

Assessing a dysphoric arousal model of acute stress disorder symptoms in a clinical sample of rape and bank robbery victims

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Background: Since the introduction of Acute Stress Disorder (ASD) into the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) research has focused on the ability of ASD to predict PTSD rather than focusing on addressing ASD's underlying latent structure. The few existing confirmatory factor analytic (CFA) studies of ASD have failed to reach a clear consensus regarding ASD's underlying dimensionality. Although, the discrepancy in the results may be due to varying ASD prevalence rates, it remains possible that the model capturing the latent structure of ASD has not yet been put forward. One such model may be a replication of a new five-factor model of PTSD, which separates the arousal symptom cluster into Dysphoric and Anxious Arousal. Given the pending DSM-5, uncovering ASD's latent structure is more pertinent than ever.

Objective: Using CFA, four different models of the latent structure of ASD were specified and tested: the proposed DSM-5 model, the DSM-IV model, a three factor model, and a five factor model separating the arousal symptom cluster.

Method: The analyses were based on a combined sample of rape and bank robbery victims, who all met the diagnostic criteria for ASD ($N=404$) using the Acute Stress Disorder Scale.

Results: The results showed that the five factor model provided the best fit to the data.

Conclusions: The results of the present study suggest that the dimensionality of ASD may be best characterized as a five factor structure which separates dysphoric and anxious arousal items into two separate factors, akin to recent research on PTSD's latent structure. Thus, the current study adds to the debate about how ASD should be conceptualized in the pending DSM-5.

Keywords: *Acute stress disorder; Acute Stress Disorder Scale; confirmatory factor analysis; bank robbery; rape; dysphoric arousal; anxious arousal; DSM-5*

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Acute Stress Disorder (ASD) was introduced as a formal diagnosis in 1994 with the publication of the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). The introduction of ASD into the DSM-IV was based on two main aims. The first aim was to describe acute stress reactions occurring within the first month after traumatic exposure. The

second aim was to provide a diagnosis which would distinguish victims at risk of developing posttraumatic stress disorder (PTSD) from victims experiencing more normative transient stress reactions. To date, ASD research has focused on the ability of ASD to predict PTSD. Notably, there is a paucity of research addressing ASD's underlying latent structure (cf. Bryant, 2011; Hansen, Lasgaard & Elklit, in press). This is despite the

fact that characterizing the dimensionality of ASD has important implications for understanding the heterogeneity in ASD symptom presentations. Understanding such may help to inform theoretical models of ASD in addition to informing approaches to assessment and treatment. The few existing confirmatory factor analytic (CFA) studies of ASD have failed to reach a clear consensus regarding ASD's underlying dimensionality. Given that the newest edition of the DSM; the DSM-5 is scheduled for publication in 2013, uncovering ASD's latent structure following all forms of traumatic exposure, may be more pertinent than ever.

This line of research mirrors that of factor analytic work in relation to the latent structure of PTSD. Recent factor analytic research on PTSD's latent structure has shown that a five-factor model containing Intrusion, Avoidance, Numbing, Dysphoric Arousal and Anxious Arousal clusters (see Table 1) provides a superior fit to the data across many different trauma populations (cf. Armour et al., 2012; Armour, O'Conner, Elklit & Elhai, in press; Elhai et al., 2011; Pietrzak, Tsai, Harpaz-Rotem,

Whealin & Southwick, 2012; Wang, Long, Li & Armour, 2011a; Wang et al., 2011b). The separation of the arousal cluster may also be pertinent in early responses to trauma thus be applicable to the latent structure of ASD.

ASD is characterized by eight diagnostic criteria in the DSM-IV. In order to meet the A criterion, the individual must show an intense emotional reaction to experiencing, witnessing, or being confronted with a traumatic event. Secondly, the individual must display at least three out of five dissociative symptoms to meet criterion B. Furthermore, in order for the individual to meet criterion C, D, and E the individual must endorse at least one re-experiencing symptom (criterion C), show symptoms of marked avoidance (criterion D), and arousal (criterion E). Finally, the individual must show symptoms of significant clinical distress or functional impairment (criterion F), and the symptoms must be present between two days and one month post trauma (criterion G). The prevalence of ASD across varying forms of traumatic exposures has been reported as ranging from 7–28% with

Table 1. Acute Stress Disorder Scale items distribution across alternative ASD models

ASDS items	Model 1 DSM-5 one-factor model	Model 2 DSM-IV four-factor model	Model 3 Three-factor model combining re-experiencing and Arousal	Model 4 Five-factor ASD dysphoric arousal model
ASDS1 (Numbness)	ASD	DIS	DIS	DIS
ASDS2 (Dazed)	ASD	DIS	DIS	DIS
ASDS3 (Derealization)	ASD	DIS	DIS	DIS
ASDS4 (Depersonalization)	ASD	DIS	DIS	DIS
ASDS5 (Amnesia)	ASD	DIS	DIS	DIS
ASDS6 (Intrusive memories)	ASD	RE-EX	RE-EX/AR	RE-EX
ASDS7 (Nightmares)	ASD	RE-EX	RE-EX/AR	RE-EX
ASDS8 (Flashbacks)	ASD	RE-EX	RE-EX/AR	RE-EX
ASDS9 (Distress on reminders)	ASD	RE-EX	RE-EX/AR	RE-EX
ASDS10 (Thought avoidance)	ASD	AV	AV	AV
ASDS11 (Conversation avoidance)	ASD	AV	AV	AV
ASDS12 (Reminders avoidance)	ASD	AV	AV	AV
ASDS13 (Emotional avoidance)	ASD	AV	AV	AV
ASDS14 (Difficulty sleeping)	ASD	AR	RE-EX/AV	DA
ASDS15 (Irritability)	ASD	AR	RE-EX/AR	DA
ASDS16 (Difficulty concentrating)	ASD	AR	RE-EX/AR	DA
ASDS17 (Hypervigilance)	ASD	AR	RE-EX/AR	AA
ASDS18 (Startle response)	ASD	AR	RE-EX/AR	AA
ASDS19 (Physiological reactivity)	ASD	AR	RE-EX/AR	RE-EX

ASD, Acute Stress Disorder; ASDS, Acute Stress Disorder Scale; DIS, Dissociation; RE-EX, Re-experiencing; AR, Arousal; AV, Avoidance; DA, Dysphoric arousal; AA, Anxious Arousal.

a mean prevalence of 13% (Bryant, Friedman, Spiegel, Ursano & Strain, 2011).

Albeit that ASD was introduced into the diagnostic nosology of the DSM almost two decades ago, research still has a tendency to focus on the predictive ability of ASD on PTSD rather than assessing ASD's latent structure. This is surprising given the immense focus placed on the latent structure of PTSD (cf. Yufik & Simms, 2011). Indeed, a recent review concluded that the majority of trauma victims who meet the diagnostic criteria for ASD go on to develop PTSD (i.e., high positive predictive power). Conversely, the review also concluded that many victims with PTSD did not initially have ASD (i.e., low sensitivity) (Bryant, 2011). However, the low sensitivity may be attributable to ASD's diagnostic criteria's emphasis on dissociation in the DSM-IV. Indeed, Bryant (2011) reported that a high percentage of victims with subclinical ASD (i.e., ASD without dissociation) developed PTSD. This has led to debates regarding the role of ASD in the pending DSM-5 (Bryant et al., 2011). The proposed DSM-5 ASD diagnosis requires at least eight symptoms being present from across the four DSM-IV symptom clusters without requiring the presence of specific clusters. As underlined by Hansen et al. (in press) it is notable that the addition of new symptoms has not been proposed for the DSM-5 as compared to the DSM-IV. Thus, by removing the symptom specific criteria the DSM-5 may be viewed as a one-factor model of the DSM-IV four symptom clusters.

There are currently seven factor analytic studies of ASD's latent structure; two studies implemented exploratory factor analysis (EFA) (Bryant, Moulds & Guthrie, 2000; Cardena, Koopman, Classen, Waelde & Spiegel, 2000) and five studies implemented confirmatory factor analysis (CFA) (Armour, Elklit & Shevlin, 2011; Brooks et al., 2008; Edmondson, Mills & Park, 2010; Hansen et al., in press; Wang, Li, Shi, Zhang & Shen, 2010). Bryant et al. (2000) conducted EFA on two different samples of trauma victims using the self-report questionnaire; the Acute Stress Disorder Scale (ASDS). Data from a sample of bushfire victims ($N=107$) yielded a four-factor solution somewhat consistent with the DSM-IV conceptualization of ASD, whereas data from a mixed sample of accident and assault victims ($N=99$) yielded a three-factor structure (dissociative symptoms, dissociative amnesia, and acute stress reactions). Cardena et al. (2000) conducted EFA on firestorm victims using the Stanford Acute Stress Reaction Questionnaire. Data yielded a three-factor structure (dissociation, re-experiencing, and anxiety/hyper-arousal). However, avoidance was excluded from the analysis.

The five CFA studies of the latent structure of ASD, all tested the four-factor DSM-IV structure of ASD in comparison to alternative models. Brooks et al. (2008)

investigated the latent structure of ASD in level one trauma patients ($N=587$, mainly transport accidents victims, $n=363$), two studies investigated the latent structure of ASD in disaster victims (hurricane victims, $N=132$, Edmondson et al., 2010; earthquake victims, $N=353$, Wang et al., 2010), and the remaining two studies investigated the ASD structure in assault victims (rape victims, $N=263$, Armour et al., 2011; bank robbery victims, $N=450$, Hansen et al., in press). The majority of studies employed the ASDS (Armour et al., 2011; Edmondson et al., 2010; Hansen et al., in press; Wang et al., 2010), whereas one study used the Acute Stress Disorder Interview (ASDI; Brooks et al., 2008). The results from three of the five CFA studies supported the four-factor DSM-IV conceptualization of ASD (Brooks et al., 2008; Hansen et al., in press; Wang et al., 2010), whereas two studies supported alternative models of ASD (Armour et al., 2011; Edmondson et al., 2010). Armour et al. (2011) found support for a three-factor model (dissociation, avoidance, and re-experiencing/arousal), whereas Edmondson et al. (2010) found support for a hierarchical two-factor model (a second-order distress factor [re-experiencing, arousal, and avoidance] and a dissociation factor). Only two studies investigated the proposed DSM-5 model of ASD and none of them supported this model (Armour et al., 2011; Hansen et al., in press).

The reason for the discrepancy in the results in the CFA studies may be attributed to variations in the index trauma or the use of different assessment tools. However, this seems unlikely since three studies following varying traumatic exposures supported the DSM-IV model, and four studies used the ASDS. Instead, it is notable that the studies which supported the DSM-IV model had low ASD prevalence rates (7.5–15.3%) (Brooks et al., 2008; Hansen et al., in press; Wang et al., 2010) compared to the much higher ASD prevalence rates (77–100%) in the two studies, which supported alternative models (Armour et al., 2011; Edmondson et al., 2010). ASD's latent structure may differ in a clinical ASD sample compared to a sample containing both ASD and non-ASD cases. Indeed, a recent study shows that the PTSD factor structure differs in veterans with and without a PTSD diagnosis (Biehn, Elhai, Fine, Seligman & Richardson, 2012). Although, the PTSD factor models for the two groups did not differ greatly, the results suggested that the available PTSD models showed better model-fit in the non-PTSD group suggesting that the available PTSD models do not apply well enough in a PTSD-diagnosed population. Indeed, this may also be the case with ASD. It is possible that using non-clinical samples may capture an underlying factor of individual responses to acute trauma rather than capturing underlying factors concerning diagnostic issues. Likewise, studies with clinical samples should be expected to capture the same

underlying factor. However, this has not been the case so far in the two CFA studies of ASD using clinical samples. However, the ASD prevalence rate was only 77% in Edmondson et al.'s (2010) study and as argued by Hansen et al. (in press) the models tested by Edmondson et al. (2010) may have been too complex relative to the sample size.

Despite the paucity of factor analytic research on ASD's latent structure, numerous CFA studies have tested the latent structure of PTSD. Previously, results generally supported one of two four-factor models of PTSD: the Dysphoria model (Simms, Watson & Doebbeling, 2002) or the Emotional Numbing model (Elhai & Palmieri, 2011; King, Leskin, King & Weathers, 1998; Yufik & Simms, 2010). However, based on an attempt to reconcile the differences between Dysphoria and Emotional Numbing models of PTSD, a five-factor model of PTSD containing a separation of the arousal symptom cluster (intrusion, avoidance, numbing, dysphoric arousal, and anxious arousal) has been put forward (Elhai et al., 2011). The separation of the arousal symptom cluster was based on Watson's (2005) distinction between arousal related to general distress (e.g., restlessness and agitation; dysphoric arousal) and arousal related to more fear-based symptoms (e.g., panic-like symptoms; anxious arousal). Several recent studies of PTSD's latent structure, across varying trauma populations, have found that the five-factor model is a better representation of the data compared to both of the two four-factor models (cf. Pietrzak et al., 2012). To the best of our knowledge, only one CFA study of ASD has tested replications of PTSD models on ASD (Armour et al., 2011). Armour et al. (2011) tested a replication of both the Dysphoria model (Simms et al., 2002) and the Emotional Numbing model (King et al., 1998). The authors were surprised to report that neither replication model met the standards for good or even adequate model fit (all CFIs <.90, TLIs <.90). Although the Armour et al. (2011) study reported that PTSD models may not replicate well for ASD, it seems likely, from a theoretical view point, that the separation of the arousal cluster applies for both ASD and PTSD, given that ASD arousal symptoms can also be distinguished as dysphoric and anxious forms of arousal.

The aim of the present study was to be the first CFA study to test existing ASD models compared to an ASD model which distinguishes between dysphoric and anxious arousal, much like the Dysphoric Arousal model of PTSD. Thus, based on the proposed DSM-5, the DSM-IV, the results of previous research into the latent structure of ASD in a clinical sample, and current research supporting the five-factor model of PTSD we specified and tested four models of ASD. These models were: the one-factor ASD model proposed for the DSM-5 (Model 1) as originally specified by Armour et al. (2011), the four-factor DSM-IV model (Model 2), the

three-factor model combining intrusion and arousal items (Model 3) originally specified by Armour et al. (2011), and the five-factor Dysphoric Arousal replication model of the PTSD (Model 5) as originally proposed by Elhai et al. (2011). Table 1 presents the distribution of the 19 ASDS items across the four alternative latent structures. In addition, we employed a combined samples approach using victims of rape and victims of robbery who were all administered the same scale; the ASDS, and who all suffered from an estimated ASD diagnosis. The rationale for doing so was based on the need for further research into the latent structure of ASD using clinical samples and the fact that the latent structure of ASD should represent psychological responses to heterogeneous trauma events (i.e., the same latent structure should represent traumatic responding to both the trauma of rape and the trauma of robbery).

Method

Participants

Three separate samples were combined for the current study. Further details are provided below.

Sample 1: rape victims

Data was provided by a larger, ongoing, longitudinal study of rape victims who presented at a center for rape victims (CRV) at the University Hospital, Aarhus, Denmark. Four hundred and eighty-four participants were administered the ASDS between two and three weeks post-rape. However, eight cases were missing >20% and thus were excluded from the analysis, leaving an effective sample size of 476. Three hundred and twenty-six (68.5%) participants met the DSM-IV criteria for each of the four symptom clusters. Mean scores for symptom clusters were 17.90 ($SD=3.2$, range: 11 to 25), 12.87 ($SD=3.3$, range: 6 to 20), 13.29 ($SD=3.2$, range: 6–20), and 21.35 ($SD=4.7$, range: 10 to 30), dissociation, intrusion, avoidance, and arousal respectively. Age ranged from 13 to 57 ($M=22.82$; $SD=8.60$) and all but one participant was female. For further details about the study please see an earlier version of this sample in Armour et al. (2011).

Sample 2: bank robbery victims

The second sample comprised 152 bank employees exposed to bank robberies committed in Denmark between September 2008 and March 2010. Participants were recruited through a network of crisis intervention specialists contracted with bank organizations in Denmark. However, three cases were missing >20% and thus were excluded from the analysis, leaving an effective sample size of 149. A total of 25 (16.8%) participants met the DSM-IV criteria for each of the four symptom clusters. Mean scores for symptom clusters

were 16.68 ($SD = 3.6$, range: 11 to 23), 13.56 ($SD = 3.3$, range: 9 to 20), 10.32 ($SD = 2.8$, range: 6 to 16), and 21.92 ($SD = 5.3$, range: 10 to 30) for dissociation, intrusion, avoidance, and arousal respectively. Age ranged from 22 to 60 ($M = 44.56$; $SD = 11.76$). The majority of participants were female (84.0%). For further details about the study please see Hansen and Elklit (2011).

Sample 3: bank robbery victims

Data was provided from a national study of bank robberies committed in Denmark from April 2010 to April 2011. The study was conducted in collaboration between the Danish Bankers Association, all Danish Banks, and the University Southern of Denmark. A total of 450 participants were administered the ASDS of which 53 (11.8%) participants met the DSM-IV criteria for each of the four symptom clusters. Mean scores for symptom clusters were 17.02 ($SD = 2.8$, range: 12 to 24), 12.36 ($SD = 3.4$, range: 7 to 20), 10.11 ($SD = 3.2$, range: 6–18), and 20.25 ($SD = 4.4$, range: 10–30) for dissociation, intrusion, avoidance, and arousal respectively. Age ranged from 21 to 61 ($M = 38.15$; $SD = 13.86$). The majority of participants were female (81.1%). For further details about the study please see Hansen et al. (in press).

Full combined sample

Collectively, a total of 404 participants met the DSM-IV criteria for each of the four ASD clusters (please refer to the measure section for further detail). The mean scores on the ASDS dissociative, intrusion, avoidance, and arousal subscales were 17.7 ($SD = 3.2$, range: 11 to 25), 16.3 ($SD = 3.6$, range: 9 to 25), 12.7 ($SD = 3.4$, range: 6 to 20), and 21.2 ($SD = 4.7$, range: 10–30), respectively. Age ranged from 13 to 61 ($M = 26.27$; $SD = 12.05$). The majority of participants were female (96.2%).

Measure

The ASD latent structure was assessed using the Danish version of the Acute Stress Disorder Scale in all three samples (ASDS; Bryant et al., 2000). The ASDS is a 19 item self-report scale with four subscales assessing the four separate symptom clusters; dissociation, re-experiencing, avoidance, and arousal as specified by the DSM-IV. Questions are answered on a five-point Likert scale (1 = not at all, 5 = very much). The ASD symptom clusters were met if the participants endorsed at least one re-experiencing symptom, one avoidance symptom, and one arousal symptom in addition to at least three dissociative symptoms, all indicated by item scores ≥ 3 on the ASDS. Previous studies have used this procedure and have reported good reliability, with reliability coefficients of .85, .90, .93, and .96 (Armour et al., 2011; Elklit & Christiansen, 2010; Hansen, in press; Hansen & Elklit, 2011) for the total scale. The reliability coefficient in the

current study for the full combined sample was satisfactory (total scale = .76).

Analysis

Nominal amounts of item-level missing data were present (<4 items) thus maximum likelihood (ML) estimation procedures were implemented (Graham, 2009) prior to the merging of the three separate samples. The combined sample of 404 participants was used to conduct competing models CFA. All analyses were conducted using Mplus 6 software (Muthén & Muthén, 2010). We specified and estimated four competing models (see Table 1. for ASDS item distributions). Assumptions of univariate (no skewness/kurtosis values > 1.35) and multivariate (Mahalanobis D^2) were met thus we used maximum likelihood estimation in CFA. When specifying the models, the first item in each latent factor was fixed to 1. In addition, we allowed all factors to correlate but we did not allow for correlated errors.

Model evaluation

Models were evaluated based on recommended guidelines (Hoyle & Panter, 1995). Thus, we inspected the chi-square (χ^2), the Comparative Fit Index (CFI: Bentler, 1990), Tucker–Lewis Index (TLI: Tucker & Lewis, 1973), the Root Mean Square Error of Approximation (RMSEA: Steiger, 1990), and the Bayesian Information Criterion (BIC: Schwarz, 1978). Adequate model fit is demonstrated by a non-significant χ^2 , CFI's and TLI's between .90 and .94 and RMSEA's $< .08$. Excellent model fit is indicated by CFI's and TLI's $> .95$, and RMSEA's $< .06$ (Hu & Bentler, 1999). Raftery (1995) reported that superior model fit is indicated by a 10-point BIC difference, which represents a 150:1 likelihood that the model with the lower BIC value fits best ($p < .05$). Additionally, given that Fan and Sivo (2009) reported that it is inaccurate to compare nested models on the basis of fit indices alone, we compared nested models using chi-squared difference tests by employing the Mplus DIFFTEST function (Muthén & Muthén, 2006). As chi-square difference testing cannot be conducted for non-nested models comparisons were based on differences in BIC values.

Results

The mean ASDS total score for the combined sample who met the DSM-IV diagnostic criteria for all four symptom clusters ($N = 404$) was 64.5 ($SD = 10.1$, range: 40–90). The fit statistics pertaining to all CFA model are presented in Table 2. Notably, the χ^2 values of all models were statistically significant. However, this should not lead to rejection of models given that chi-square values tend to become non-significant when assessing model fit with samples which have > 200 participants (current $N = 404$) (Schumacher & Lomax, 1996). None of the

Table 2. Fit indices for the four alternative ASD models

Item	DSM-5 one-factor model: model 1	DSM-IV four-factor model: model 2	Three-factor model combining intrusion and arousal items: model 3	Five-factor ASD dysphoric arousal model: model 4
χ^2	598.288	426.956	436.473	354.062
df (p)	152 (.00)	146 (.00)	147 (.00)	142 (.00)
RMSEA (95% CI)	.085 (.078 – .093)	.069 (.062 – .077)	.069 (.062 – .077)	.061 (.053 – .069)
CFI	.59	.74	.74	.81
TLI	.54	.70	.70	.77
BIC	25509.816	25374.477	25365.998	25325.580

χ^2 , chi-square; RMSEA, root mean square error of approximation; CI, confidence interval; CFI, comparative fit index; TLI, Tucker–Lewis index; BIC, Bayesian information criteria.

models reached the recommended values of the CFI and TLI for adequate (between .90 and .95) or excellent (>.95) fit. However, the highest CFI and TLI values were reported for Model 4. The RMSEA failed to reach recommended values for adequate or excellent fit for Model 1; however RMSEA values for Model 2 and 3 indicated adequate model fit, whereas the RMSEA for Model 4 indicated excellent model fit. Additionally, the lowest BIC value was reported for Model 4.

As stated above we compared nested models using chi-squared difference tests by employing the Mplus DIFFTEST function (Muthén & Muthén, 2006). Model 2 did not fit significantly better than Model 3, χ^2 change (3, $N=404$) = 10.17, $p = .0172$. However, Model 4 fit significantly better than both Model 2, χ^2 change

(4, $N=404$) = 71.29, $p < .000$ and Model 3, χ^2 change (7, $N=404$) = 77.33, $p < .000$ (cf. Muthén & Muthén, 2010 for statistical formulas). Thus, Model 4 provided optimal fit to the data compared to alternative models in the current study. Therefore, the corresponding standardized factor loadings for the ASD Dysphoric Arousal replication model can be found in Table 3. Inter-factor correlations are reported in Table 4.

Discussion

The present study is the first study to assess a replication of PTSD's newest five-factor Dysphoric Arousal model using ASD data. A competing models approach was implemented in which the ASD Dysphoric Arousal model was compared to three alternative ASD models,

Table 3. Standardized factor loadings (standard errors) for the ASD dysphoric arousal model

ASD Scale items	Dissociation	Re-experiencing	Avoidance	Dysphoric arousal	Anxious arousal
ASDS1 (Numbness)	.493 (.064)				
ASDS2 (Dazed)	.497 (.052)				
ASDS3 (Derealization)	.471 (.069)				
ASDS4 (Depersonalization)	.576 (.069)				
ASDS5 (Amnesia)	.213 (.087)				
ASDS6 (Intrusive memories)		.497 (.072)			
ASDS7 (Nightmares)		.826 (.088)			
ASDS8 (Flashbacks)		.656 (.078)			
ASDS9 (Distress on reminders)		.421 (.067)			
ASDS10 (Thought avoidance)			.673 (.070)		
ASDS11 (Conversation avoidance)			.924 (.084)		
ASDS12 (Reminders avoidance)			.557 (.085)		
ASDS13 (Emotional avoidance)			.512 (.067)		
ASDS14 (Difficulty sleeping)				.790 (.077)	
ASDS15 (Irritability)				.718 (.070)	
ASDS16 (Difficulty concentrating)				.644 (.058)	
ASDS17 (Hypervigilance)					.718 (.067)
ASDS18 (Startle response)					.939 (.083)
ASDS19 (Physiological reactivity)		.673 (.070)			

Note: All factor loadings were statistically significant ($p < .05$).

Table 4. Inter-factor correlations for the dysphoric arousal model of ASD

	Dissociation	Re-experiencing	Avoidance	Dysphoric arousal	Anxious arousal
Dissociation	1				
Re-experiencing	.415	1			
Avoidance	.376	.228	1		
Dysphoric arousal	.675	.787	.364	1	
Anxious arousal	.349	.699	.001*	.491	1

*The correlation which was not significant ($p < .001$).

in a combined heterogeneous clinical trauma sample. Akin to a burgeoning literature base in relation to the latent structure of PTSD (reviewed in Pietrzak et al., 2012) results suggest that the latent structure of ASD, measured by the ASDS, is best described as a five-factor structure separating the arousal factor into two separate factors of dysphoric arousal and anxious arousal. Thus, it appears that Watson's (2005) distinction between arousal related to general distress (i.e., dysphoric arousal) and arousal related to fear-based symptoms (i.e., anxious arousal) in relation to PTSD also holds for acute posttraumatic symptoms. Hence, it is possible that arousal symptoms play a similar role in both early and long term posttraumatic responding. The pronounced role of arousal symptoms in posttraumatic symptomatology is highlighted in Schell, Marshall, and Jaycox's (2004) prospective study of the relationship between PTSD symptom clusters in victims of community violence. Schell et al. (2004) found that arousal strongly influenced the other symptom clusters, but at the same time arousal was generally not influenced back by the other symptom clusters. Furthermore, arousal was found to be the best predictor of subsequent PTSD symptom severity compared to alternative PTSD symptom clusters. Indeed, Schell et al. (2004) found that those with the most pronounced acute arousal symptoms were ($M = 9.55$ days after hospital admission) also those who showed the least symptom improvement across a 12 month period. Thus, the role of arousal appears pronounced in both early and long term posttraumatic symptomatology. Thus, it is also pertinent to differentiate between different forms of arousal both in relation to ASD and PTSD.

Given that the proposed Dysphoric Arousal model separates the original hyperarousal factor, it is important to investigate the inter-factor correlations. With this in mind, the current study found a certain degree of orthogonality between the dysphoric arousal and anxious arousal factors ($r = .49$) of the ASD Dysphoric Arousal model. This relationship was somewhat more attenuated than expected. Indeed, this finding is contrary to that of some PTSD factor analytic studies, which have previously (but not always) reported high inter-factor correlations between dysphoric arousal and anxious arousal (Armour

et al., 2012). However, a moderate correlation between these two factors adds strength to the rationale behind their separation (cf. Elhai et al., 2011).

Interestingly, separating the original arousal factor into dysphoric arousal and anxious arousal resulted in a non-significant correlation between the latter and avoidance. One possible explanation for this is that avoidant coping may theoretically and practically overlap with the PTSD avoidance factor, in that avoidance symptoms may act as coping processes for alternative posttraumatic symptomatology (as argued by Leiner, Kearns, Jackson, Astin & Rothbaum, 2012). Due to the close similarity between the ASD and the PTSD avoidance items and factor, this overlap is likely also apparent between ASD avoidance symptoms and avoidant coping behaviors. Thus, the lack of a significant correlation between avoidance and anxious arousal in the current study may indicate that avoidance has functioned as a coping mechanism and thus has prevented the development of anxious arousal. Indeed, the potentially protective function of the avoidance symptoms may also be indicated by the low to moderate correlations between the avoidance factor and the remaining ASD factors in the present study. In accordance with the present study, Leiner et al. (2012) also found that avoidant coping was negatively associated with PTSD severity in treatment seeking rape victims. Furthermore, Leiner et al. (2012) found that the association between avoidant coping and PTSD severity was still significant after controlling for initial PTSD severity and after the removal of PTSD avoidance symptoms in order to account for the possible overlap between avoidant coping and PTSD avoidance symptoms. Although, the majority of the sample in present study were rape victims, avoidant coping has also previously been found protective against posttraumatic symptoms following robbery (Elklit, 2002). In contrast, however, Holahan and Moos (1987) reported that although avoidant emotional coping may be adaptive in the immediate aftermath of trauma, such becomes maladaptive if relied on over a prolonged period of time (see also Olf, Langeland & Gersons, 2005). Indeed, Schnider, Elhai and Gray (2007) concluded that avoidant coping is one of the best predictors of PTSD severity in

college student who had suffered a traumatic loss. Notably however, the non-significant correlation is not with hyperarousal specifically, but with a relatively new grouping of symptoms; Anxious Arousal. This particular constellation of symptoms is based on fear response rather than anxiety *per se*, thus the lack of association between Avoidance and Anxious Arousal is, as of yet, unexplored territory.

In contrast to the majority of the previous CFA studies (Brooks et al., 2008; Hansen et al., in press; Wang et al., 2011) the DSM-IV model was not supported in the present study and neither was the Armour et al. (2011) three-factor model. As mentioned earlier, it is possible that the discrepancy in the previous CFA studies of ASD is caused by variation in the form of traumatic exposure or the ASD prevalence rates as recently found in relation to PTSD (Biehn et al., 2012). Both are apparent in relation to ASD, because the DSM-IV model was found to be the best fit following bank robbery (Hansen et al., in press) in a sample of all participants exposed to the trauma, whereas the three-factor model was found to be the best fit following rape (Armour et al., 2011) in a sample where only those participants who met the diagnostic criteria for all four ASD symptom clusters was assessed. Notably, however the Dysphoric Arousal model was not tested in previous studies and thus may have provided superior fit in the varying trauma and ASD prevalence samples. Thus, taking these points and the current results into consideration, the separation of the arousal factor into separate dysphoric and anxious arousal factors may point to an ASD model which represents ASD's underlying dimensionality across heterogeneous trauma events better than that of the previous models.

The current study is the third (apart from Armour et al., 2011; Hansen et al., in press) to investigate the fit of the uni-dimensional, one-factor model proposed for the DSM-5. Notably, none of the studies, including this one, have found support for this model over and above alternative models. Thus, despite certain discrepancies in factor analytic results related to ASD's latent structure, and despite the only recent (thus, not fully explored) proposal that the Dysphoric Arousal model may represent ASD's latent structure, it is becoming increasingly clear that the current proposal of ASD in the DSM-5 seems to be an unsuitable description of acute traumatic stress symptoms. In other words, a growing body of empirical literature highlights the need for accommodating the diagnostic criteria in the DSM-5. Indeed, not doing so may have a serious negative impact, given that assessment and treatment may be based on an imprecise theoretical model. On a more promising note, Bryant et al. (2011) proposed that the inclusion of a wider range of acute reactions in ASD in the DSM-5 would result in a more precise conceptualization of ASD than previously.

However, alternative proposals of ASD in the DSM-5 need to be put forward so that they can be tested.

Limitations of the present study include using a self-report measurement of ASD rather than a clinician-administered interview. Thus, it is possible that the results reflect properties of the ASDS rather than the ASD diagnosis *per se*. However, this does seem unlikely, given that the ASDS items are specifically matched to each of the ASD symptoms and given that, unlike previous studies, we used a 100% clinical sample (i.e., all participants met diagnostic criteria). However, as highlighted by Brooks et al. (2008) it is important to underline that the results should not be interpreted in relation to the utility of the ASD diagnosis. It is also important to note that the generalization of these results to alternative trauma populations must be conducted with caution. This is attributable to the fact that although we used a heterogeneous sample of bank robbery and rape victims, the latent structure may vary in trauma populations which have not experienced interpersonal assault. It is also important to note that the large majority of participants in the current study were female, thus the results may not generalize well to male populations, given that gender may also moderate ASD's latent structure. Furthermore, we did not assess the individual factors of the ASD dysphoric arousal model in relation to external psychopathological constructs. This line of enquiry has been implemented in the PTSD literature (cf. Armour et al., 2012) and as such would be an interesting line of enquiry in relation to the ASD dysphoric arousal model. Moreover, albeit that the Dysphoric Arousal model was the optimal model compared to alternatives in the current study, model fit was not ideal with excellent model fit only being indicated by the RMSEA value and corresponding confidence intervals.

In spite of these limitations, the present study represents the first examination of the latent structure of ASD in a heterogeneous clinical assault sample. Indeed, all previous studies to date have been based on homogeneous trauma samples. In addition, the present study is based on the largest ASD clinical sample thus far. Moreover, the present study is the first study to examine a replication of the five-factor Dysphoric Arousal model of PTSD which separates the arousal factor into dysphoric arousal and anxious arousal factors. The results of the present study suggest that the dimensionality of ASD may best be represented as a five factor structure following exposure to two heterogeneous assault types. Thus, the current study adds to the debate about how ASD should be conceptualized in the pending DSM-5. Future research on ASD's latent structure should further test the Dysphoric Arousal model across varying forms of traumatic experience. Future research may also wish to assess if the ASD Dysphoric Arousal model remains

invariant across sub-populations (i.e., split by gender, culture, and perhaps diagnostic status).

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There is no conflict of interest in the present study for any of the authors.

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