-5 and Dysphoria models. Negative Affect consistently showed significant direct effects on each symptoms cluster in both models. Anxiety Sensitivity served as a significant mediator of Negative Affect for several symptom clusters in both models. Intolerance of Uncertainty was non-significant either as a direct effect or as a mediator of Negative Affect in all analyses. This study demonstrates how the hierarchical model of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty may fit upon multiple PTSD symptom constructs and offers new directions for conceptualizing this disorder.

Keywords Trauma · PTSD · Transdiagnostic · Negative Affect · Anxiety Sensitivity · Intolerance of Uncertainty

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Posttraumatic Stress Disorder (PTSD) is associated with increases in serious psychological, physical and disability outcomes (Sareen et al., 2007). However, our understanding of PTSD nosology within an adult population is still an ongoing debate within the mental health literature.

In particular, the high levels of comorbidity of PTSD with anxiety and depressive disorders, as well as the wide range of symptoms potentially present in PTSD present significant challenges to the construct of the disorder (Barnes et al., 2018; van Minnen et al., 2015). For example, intrusive thoughts occur in a range of Anxiety and Obsessive–Compulsive disorders whilst depressive symptoms are common to all the Depressive disorders (Lockwood & Forbes, 2014) and Bipolar Disorder (Carmassi et al., 2020). These issues of comorbidity and symptom overlap are, of course, not unique to PTSD. Individuals experiencing an anxiety disorder are far more likely to also experience a comorbid second anxiety or depressive disorder then to have that disorder in isolation (Ellard et al., 2010), differentiating anxiety and mood disorders into principal and comorbid diagnoses appears to have little validity (Norton & Chase, 2015), and within an individual, stability of any anxiety or depressive diagnoses over time is poor (Spinhoven et al., 2016). These issues have led a number of researchers to instead take a transdiagnostic approach to mental health, placing greater emphasis on the similarities between disorders, as

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opposed to their differences (Barlow et al., 2004; Norton & Paulus, 2017).

Transdiagnostic approaches hold the different anxiety, as well as depressive, disorders reflect morphological differences in terms of eliciting stimuli and coping responses, as opposed to any ontological differences (Norton & Paulus, 2017). Although multiple transdiagnostic factors have been proposed, one of the most prominent models is that of Norton and colleagues, who focus upon the three transdiagnostic factors of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty within a hierarchical model. The transdiagnostic factor of Negative Affect is characterized as a higher-order dispositional trait which predisposes an individual to experience emotions such as anxiety, fear and sadness (Watson et al., 1988a). Elevated levels of Negative Affect have been linked to heightened risk of PTSD acquisition and increased symptom severity (Brown et al., 2018). Although Negative Affect has previously been demonstrated to underlie various emotional disorders and serve as a common etiological factor, it appears to not sufficiently account for the morphological heterogeneity among various emotional disorders (Clark et al., 1994; Taylor, 1998). Therefore, in order to explain the mechanisms of how Negative Affect may impact upon mental health symptoms, and to offer potential targets to tailor any clinical intervention, two additional transdiagnostic factors, Anxiety Sensitivity and Intolerance of Uncertainty, were further integrated into the model (Sexton et al., 2003).

Developed predominately from research into agoraphobia and panic disorder (McNally, 1999), Anxiety Sensitivity is conceptualized as a trait-like cognitive vulnerability which causes the individual to fear anxiety-related symptoms, as he or she believes these symptoms will have negative cognitive, physical and social outcomes (McNally, 1999). Elevated Anxiety Sensitivity has been linked to increased risk for PTSD symptoms (Cobb et al., 2017) as well as long-term PTSD symptom severity (Marshall et al., 2010). The concept of Intolerance of Uncertainty developed from research into Generalized Anxiety Disorder treatment, and can be defined as a dispositional cognitive trait reflective of an negative attitude towards, and a fear of, uncertainty and its implications (Dugas & Robichaud, 2012). In relationship to PTSD, Intolerance of Uncertainty positively affects the symptom cluster of Hyperarousal, as well as moderates the relationship between worry and Hyperarousal in university undergraduates exposed to a DSM-IV traumatic event (Bardeen et al., 2013). Further, higher levels of Intolerance of Uncertainty pre-trauma have been shown to predict increased PTSD symptoms of Hyperarousal and Intrusion, with Intolerance of Uncertainty having greater predictive power then pre-trauma Anxiety Sensitivity (Oglesby et al., 2016).

Norton and colleagues have shown these three transdiagnostic factors relate to one another in an hierarchical fashion, with Negative Affect (seen as a deeper personality trait, conceptually similar to Neuroticism; Watson et al., 1988a) as the higher order factor and Anxiety Sensitivity and Intolerance of Uncertainty (seen as more specific, trait-like cognitive vulnerabilities) as secondary factors. The hierarchical transdiagnostic model has been shown to both identify commonalities among multiple anxiety and depressive diagnoses, and account for heterogeneity in specific symptoms presentations, in both non-clinical and clinical samples of adults (Norton & Mehta, 2007; Norton et al., 2005; Paulus et al., 2015). Specifically, Negative Affect accounts for a significant amount of variance in all of the disorders. At the same time, Anxiety Sensitivity, but not Intolerance of Uncertainty, accounts for unique aspects of Panic Disorder, while the opposite pattern (Intolerance of Uncertainty but not Anxiety Sensitivity) is seen in Generalised Anxiety Disorder. Notably, none of these studies integrated PTSD symptomology into the model, however Paulus et al. (2015) did predict PTSD to load more strongly onto Anxiety Sensitivity than Intolerance of Uncertainty.

Thus, it remains unclear whether the hierarchal model of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty can apply to the symptomology of PTSD. Two studies have addressed this issue in a preliminary fashion previously, with both reporting Intolerance of Uncertainty showed a significant association with the DSM-5 PTSD symptom clusters (Oglesby et al., 2017; Raines et al., 2019). However Oglesby et al. (2017) had high collinearity between the Intolerance of Uncertainty and PTSD subfactors, raising questions as to whether Intolerance of Uncertainty was a truly unique explanatory factor, whilst Raines et al. (2019) only measured Anxiety Sensitivity and Intolerance of Uncertainty, and not Negative Affect. Further, these studies utilized a simplified regression model, which does not allow investigators to specify theoretically driven relationships among the explanatory factors (Gefen et al., 2000).

The two most prominent models proposed to organize PTSD symptoms are the four-factor Emotional Numbing Model (King et al., 1998) and the four-factor Dysphoria model (Liu et al., 2014; Simms et al., 2002), with the difference between these models being largely related to how they conceptualize the emotional dysfunction symptoms of PTSD. Although multiple other PTSD factor models have been proposed, the DSM-5 Emotional Numbing model and the Dysphoria model have the most research and strongest support (Armour, 2015), and will therefore be the only models investigated by this study.

This study aimed to build upon both the hierarchal model proposed by Norton and Mehta (2007) and Paulus et al. (2015) and the initial work in PTSD from Oglesby and colleagues. As the higher-order factors within the hierarchical transdiagnostic model are agnostic to any

specific symptom-cluster models, we do not hypothesize any differences emerging between the two PTSD factor models examined. Thus, rather than arguing in favor of one model over the other, or trying to propose a new way to cluster PTSD symptoms, we believe the hierarchical model may be able to instead highlight similarities between the different PTSD symptom-cluster models. We utilized structural equation modelling to examine the ability of the hierarchical model to explain the symptom structure of PTSD, testing both the DSM-5 and the Dysphoria Models. This study had two hypotheses: 1) the hierarchal model factors of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty will each show direct effects upon the Dysphoria and DSM-5 PTSD symptom constructs; and 2) the hierarchal model factors of Anxiety Sensitivity and Intolerance of Uncertainty will partially mediate the effects of Negative Affect upon the Dysphoria and DSM-5 PTSD symptom constructs.

Method

Participants

Participants were 285 individuals from the United States and Australia (average age 35.43; 181 male, 102 female, 1 intersex, 1 declined to answer) recruited through Mechanical Turk, an online recruitment method which has received support as an inexpensive way to obtain high-quality data. Participant samples recruited through this method are often more demographically diverse in attributes such as age, race and education, and are therefore more representative of the general population then typical undergraduate samples (Buhrmester et al., 2011). We specifically aimed to recruit a broad sample of trauma-exposed general community participants for this study, as this is the first to examine the role of the hierarchical model specifically in PTSD symptomatology. This approach is consistent with studies examining other sets of symptoms (e.g., anxiety symptoms), and in those studies the hierarchical model has been shown to hold in both general (Norton & Mehta, 2007; Sexton et al., 2003) and clinical (Norton et al., 2005; Paulus et al., 2015) populations. In addition, PTSD clinical groups are considered a vulnerable population, underscoring the importance of initially testing this model in a general population before approaching any more specific populations. The only inclusion criteria were the participant being over the age of 18 and self-reporting a prior exposure to a traumatic event as defined by DSM-5 criterion A (American Psychiatric Association, 2013).

Measures

The Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013) This is a self-report measure designed to screen for potentially traumatic events within the respondent's lifetime. Participants are assessed across 16 different events which have been shown to potentially result in PTSD, as well as the option of adding an unlisted event. Participants indicate which event(s) they have encountered and how they encountered it (e.g. 'happened to me'). Participants had to indicate exposure (happened to them/ they witnessed it/ they learned about it happening to a close other/ part of their job) to one or more of the 16 specific events in order meet DSM-5 Criterion A and be eligible for the study.

Positive and Negative Affect Scale (PANAS; Watson et al., 1988b) This 20-item test measures both positive and negative affect. Items are scored along a 5-point Likert scale ranging from 0 (very slightly or not at all) to 4 (extremely) on how often they felt a certain way over the past few weeks; sample items include 'ashamed' and 'daring'. Higher scores indicate higher levels of each subscale's construct. High internal consistency has been reported previously for both the positive ($\alpha = 0.86$-0.90) and negative affect ($\alpha = 0.84$-0.87) sub-scales. Here, the negative affect subscale was used to measure Negative Affect, and those 10 items showed high internal consistency ($\alpha = 0.93$).

The Anxiety Sensitivity Index—Version 3 (ASI-3; Taylor et al., 2007) This 18-item test measures the 3 factors of Anxiety Sensitivity; cognitive, somatic and public concerns. Items are rated a 5-point Likert scale from 0 (very little) to 4 (very much); sample item 'it is important to me not to appear nervous'. A score for each domain is calculated (range 0–24) and summed to generate a total standardized score (range 0–72) with higher scores indicating higher levels of Anxiety Sensitivity. This measure has been shown to have good construct validity and internal consistency amongst the subscales ($\alpha = 0.73$-0.91). There were three subscales utilized as indicators of the Anxiety Sensitivity construct: cognitive concerns ($\alpha = 0.93$), somatic concerns ($\alpha = 0.91$) and public concerns ($\alpha = 0.82$).

Intolerance of Uncertainty Scale 12-Item (IUS-12; Carleton et al., 2007) This 12-item test measures the 2 factors of Intolerance of Uncertainty, prospective and inhibitory anxiety. Items are scored upon a Likert scale ranging from 0 (not at all characteristic of me) to 4 (entirely characteristic of me); sample item 'Unforeseen events upset me greatly'. A

scale score for each domain is calculated (range 0–30) and summed to generate a total score (range 0–60) with higher scores indicating higher levels of Intolerance of Uncertainty. High internal consistency is shown by this scale (α = 0.90) as well as comparing to the original 27-item scale (r = 0.96). The two subscales utilized as indicators of the Intolerance of Uncertainty construct within this study: prospective anxiety (α = 0.84) and inhibitory anxiety (α = 0.89), both showed good internal consistency.

Post Traumatic Checklist for DSM-5 (PCL-5; Blevins et al., 2015) This is a self-report 20-item measure of PTSD symptoms, covering all the symptoms for the DSM-5's conceptualization of the disorder. Clients are asked how often they were bothered by various trauma symptoms within the past month along a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely); sample item 'Being "superalert" or watchful or on guard?' with higher scores indicative of higher trauma symptoms. The PCL-5 has exhibited excellent internal consistency (α = 0.94) and convergent (*r*s = 0.74-0.85) validity, as well as good test–retest reliability (r = 0.82). Within this study, the DSM-5 conceptualization of the PTSD factor structure: Intrusion (α = 0.93), Avoidance (α = 0.84), Negative Alterations in Cognition and Mood (α = 0.93), and Alterations in Arousal and Reactivity (α = 0.91) showed high reliability. Likewise the four-factor Dysphoria Model proposed by Liu et al. (2014) of Intrusion (α = 0.93), Avoidance (α = 0.84), Dysphoria (α = 0.95) and Hyperarousal (α = 0.84) also showed acceptable internal reliability. Although not a diagnostic scale per-se, a score of 33 or higher on the PCL-5 can be used to make a provisional PTSD diagnosis (Weathers et al., 2013), with 168 participants (58.95%) in the current sample meeting this criterion.

Procedures

Individuals were recruited via Mechanical Turk with, upon completion of the survey, payment of $5.00 USD provided as an incentive. Participants were then provided with a web-link and invited to participate in an online Qualtrics-based survey at their own convenience. The survey was introduced as research on the effects state-based traits could have upon traumatic symptoms. Participants were then immediately asked as to whether or not they had been exposed to a traumatic event as per DSM-5 criterion A via the LEC-5, with only those admitting to this prior exposure being allowed to proceed.

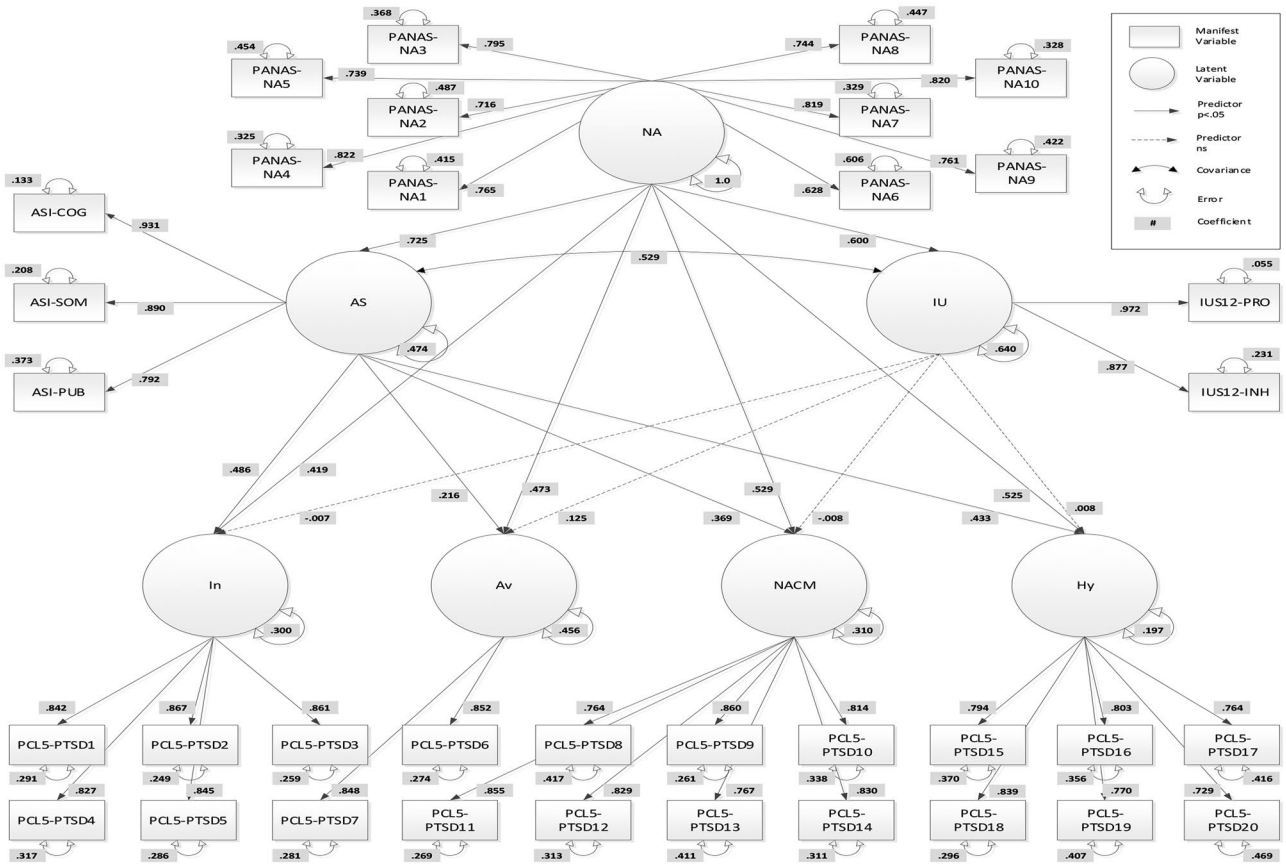

Fig. 1 DSM-5 Model with standardized path coefficients

Data Analyses

All assumptions for structural equation modelling were initially tested utilizing Statistical Package for the Social Sciences (SPSS) version 23. The utilization of electronic data collection and required responses meant there were no data missing from the dataset. Structural equation modelling model fit was then tested with M*Plus* (Muthen & Muthen, 2012). The model, based upon Norton and Mehta (2007) and Paulus et al. (2015) was hierarchical, including Negative Affect as a higher order factor and Anxiety Sensitivity and Intolerance of Uncertainty as mid-level factors (see Figs. 1 and 2). The causal effects of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty were estimated for the latent constructs of PTSD symptom clusters (Evermann & Tate, 2016). This was done utilizing both the DSM-5 conceptualization of PTSD with the four factors of Intrusion, Avoidance, Negative Alterations in Cognition and Mood, and Alterations in Arousal and Reactivity (American Psychiatric Association, 2013), as well as the four-factor Dysphoria model proposed by Liu et al. (2014) of Intrusion, Avoidance, Dysphoria and Hyperarousal. The dependent latent variables of the PTSD symptom constructs were allowed to correlate. Standardized root mean square residual (SRMR) values < 0.08 have been previously proposed as measures of good fit (Hu & Bentler, 1999). Ideally, root mean square error of approximation (RMSEA) should be between 0.02 and 0.07 (Browne & Cudeck, 1992). The accepted rule-of-thumb for comparative fit index (CFI) should be > 0.90 (Marsh & Hau, 1996).

For exploratory purposes, the fit of the DSM-5 and Dysphoria models were also compared to one another. Which measure is most useful to determine model fit is an ongoing debate between proponents of Akaike's Information Criterion (AIC; Burnham & Anderson, 2004) and the Bayesian Information Criterion (BIC; Kass & Raftery, 1995). Therefore this study will utilize both information criterions.

Results

Descriptive statistics for each of the observed indicators are provided in Table 1.

Hierarchical Model – DSM-5 and Dysphoria

As expected, the hierarchical model for the DSM-5 and Dysphoria symptom structures fit the data adequately. SRMR for both the DSM-5 and Dysphoria models was 0.04, suggesting

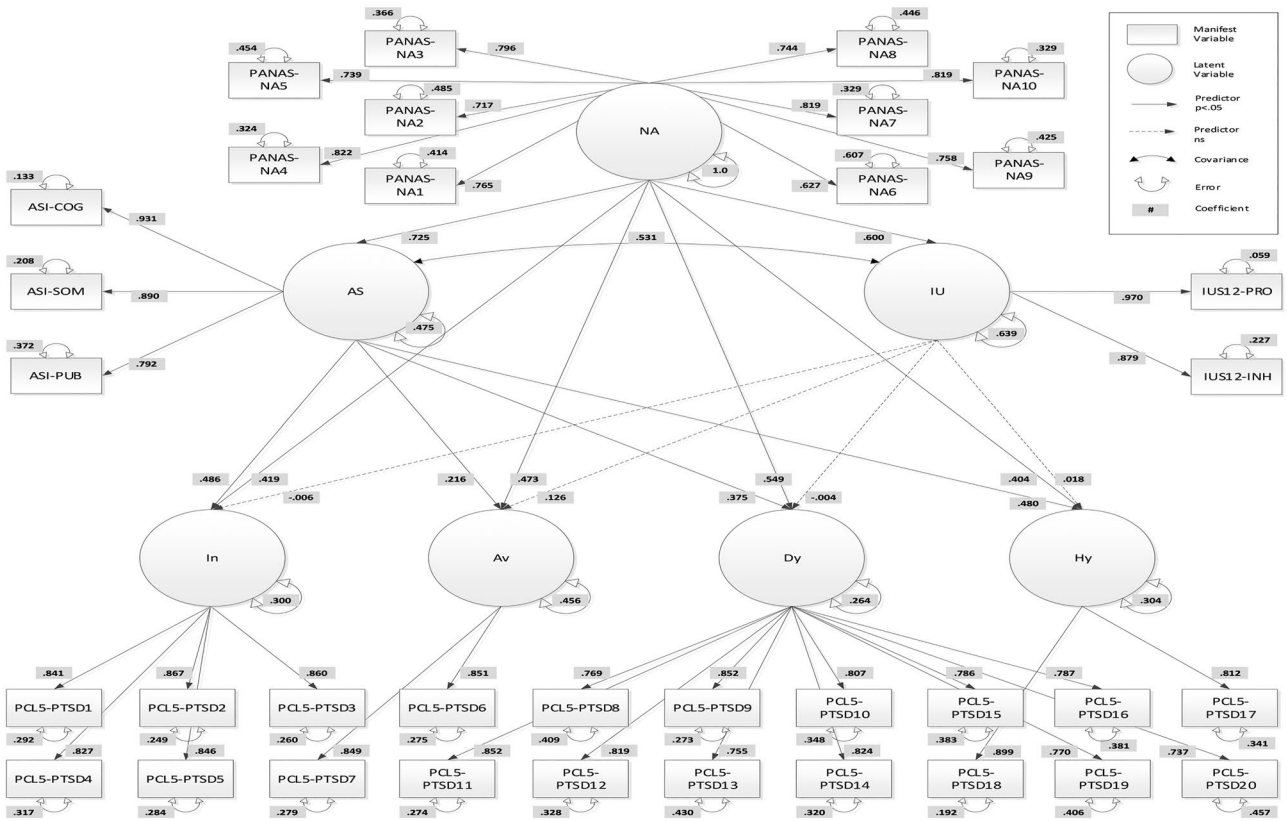

Fig. 2 Dysphoria Model with standardized path coefficients

Table 1 Univariate Summaries of Observed Indicators

Measure	*M*	SD	Range
PANAS-NA	16.712	10.769	0—40
ASI-Cog	11.077	7.206	0—24
ASI-Som	11.305	6.824	0—24
ASI-Pub	13.333	5.641	0—24
IUS12-Pro	16.305	6.182	0—28
IUS12-Inh	11.758	4.487	0—20
DSM-5—In	9.165	6.088	0—19
DSM-5—Av	4.228	2.449	0—8
DSM-5—NACM	13.586	8.269	0—28
DSM-5—Hy	11.246	6.970	0—24
Dysphoria—In	9.165	6.088	0—19
Dysphoria—Av	4.228	2.449	0—8
Dysphoria—Dy	21.084	12.595	0—43
Dysphoria—Hy	3.747	2.638	0—8
PCL-5—Total	38.225	22.477	0—76

PANAS-NA Positive and Negative Affect Scale Negative Affect, *ASI* Anxiety Sensitivity Index, *Cog* Cognitive, *Som* Somatic, *Pub* Public, *IUS12* Intolerance of Uncertainty Scale 12-item, *Pro* Prospective, *Inh* Inhibitory, *DSM-5* the four-factor DSM-5 model, *Dysphoria* the DSM-5 four-factor Dysphoria model, *In* Intrusion, *Av* Avoidance, *NACM* Negative Alterations in Cognitions and Mood, *Hy* Hyperarousal, *Dy* Dysphoria, *PCL-5* Post Traumatic Checklist for the DSM-5

the sample covariances were well reproduced by both models. RMSEA was 0.069 and CFI was 0.92 in both the DSM-5 model and the Dysphoria model, suggesting adequate fit for both models.

As shown in Figs. 1 and 2, each observed indicator was highly associated with the respective latent variable, providing support for the DSM-5 and Dysphoria hierarchal constructs. The proportion of variance explained was greater than 0.3 for all the observed variables in the both the DSM-5 and Dysphoria models. Although not shown, the latent variables of the PTSD symptom clusters were significantly related to one another in both the DSM-5 ($rs = 0.69$-0.88, $p < 0.001$) and Dysphoria ($rs = 0.44$-0.82, $p < 0.001$) models. Accounting for the influence of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty were significantly related to each other in both the DSM-5 ($r = 0.51$, $p < 0.001$) and Dysphoria ($r = 0.51$, $p < 0.001$) models.

Consistent with Norton and Mehta (2007) and Paulus et al. (2015), Negative Affect showed strong associations with both Anxiety Sensitivity and Intolerance of Uncertainty in both the DSM-5 and Dysphoria models (Table 2). Negative Affect also showed direct associations with all latent symptom constructs of both the DSM-5 model the Dysphoria model. Accounting for Negative Affect, Anxiety Sensitivity had a significant direct effect on all the PTSD latent symptom constructs in both the DSM-5 and Dysphoria models, however Intolerance of Uncertainty had no significant effects on any latent symptom construct. Percentage of variance explained (R^2) for the latent constructs ranged from 0.37 to 0.81 in the DSM-5 model and from 0.37 to 0.75 in the Dysphoria model with all $ps < 0.001$.

Direct and Indirect Effects of the Hierarchical DSM-5 and Dysphoria Models

Table 3 and Table 4 show the results for the mediation analyses of Anxiety Sensitivity and Intolerance of Uncertainty for the DSM-5 and Dysphoria models giving partial support for the first two hypotheses. In

Table 2 Standardized Regression Coefficients for the DSM-5 and Dysphoria Models

DSM-5 Model				Dysphoria Model		
Variable	AS	IU	NA	AS	IU	NA
Intrusion	0.493***	0.002	0.404***	0.493***	0.003	0.403***
Avoidance	0.227*	0.141	0.458***	0.227*	0.141	0.458***
DSM-5 – Negative Alterations in Cognitions and Mood	0.381***	0.000	0.517***			
Dysphoria—Dysphoria				0.384***	0.002	0.540***
DSM-5—Hyperarousal	0.438***	0.013	0.521***			
Dysphoria—Hyperarousal				0.489***	0.024	0.404***
Anxiety Sensitivity		0.508***	0.732***		0.510***	0.732***
Intolerance of Uncertainty	0.508***		0.608***	0.510***		0.608***

AS Anxiety Sensitivity, *IU* Intolerance of Uncertainty, *NA* Negative Affect

[a]*The StdYX standardization is reported here. StdYX uses the variances of the continuous latent variables, as well as the variances of the background and outcome variables for standardization*

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 3 Direct, Indirect and Total Effects of Negative Affect for the DSM-5 Model

Outcome	Effect	NA	
		Unstandardized	Standardized[a]
Intrusion	Indirect via AS	0.393***	0.361***
	Indirect via IU	0.002	0.001
	Direct	0.439***	0.404***
	Total	0.833***	0.766***
Avoidance	Indirect via AS	0.189*	0.166*
	Indirect via IU	0.097	0.086
	Direct	0.520***	0.458***
	Total	0.806***	0.710***
Negative Alterations	Indirect via AS	0.313***	0.279***
In Cognitions and Mood	Indirect via IU	0.000	0.000
	Direct	0.581***	0.517***
	Total	0.894***	0.796***
Hyperarousal	Indirect via AS	0.354***	0.321***
	Indirect via IU	0.009	0.008
	Direct	0.575***	0.521***
	Total	0.938***	0.849***

AS Anxiety Sensitivity, *IU* Intolerance of Uncertainty, *NA* Negative Affect

[a]*The StdYX standardization is reported here. StdYX uses the variances of the continuous latent variables, as well as the variances of the background and outcome variables for standardization*

$^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$

Table 4 Direct, Indirect and Total Effects of Negative Affect for the Dysphoria Model

Outcome	Effect	NA	
		Unstandardized	Standardized[a]
Intrusion	Indirect via AS	0.392***	0.361***
	Indirect via IU	0.002	0.002
	Direct	0.438***	0.403***
	Total	0.831***	0.766***
Avoidance	Indirect via AS	0.188*	0.166*
	Indirect via IU	0.097	0.086
	Direct	0.519***	0.458***
	Total	0.804***	0.710***
	Direct	0.519***	0.458***
Dysphoria	Indirect via AS	0.317***	0.281***
	Indirect via IU	0.002	0.002
	Direct	0.609***	0.540***
	Total	0.928***	0.822***
Hyperarousal	Indirect via AS	0.416***	0.358***
	Indirect via IU	0.017	0.015
	Direct	0.470***	0.404***
	Total	0.904***	0.777***

AS Anxiety Sensitivity, *IU* Intolerance of Uncertainty, *NA* Negative Affect

[a]*The StdYX standardization is reported here. StdYX uses the variances of the continuous latent variables, as well as the variances of the background and outcome variables for standardization*

$^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$

both the DSM-5 and the Dysphoria models, Negative Affect accounted for 36.9% of the variance in Intolerance of Uncertainty and 53.6% of the variance in Anxiety Sensitivity.

Hierarchical DSM-5 Model

DSM-5—Intrusion The model explained 58.7% of the variability in Intrusion. Negative Affect had a moderate direct effect on Intrusion (β = 0.40), which accounted for 16.3% of the variance. Anxiety Sensitivity had a smaller direct effect on Intrusion (β = 0.13), contributing 1.7% of the variance. Its role as a mediator was much more substantial however, contributing an additional 13.0% via mediation of Negative Affect (β = 0.36). Intolerance of Uncertainty was nonsignificant both as a direct effect (β = 0.001) and via mediation of Negative Affect (β = 0.001), with both effects contributing only 0.0001% of the variance each.

DSM-5—Avoidance The model explained 50.4% of the variability in Avoidance. Negative Affect had a direct effect on Avoidance (β = 0.46) contributing 20.9% of the variance. Anxiety Sensitivity had a non-significant direct effect (β = 0.06) where it contributed 0.4% of the variance, but it did have a small yet significant role where it contributed an additional 2.8% via mediation of Negative Affect (β = 0.17). Again, Intolerance of Uncertainty was nonsignificant both as a direct effect (β = 0.06) and via mediation of Negative Affect (β = 0.09), contributing 0.3% and 0.7% of the variance respectively.

DSM-5—Negative Alterations in Cognitions and Mood The model explained 63.4% of the variance in this construct. Negative Affect had a significant direct effect (β = 0.52) contributing 26.7% of the variance. Anxiety Sensitivity had a non-significant direct effect (β = 0.10), contributing 1.0% of the variance, however via mediation of Negative Affect (β = 0.28), it contributed a significant 7.8% of the variance. Intolerance of Uncertainty remained nonsignificant both as a direct effect (β = 0.00) and via mediation of Negative Affect (β = 0.00), contributing 0.0% of the variance.

DSM-5—Hyperarousal The model explained 72.1% of the variance in Hyperarousal. Negative Affect had a direct effect on Hyperarousal (β = 0.52), contributing 27.1% of the variance. Anxiety Sensitivity had small but significant direct

effect (β = 0.12), contributing 1.4% of the variance, however via mediation of Negative Affect (β = 0.32) it contributed a larger 10.3% of the variance. Intolerance of Uncertainty remained non-significant as a direct effect (β = 0.005) contributing 0.0003% of the variance, and via mediation of Negative Affect (β = 0.008) where it contributed an additional 0.006% of the variance.

Hierarchical Dysphoria Model

Dysphoria—Intrusion The model contributed 58.7% of the variance in Intrusion. Negative Affect had a large direct effect (β = 0.40) which accounted for 16.2% of the variance. Anxiety Sensitivity had a small direct effect on Intrusion (β = 0.13), contributing 1.7% of the variance. Its role as a mediator was much more substantial however, contributing an additional 13.0% via mediation of Negative Affect (β = 0.36). Intolerance of Uncertainty was nonsignificant both as a direct effect (β = 0.001) and via mediation of Negative Affect (β = 0.002), contributing 0.0001% and 0.0004% of the variance respectively.

Dysphoria—Avoidance The model explained 50.4% of the variance in Avoidance. Negative Affect had an significant direct effect on Avoidance (β = 0.46), contributing 20.9% of the variance. Anxiety Sensitivity had a non-significant direct effect (β = 0.06) where it contributed 0.37% of the variance, but it did have a small yet significant mediator role where it contributed an additional 2.8% via mediation of Negative Affect (β = 0.17). Again, Intolerance of Uncertainty was nonsignificant both as a direct effect (β = 0.06) and via mediation of Negative Affect (β = 0.09), contributing 0.3% and 0.7% of the variance respectively.

Dysphoria—Dysphoria The model explained 67.6% of the variance in Dysphoria. Negative Affect had a significant direct effect on Dysphoria (β = 0.54) contributing 29.2% of the variance. Anxiety Sensitivity had a non-significant direct effect (β = 0.10), contributing 1.1% of the variance, however via mediation of Negative Affect (β = 0.28) it contributed a significant 7.9% of the variance. Intolerance of Uncertainty remained nonsignificant both as a direct effect (β = 0.00) and via mediation of Negative Affect (β = 0.002), contributing 0.0% and 0.0004% of the variance respectively.

Dysphoria—Hyperarousal The model explained 60.4% of the variance in Hyperarousal. Negative Affect had moderate direct effect (β = 0.40) which accounted for 16.3% of the variance. Anxiety Sensitivity had a small direct effect on Hyperarousal (β = 0.13), contributing 1.7% of the variance. As a mediator of Negative Affect (β = 0.36) however, it contributed an additional 12.8% of the variance. Intolerance of Uncertainty remained nonsignificant both as a direct effect (β = 0.01) and via mediation of Negative Affect (β = 0.02), contributing 0.008% and 0.04% of the variance respectively.

Goodness of Fit of the Hierarchical DSM-5 and Dysphoria Models

The difference between the AIC for the DSM-5 (30,709.786) and Dysphoria (30,708.543) hierarchical models was 1.24, in favor of the Dysphoria model. The difference between the BIC for the DSM-5 (31,169.999) and Dysphoria (31,168.757) models was also 1.24 in favor of the Dysphoria model. It has been previously proposed a difference score > 10 for either AIC (Burnham & Anderson, 2004) or BIC (Kass & Raftery, 1995) suggests the evidence favoring the stronger model is considered compelling. Thus, in both cases the two hierarchical models tested here appear to fit the observed PTSD symptoms equally well.

Discussion

This study aimed to investigate how the DSM-5 and Dysphoria PTSD symptom constructs fit into an existing transdiagnostic hierarchal model. The hierarchal model of Negative Affect, Anxiety Sensitivity and Intolerance of Uncertainty converged onto the DSM-5 and Dysphoria PTSD symptom constructs. Negative Affect showed large direct effects upon all the PTSD symptom constructs in both models. As Negative Affect increased, PTSD symptoms became more severe. For overall effects, Negative Affect was especially strongly related to Negative Alterations in Cognitions and Mood and Hyperarousal in the DSM-5 model and Dysphoria in the Dysphoria model. This appears to support previous research where Negative Affect was shown to load more strongly onto the latter DSM-5 PTSD symptoms which compose Negative Alterations in Cognitions and Mood, Dysphoria and Hyperarousal, with somewhat weaker loadings onto the former symptoms which compose Intrusion and Avoidance (Byllesby et al., 2016). This in turn can be explained as the latter PTSD symptoms being more conceptually in line with common distress (which the construct of Negative Affect asserts as measuring) as opposed to a specific traumatic response per-se (Byllesby et al., 2016). The difference between the effects of Negative Affect upon Hyperarousal between the DSM-5 and Dysphoria models could be explained by the change in specific symptoms for these symptom constructs. For example, sleep disturbance has shown a strong association with Negative Affect in previous research (Leyro et al., 2014), however the PTSD symptom of 'sleep disturbance' was removed from the Dysphoria model's conceptualization of Hyperarousal. Therefore,

by removing symptoms such as sleep disturbance from the symptom construct of Hyperarousal, the strength of the relationship of Hyperarousal to Negative Affect could be expected to be weakened.

The effects of Negative Affect were consistently partially mediated by Anxiety Sensitivity, however this relationship never fully mediated the link between Negative Affect and the symptom constructs, nor did the partial mediation ever explain more variance in the symptoms constructs than the direct relationship between Negative Affect and the symptom constructs in either hierarchal model. These mediated effects were significant for all symptom constructs, however the direct effects of Anxiety Sensitivity were not significant for the Avoidance and Negative Alterations in Cognitions and Mood symptom constructs in the DSM-5 model, nor the Avoidance and Dysphoria symptom constructs in the Dysphoria model. The mediated effects are largely consistent with previous research (Cobb et al., 2017; Marshall et al., 2010) and the expected results suggested by Paulus et al. (2015). Conceptually, high Anxiety Sensitivity would be expected to lead to an individual fearing the cognitive, physical and social consequences of their traumatic symptoms. This fear may, in turn, inadvertently amplify these symptoms. The general lack of direct effects of Anxiety Sensitivity on PTSD symptoms clusters was unexpected. In Paulus et al. (2015), Anxiety Sensitivity showed strong direct effects upon Panic Disorder. As some symptoms in Panic Disorder are similar to some of the PTSD symptom constructs (e.g. the avoidance of environments which could cause panic attacks in Panic Disorder is quite similar to avoidance of trauma-related stimuli in PTSD), one might expect Anxiety Sensitivity would have had a stronger direct relationship with more of the PTSD symptom constructs. The different role of Anxiety Sensitivity could be explained by differences in the sample enrolled here (general community) vs in Paulus et al. (clinically diagnosed individuals). Replication of the current study in a clinical sample would help address this issue and further clarify the direct role of Anxiety Sensitivity in PTSD symptom clusters. Regardless, these results still argue for the importance of Anxiety Sensitivity as an explanatory variable, and its potential in helping to discriminate between the PTSD symptom constructs.

In contrast to Anxiety Sensitivity, the association between Intolerance of Uncertainty and the PTSD symptom constructs remained completely nonsignificant in both the DSM-5 and Dysphoria hierarchal models. This finding is inconsistent with the results of Oglesby et al. (2017), who found Intolerance of Uncertainty to be a significant explanatory factor over and above Anxiety Sensitivity and Negative Affect, and the findings by Raines et al. (2019) which showed Intolerance of Uncertainty was a stronger explanatory factor than Anxiety Sensitivity. As with Paulus et al. (2015), both Oglesby and Raines enrolled clinical samples, which might explain differences in in results between those studies and this one. Importantly though, this current study also employed a different analytical approach than the prior studies, by incorporating both all three vulnerability factors and the theoretically-driven conceptualization of the relationships among those factors.

This study found no significant differences between the hierarchical DSM-5 and Dysphoria models, instead showing these models both explained an equal amount of variance within the data. In her review of the PTSD construct, Armour (2015) noted the confusion surrounding the latent structure of PTSD and the need to resolve this so as to develop and target treatment approaches. The hierarchical model utilized within this current paper appears to have largely united two otherwise divergent understandings of PTSD symptoms. A suggestion for future researchers would therefore be to further investigate how additional etiological factors could underpin the symptom constructs of different PTSD models.

Of further theoretical interest, the strong role Anxiety Sensitivity plays within both hierarchical models links in to previous studies investigating the placement of PTSD within the DSM. The presence of heightened anxiety and fear responding to threat signaling cues is considered characteristic of anxiety disorders in general (Craske et al., 2011). Therefore, this study provides preliminary support to Zoellner et al. (2011), who argue PTSD should be seen as simply another variant of an anxiety disorder (as it did in previous DSM iterations), as opposed to being considered under its own category of disorder (as it now does in DSM-5). Further, the strong links between each of the hierarchical constructs of Negative Affect and Anxiety Sensitivity to each of the PTSD symptom clusters provides preliminary support to the arguments of Norton and Mehta (2007) and Paulus et al. (2015) highlighting the similarities among the anxiety and depressive disorders, including PTSD.

Finally, some potential clinical implications may be speculated. Although Prolonged Exposure and Cognitive Processing Therapy are consistently recognized as the gold-standard for the treatment of PTSD, given the high drop-out rates, there is an identified need to develop other treatment modalities (Sciarrino et al., 2020). Based upon the current data, it is speculated interventions focused upon reducing an individual's Negative Affect and Anxiety Sensitivity may benefit PTSD symptomology. The Transdiagnostic Group Cognitive Behavioral Therapy protocol is an established treatment protocol for the reduction of Negative Affect (Norton, 2012; Talkovsky & Norton, 2014) and has shown initial promise in the reduction of psychopathological symptoms in veterans experiencing PTSD (Espejo et al., 2016). For the treatment of Anxiety Sensitivity, the Cognitive Anxiety Sensitivity Treatment protocol has also shown initial promise, especially in the reduction of the cognitive concerns subfactor (Boffa & Schmidt, 2019; Schmidt et al., 2014). When

applied to individuals experiencing PTSD, this intervention has been shown to directly reduce PTSD symptoms, with this reduction in turn being mediated by declines in the cognitive concerns component of Anxiety Sensitivity (Mitchell et al., 2014). If the current study is replicated in clinical samples, future studies may wish to examine the efficacy of these two transdiagnostic interventions for PTSD symptoms, as they may prove useful adjuncts to current interventions.

Whilst both the hierarchal DSM-5 and Dysphoria models fit the data well, this study did have a number of limitations. This study assessed trauma symptoms within the general public and, although the proportion of participants scoring above the suggested clinical cut off for a provisional PTSD diagnosis (58.95%) was substantially larger than in prior studies (Kilpatrick et al., 2013), this study still did not specifically assess symptoms in individuals diagnosed with PTSD. To provide support to these findings, this research should be replicated in a clinical population previously diagnosed with PTSD. In regards to measurement, and contrary to Paulus et al. (2015), this study used only self-report measures of Negative Affect, Anxiety Sensitivity, and Intolerance of Uncertainty and PTSD symptoms. Future studies should determine if these findings can be replicated utilizing clinician rated scales.

This study has however shown how the transdiagnostic factors of Negative Affect, Anxiety Sensitivity, and Intolerance of Uncertainty may fit both the DSM-5 and Dysphoria PTSD symptom constructs. These results demonstrate a common underpinning across each of these symptom constructs, providing future targets for both researchers and clinicians. Finally, this study provides preliminary support to a quite different conceptualization of PTSD, one that emphasizes this disorder's similarities to other anxiety and depressive disorders, as opposed to strictly seeing PTSD as ontologically different in nature.

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Data Availability The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

Code Availability Not applicable.

Declarations

Ethics Approval This study was performed in line with the principles of the declaration of Helsinki, with Monash University Human Research Ethics Committee (MUHREC) approving all procedures for this study (Protocol 2018/17977).

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

Consent to Publication Not applicable.

Conflicts of Interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

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