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The structure of acute stress disorder among Chinese adults exposed to an earthquake: Is dysphoric arousal a unique construct of acute posttraumatic responses?

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As a diagnosis organized mainly on the basis of theoretical conceptualization, acute stress disorder (ASD) has been widely criticized for lack of empirical support since it was introduced into the DSM system. To address this issue, the present study investigated the latent structure of ASD symptoms measured by the Acute Stress Disorder Scale (ASDS). A total of 350 adults with a mean age of 32.9 years (SD = 14.0, range: 16–85) took part in this study 12 to 15 days after an earthquake. The results of confirmatory factor analyses showed that a five-factor intercorrelated model (dissociation, reexperiencing, avoidance, dysphoric arousal, and anxious arousal) demonstrated the best fit data. The findings provide preliminary empirical evidence in favor of a new reconceptualization of ASD symptoms, and are informative for the impending DSM-5.

Key words: Acute stress disorder, factor structure, confirmatory factor analysis, earthquake, China.

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INTRODUCTION

According to the Diagnosis and statistical manual of mental disorders, 4th Edition (DSM-IV), acute stress disorder (ASD) is an anxiety disorder describing acute stress reactions precipitated by exposure to potential trauma events (American Psychiatric Association, 1994). To meet ASD criteria, a person must experience a traumatic event (Criterion A1) and have an intense feeling of fear, helplessness or horror (Criterion A2), exhibit at least three out of five dissociative symptoms (Criterion B), and have at least one reexperiencing symptom (Criterion C), a marked avoidance of particular thoughts, feelings or places (Criterion D), and marked arousal (Criterion E). A person who meets the above criteria within the period of the initial 2 days to 4 weeks after the traumatic event, and whose normal functioning is impaired by these symptoms will be diagnosed as having ASD. The incidence of ASD among trauma-exposed populations has been reported as ranging from 7% to 28%, with a mean rate of 13% (cf. Bryant, Friedman, Spiegel, Ursano & Strain, 2011).

ASD was included in DSM-IV as a new diagnosis in 1994. It was introduced into the DSM system for two purposes: to address the acute maladaptive reaction and distress associated with trauma within one month after a traumatic event, which is too early for posttraumatic stress disorder (PTSD) to be diagnosed; and to identify traumatized individuals who are more likely to develop subsequent PTSD (cf. Harvey & Bryant, 2002; Bryant et al., 2011; Cardena & Carlson, 2011). PTSD is another trauma-related disorder which is characterized by three symptom clusters: reexperiencing (Criterion B), avoidance (Criterion C), and arousal (Criterion D), and can be diagnosed one month after a traumatic event. Apart from the different time frame, the main difference between ASD and PTSD is that ASD has an additional dissociative cluster. Prospective studies have indicated that most people, but not all, who meet the diagnostic criteria of ASD subsequently develop PTSD, and the proportion of ASD who developed PTSD ranges from 30% to 83% in follow-ups of 6 months to 2 years (cf. Bryant, 2003, 2011).

It should be noted that both ASD and PTSD are constructed mainly on the basis of expert consensus. Thus, the 4-factor structure of ASD and the 3-factor structure of PTSD described in DSM-IV have been criticized for lack of empirical support (e.g., Bryant & Harvey, 1997; Asmundson, Stapleton & Taylor, 2004). With respect to PTSD, a wealth of confirmatory factor analysis (CFA) studies has demonstrated that the DSM-IV model fails to account for the latent structure of PTSD symptoms, and two similar four-factor models have received the most empirical support although neither of them seems to fit best across a majority of studies (cf. King, King, Orazem & Palmieri, 2006; Yufik & Simms, 2010; Elhai & Palmieri, 2011; Gootzeit & Markon, 2011). The first four-factor model, namely the emotional numbing model, is comprised of reexperiencing, effortful avoidance, emotional numbing, and arousal clusters (King, Leskin, King & Weathers, 1998). This model stems from empirical evidence suggesting that effortful avoidance (C1–C2) and emotional numbing (C3–C7) are distinct constructs with different prognoses and treatment effects, and associate differently with depression and anxiety (Asmundson et al., 2004). The second four-factor model, namely the dysphoria model, consists of reexperiencing, effortful avoidance, dysphoria, and arousal clusters (Simms, Watson & Doebbeling, 2002). This model stems from theoretical and empirical research asserting that emotional numbing (C3–C7) and neurotic arousal (D1–D3) symptoms represent the common underlying
distress of anxiety and mood disorders (Watson, 2005, 2009). The difference between the four-factor models is that PTSD’s D1–3 symptoms (i.e., sleep difficulty, irritability, and concentration problems) are placed in the arousal cluster of the emotional numbing model as anxiety-specific symptoms, but in the dysphoria cluster of the dysphoria model, as unspecific negative affective symptoms.

Most recently, both four-factor models were challenged by a five-factor model proposed by Elhai and his colleagues (Elhai, Biehn, Armour, Kloper, Frueh & Palmieri, 2011) based on prior theoretical conceptualization and empirical evidence suggesting that PTSD’s D1–D3 symptoms may be psychopathologically unique (e.g., Shevlin, McBride, Armour & Adamson, 2009; Watson, 2005, 2009). This model hinges on reconceptualizing PTSD’s D1–D3 symptoms as a distinct dysphoric arousal factor from both anxious arousal (represented by hypervigilance and exaggerated startle response) and emotional numbing, and is composed of reexperiencing, effortful avoidance, emotional numbing, dysphoric arousal, and anxious arousal factors. The five-factor PTSD model has demonstrated as fitting the data significantly better than the four-factor models in diverse trauma-exposed adult samples, including domestic violence victims (Elhai et al., 2011), both adult and adolescent survivors of an earthquake (Wang, Li, Shi, Zhang, Zhang, Liu & Elhai, 2011a; Wang, Long, Li & Armour 2011b; Wang, Zhang, Shi, Zhou, Li, Zhang, Liu & Elhai, 2011c), violent riot witnesses (Wang et al., 2011c), war veterans (Armour, Elhai, Richardson, Ratcliffe, Wang & Elklit, 2012; Pietrzak, Tsai, Harpaz-Rotem, Whealin & Southwick, 2012), and primary care medical patients (Armour et al., 2012).

In contrast to the extensive exploration on PTSD, research on the latent structure of ASD is rare. To the best of our knowledge, there are only four CFA studies addressing this issue (Brooks, Silove, Bryant, O’Donnell, Creamer & McFarlane, 2008; Edmondson, Mills & Park, 2010; Wang, Li, Shi, Zhang & Shen, 2010; Armour, Elklit & Shevlin, 2011). The first CFA study on ASD symptoms was conducted by Brooks et al. (2008), with a sample of 587 victims of different accidents and assaults. In this study, Brooks et al. (2008) tested the four-factor DSM-IV model and the DSM-IV model with a second-order factor, and found support for the former. In terms of their own findings and findings from studies on PTSD, Brooks et al. (2008) further specified the conceptual similarity between the emotional numbing symptoms in PTSD and the dissociative symptoms in ASD, and proposed that ASD and PTSD are similar trauma-related constructs. In subsequent CFA conducted by Wang et al. (2010) with 353 earthquake survivors, the DSM-IV model of ASD was further found superior to four other competing models, namely: a three-factor model and a four-factor model identified by Bryant and his colleagues using exploratory factor analysis (cf. Bryant, Moulds & Guthrie, 2000), a three-factor model combining reexperiencing and arousal symptoms, and a DSM-IV model with a second-order factor. However, two more recent CFA studies challenged the four-factor DSM-IV model of ASD (; Edmondson et al., 2010; Armour et al., 2011). Using data from 132 Hurricane Katrina evacuees, Edmondson et al. (2010) tested three competing ASD models: the DSM-IV model; a three-factor model comprised of dissociation, avoidance, and a second-order distress factor loaded by reexperiencing and arousal; and a two-factor model comprised of dissociation and a second-order distress factor loaded by reexperiencing, avoidance and arousal. Initial results indicated that none of the three models achieved a good fit to the data. Through retaining correlations between measurement errors suggested by modification indices, Edmondson et al. (2010) further modified the models, and found support for the two-factor model. The authors argued that the lack of distinction of the three first-order symptoms might possibly be due to a latent distinction of these symptoms in those who are about to develop PTSD, with dissociation as a predictor to later PTSD. It was equally possible that the three first-order symptoms comprise early PTSD symptoms while peri-traumatic dissociation is merely a phenomenon related to PTSD during the first month. However, as stated by Edmondson et al. (2010) themselves, their findings hold considerably weak empirical sway given the small sample size and problematic analytic approach. The latest ASD CFA study was conducted by Armour et al. (2011) with a sample of 380 rape victims. Taking a PTSD approach, they proposed five competing ASD models to investigate, including a unidimensional model, the DSM-IV model, two replication four-factor models based on King et al. (1998) and Simms et al. (2002) in which dissociative symptoms were treated as emotional numbing symptoms, and a three-factor model combining reexperiencing and arousal symptoms which has been investigated in the CFA study of Wang et al. (2010). The DSM-IV model, the Simms et al. (2002) replication models, and the three-factor model combining reexperiencing and arousal symptoms demonstrated adequate fit, and the three-factor model was finally deemed preferable in terms of parsimony (Armour et al., 2011).

In summary, empirical studies examining the factor structure of ASD are rather limited. Even among these limited studies, discrepant results were found. Considering the impending appearance of DSM-5, additional research on the factor structure of ASD is clearly needed. Furthermore, as outlined earlier, ASD and PTSD are conceptually and diagnostically similar constructs. Especially, their arousal symptom clusters almost mirror each other, except that one symptom (i.e., physiological reactivity) is included in the reexperiencing cluster in PTSD. In light of the latest theoretical and empirical work on the factor structure of PTSD (e.g., Elhai et al., 2011; Wang et al., 2011a, 2011b, 2011c; Armour et al., 2012; Pietrzak et al., 2012), it is reasonable to hypothesize that dysphoric arousal (represented by sleep difficulty, irritability, and concentration problems) may also be a psychopathologically unique ASD construct. To test this hypothesis and expand the limited literature on ASD symptom structure, we investigated the factor structure of ASD in a sample of victims suffering from a recent earthquake. Using a CFA alternative models approach, four competing ASD models were tested in the present study, including the four-factor DSM-IV model, the two-factor model validated by Edmondson et al. (2010), the three-factor model validated by Armour et al. (2011), and a five-factor model positing that dysphoric arousal is a unique ASD construct (cf. Table 1 for item mappings).

**METHODS**

**Participants**

On March 10, 2011, an earthquake measuring 5.8 magnitude on the Richter scale occurred in Yingjiang County, Yunnan province, People’s
Republic of China. During the earthquake, 26 people were killed, 313 injured with 133 in serious condition, and about 127,000 were evacuated to nearby shelters.

Shortly after the earthquake, a psychological relief team was sent to the earthquake-affected area by the Institute of Psychology, Chinese Academy of Sciences. For the purpose of assessing disaster-related mental health needs and implementing effective psychological assistance, a sample was collected by the psychological relief team from a temporary camp community. A total of 358 adult survivors took part in the investigation. Eight subjects were excluded from analysis due to missing data amounting to greater than 20% of the ASD items, leaving an effective sample of 350. The final sample of this study was comprised of 176 females (50.3%) and 169 (49.7%) men with a mean age of 32.9 years (SD = 14.0, range: 16–85). Of the participants, 246 (70.3%) were of Han nationality, 50 (14.3%) were Dai, 27 (7.7%) were Jingpo, and 22 (6.3%) belonged to other subnationalities in China including Bai, Li, Hui, and Tujia, etc. One hundred ninety-nine (56.9%) participants were married, 146 (41.7%) were unmarried (never married, separated, divorced, or widowed). Regarding educational levels, 180 (51.4%) did not complete SD and 146 (41.7%) were unmarried (never married, separated, divorced, or widowed). Regarding educational levels, 180 (51.4%) did not complete SD and 146 (41.7%) were unmarried (never married, separated, divorced, or widowed). Regarding educational levels, 180 (51.4%) did not complete SD and 146 (41.7%) were unmarried (never married, separated, divorced, or widowed). Regarding educational levels, 180 (51.4%) did not complete SD and 146 (41.7%) were unmarried (never married, separated, divorced, or widowed). For the current sample, the mean score on ASDS was 35.1 (SD = 12.4, range: 19–84). As recommended by Bryant et al. (2000), we used a cut-off score of 9 on the dissociation cluster combined with a cut-off score of 28 on the reexperience, avoidance and arousal clusters. On the basis of these criteria, 95 (27.1%) participants were identified as probable ASD cases.

Table 2 summarizes goodness-of-fit indices for all competing ASD models. According to the aforementioned criteria, all the models demonstrated good fit to the data. Model 1 (the four-factor DSM-IV model) nested with Model 2 (the two-factor model validated by Armour et al., 2010) and Model 3 (the three-factor model validated by Armour et al.), and Model 3 nested with Model 4 (the five-factor model proposed in this study). To compare the nested models, corrected scaled $\chi^2$ difference tests were conducted. The results showed that Model 1 fit the data significantly better than both Model 2 ($\Delta$-By $\chi^2$ (2, $N = 350$) = 7.61, $p < 0.05$) and Model 3 ($\Delta$-By $\chi^2$ (3, $N = 350$) = 26.15, $p < 0.001$), and Model 4 fit the data significantly better than Model 3 ($\Delta$-By $\chi^2$ (7, $N = 350$) = 101.23, $p < 0.001$). With respect to comparison of non-nested models, Model 4 fit the data significantly better than the other three models ($\Delta$-By $\chi^2$ tests, $p < 0.001$).

RESULTS

For the current sample, the mean score on ASDS was 35.1 (SD = 12.4, range: 19–84). As recommended by Bryant et al. (2000), we used a cut-off score of 9 on the dissociation cluster combined with a cut-off score of 28 on the reexperience, avoidance and arousal clusters. On the basis of these criteria, 95 (27.1%) participants were identified as probable ASD cases.

Table 2 summarizes goodness-of-fit indices for all competing ASD models. According to the aforementioned criteria, all the models demonstrated good fit to the data. Model 1 (the four-factor DSM-IV model) nested with Model 2 (the two-factor model validated by Armour et al., 2010) and Model 3 (the three-factor model validated by Armour et al.), and Model 3 nested with Model 4 (the five-factor model proposed in this study). To compare the nested models, corrected scaled $\chi^2$ difference tests were conducted. The results showed that Model 1 fit the data significantly better than both Model 2 ($\Delta$-By $\chi^2$ (2, $N = 350$) = 7.61, $p < 0.05$) and Model 3 ($\Delta$-By $\chi^2$ (3, $N = 350$) = 26.15, $p < 0.001$), and Model 4 fit the data significantly better than Model 3 ($\Delta$-By $\chi^2$ (7, $N = 350$) = 101.23, $p < 0.001$). With respect to comparison of non-nested models, Model 4 fit the data...
better than both Model 1 and Model 2, indicated by a ΔAIC value of –23.46 and –26.88, respectively.

In summary, results of the present study supported Model 4 as the best fit. The standardized factor loadings and factor correlations of the five-factor ASD model are summarized in Table 3. For the five ASD clusters, Cronbach’s α was 0.79 (dissociation), 0.80 (reexperiencing), 0.87 (avoidance), 0.80 (dysphoric arousal), and 0.71 (anxious arousal).

To test whether the present findings were robust to the level of symptom severity, we further reconducted CFAs using a subsample excluding participants with low symptom level (i.e., an average score for each ASDS item ≤ 1.5). The subsample consisted of 220 participants with a mean ASDS score of 41.3 (SD = 11.8, range: 29–84). Table 4 presents goodness-of-fit indices for all competing ASD models with the subsample. Again, all the models demonstrated good fit to the data. Regarding model comparisons, it was also found that Model 4 fit the data significantly better than Model 3 (ΔS-Bχ² (7, N = 220) = 39.81, p < 0.001), and superior to both Model 1 (ΔAIC = –44.55) and Model 2 (ΔAIC = –44.63). Furthermore, all standardized factor loadings of Model 4 for the subsample were statistically significant (p < 0.01), and ranged from 0.42 to 0.87.

DISCUSSION
The present study investigated alternative models of ASD symptoms measured in the ASDS in a sample of victims who recently experienced an earthquake. The results of CFA showed that a five-factor intercorrelated model fit the data better than three other alternative models proposed by prior studies, including the four-factor DSM-IV model, the two-factor model validated by Edmondson et al. (2010), and the three-factor model validated by Armour et al. (2011). The findings of this study suggest that acute stress responses can be best represented by the dissociation, reexperiencing, avoidance, dysphoric arousal, and anxious arousal symptom clusters, and provide empirical evidence in favor of the proposition that even in the early stage after exposure to a traumatic event, dysphoric arousal is a unique construct of posttraumatic responses.

As a diagnosis organized mainly on the basis of theoretical conceptualization, ASD has been widely criticized for lacking empirical support since its first appearance in the DSM system (Bryant & Harvey, 1997; Harvey & Bryant, 2002). With the expected advent of the DSM-V, it is especially timely to examine empirically the conceptual structure of ASD. As outlined earlier, there have been very few empirical studies addressing this issue. Even among extant CFA studies on ASD, two found support for the four-factor model proposed by DSM-IV (Brooks et al., 2008; Wang et al., 2010), while another two yielded evidence in favor of either a two-factor model (Edmondson et al., 2010) or a three-factor model (Armour et al., 2011). In this study, we submitted all these empirically supported models to test using a CFA alternative model approach. Furthermore, informed by the latest development in the literature related to the factor structure of PTSD (e.g., Elhai et al., 2011; Wang et al., 2011a, 2011b, 2011c; Armour et al., 2012; Pietrzak et al., 2012), we included a new five-factor model which divides the original arousal cluster into two others, as the dysphoric arousal cluster and the anxious arousal cluster. The five-factor model demonstrated a better representation of ASD symptoms than the other competing models in the present sample. These findings lend empirical evidence in favor of the newly proposed five-factor model of ASD, and contribute to the limited literature on the underlying dimensions of human acute stress responses to trauma.

Previous studies on the factor structure of PTSD have demonstrated that dysphoric arousal, which is characterized by restlessness and agitation (i.e., sleep difficulty, irritability, and
Notes: N = 220. $S-B^2 = \text{scaled Satorra-Bentler } \chi^2$; CFI = Comparative fit index; TLI = Tucker-Lewis index; SRMR = Standardized root mean square residual; RMSEA = Root mean square error of approximation; CI = Confidence interval; AIC = Akaike information criterion.

Table 4. Model goodness of fit indices for four competing ASD models with the subsample excluding participants with low symptom level

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>$S-B^2$</th>
<th>df</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>342.24</td>
<td>230.87</td>
<td>146</td>
<td>0.98</td>
<td>0.97</td>
<td>0.066</td>
<td>0.052</td>
<td>0.039–0.064</td>
<td>430.24</td>
</tr>
<tr>
<td>Model 2</td>
<td>346.32</td>
<td>233.79</td>
<td>148</td>
<td>0.98</td>
<td>0.98</td>
<td>0.067</td>
<td>0.051</td>
<td>0.039–0.064</td>
<td>430.32</td>
</tr>
<tr>
<td>Model 3</td>
<td>349.86</td>
<td>238.49</td>
<td>149</td>
<td>0.98</td>
<td>0.98</td>
<td>0.067</td>
<td>0.052</td>
<td>0.040–0.064</td>
<td>431.86</td>
</tr>
<tr>
<td>Model 4</td>
<td>289.69</td>
<td>197.77</td>
<td>142</td>
<td>0.99</td>
<td>0.99</td>
<td>0.063</td>
<td>0.042</td>
<td>0.027–0.056</td>
<td>385.69</td>
</tr>
</tbody>
</table>

concentration problems), is conceptually and empirically distinct from anxious arousal, characterized by fear-based symptoms such as hypervigilance and exaggerated startle response (e.g., Elhai et al., 2011; Elklit & Shevlin, 2007; Armour et al., 2012; Pietrzak et al., 2012). In the present study, we also found that dysphoric arousal and anxious arousals could be differentiated even at an early stage after exposure to a trauma event. These findings deserve special consideration in the context of posttraumatic responses, given that they are generally consistent with previous findings from PTSD studies. Despite the temporal difference between the two diagnoses, the consensus findings yield robust evidence in favor of the distinction between dysphoric and anxious arousal as two psychopathologically constructs of posttraumatic responses, and extend empirical support for prior theoretical work by Elhai et al. (2011) and Watson (2005, 2009) on chronic posttraumatic responses.

It should be noted that in current study the dissociative amnesia loaded as strongly on dissociation as did other dissociative symptoms. In previous studies, some reported that this symptom contributed strongly to dissociation (e.g., Wang et al., 2010), while some found that it was a poor indicator of dissociation (e.g., Armour et al., 2011). Mixed results regarding whether psychogenic amnesia is a good marker of emotional numbing also have been previously reported within the context of PTSD (e.g., King et al., 1998; Simms et al., 2002; Elklit & Shevlin, 2007; Palmieri, Marshall & Schell, 2007; Carragher, Mills, Slade, Teesson & Silove, 2010; Wang et al., 2011a, 2011b, 2011c). According to several researchers (e.g., Palmieri et al., 2007; Carragher et al., 2010), psychogenic amnesia may be more relevant to posttraumatic stress responses for particular populations. Thus, further studies investigating the exact role of psychogenic amnesia in the ASD/PTSD structure are clearly needed (Brooks et al., 2008).

The current findings carry implications for the forthcoming DSM-5. In the proposed revision of the DSM (cf. American Psychiatric Association, 2010), the draft criteria for ASD are reorganized into four subheadings (reexperiencing, dissociation, avoidance, and arousal), but not four clusters. They require a specific number of all ASD symptoms rather than any particular symptoms to be present. Although the DSM-5 task force asserted that the revision is made based on recognition of the heterogeneity in acute stress responses (cf. Bryant et al., 2011), this arrangement substantially treats the heterogeneous symptoms as a homogeneous entity. This approach has been challenged in the study by Armour et al. (2011), showing that the unidimensional ASD model fit the data poorly. As acknowledged by Watson (2005), recognition of the heterogeneity of a psychiatric condition hinges mainly on sufficiently distinguishing the underlying symptom dimensions. The empirically supported five-factor model indicates that the clinical presentation of ASD might be more heterogeneous and complicated than represented by the four-factor DSM-IV model or the unidimensional model in the draft revision of DSM-5, and may deserve special consideration for further reorganizing clinically useful ASD criteria. Furthermore, the findings of this study also cast light into the latent psychopathological processes of posttraumatic responses. Previous studies have reported that the arousal cluster of ASD may be the best predictor of subsequent PTSD diagnosis (e.g., Bryant, Creamer, O’Donnell, Silove & McFarlane, 2008). Additionally, findings from PTSD studies also suggest that the arousal symptoms of PTSD may play a prominent role in the natural course of posttraumatic distress (e.g., Schell, Marshall & Jaycox, 2004; Marshall, Schell, Glynn & Shetty, 2006). Therefore, further research investigating the differentiated roles of dysphoric and anxious arousal of ASD in the persistence and development of subsequent posttraumatic distress may be informative for understanding the pathogenesis and nature of trauma-related disorders and in developing more effective prevention and intervention programs by selectively targeting special symptoms.

Limitations of the current study should be acknowledged. First, to our knowledge, the present study is the first to investigate this five-factor ASD model. Considering the use of only a single sample exposed to a special type of traumatic event – an earthquake – the generalizability of our findings needs to be evaluated by future studies with samples from a range of trauma-exposed populations. Second, our data is yielded from a self-report ASD measure, ASDS. The limitations to the self-reporting of symptoms have been clearly acknowledged (e.g., Elhai et al., 2011). Thus, the findings need to be further examined using clinician-administered ASD measures. Third, the evidence in favor of the five-factor ASD model mainly came from the internal fitness of the competing model. A diagnostic model cannot be validated only relying on internal fit statistics (Miller, Wolf, Harrington, Brown, Kaloupek & Keane, 2010). Therefore, additional research should further examine the convergent and discriminant validity of the model by testing the differentiable relationships between the five ASD factors and external psychological, behavioral, and biological variables.

In spite of the limitations, the present study is one of a few that has investigated the latent structure of ASD symptoms, and is the first study that tested a five-factor ASD model constructed on the basis of the latest developments in areas related to PTSD. Our findings demonstrate that dysphoric and anxious arousal could be differentiated even at an early stage after exposure to a
trauma event. These findings add to the limited literature on the factor structure of ASD, and extend empirical support for prior theoretical work on chronic posttraumatic responses. In light of the upcoming DSM-5, the information provided by the current study is pertinent for further reorganizing clinically useful ASD criteria.

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