Acute Stress Disorder Scale: A Self-Report Measure of Acute Stress Disorder

Richard A. Bryant, Michelle L. Moulds, and Rachel M. Guthrie
University of New South Wales

The Acute Stress Disorder Scale (ASDS) is a self-report inventory that (a) indexes acute stress disorder (ASD) and (b) predicts posttraumatic stress disorder (PTSD). The ASDS is a 19-item inventory that is based on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*, American Psychiatric Association, 1994) criteria. The ASDS possessed good sensitivity (95%) and specificity (83%) for identifying ASD against the ASD Interview on 99 civilian trauma survivors. Test–retest reliability of the ASDS scores between 2 and 7 days was strong ($r = .94$). The ASDS predicted 91% of bushfire survivors who developed PTSD and 93% of those who did not; one third of those identified by the ASDS as being at risk did not develop PTSD, however. The ASDS shows promise as a screening instrument to identify acutely traumatized individuals who warrant more thorough assessment for risk of PTSD.

A major reason for the introduction of acute stress disorder (ASD) in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV;* American Psychiatric Association, 1994) was to identify acute posttraumatic stress reactions that are precursors of chronic posttraumatic stress disorder (PTSD; Bryant & Harvey, 1997). To meet criteria for ASD, one must experience a stressor and respond with fear or helplessness (Criterion A), have at least three of five dissociative symptoms (Criterion B), at least one reexperiencing symptom (Criterion C), marked avoidance (Criterion D), and marked arousal (Criterion E). Recent prospective studies have indicated that approximately 80% of trauma survivors who initially suffer ASD will meet criteria for PTSD 6 months later (Brewin, Andrews, Rose, & Kirk, 1999; Bryant & Harvey, 1998; Harvey & Bryant, 1998), and between 75% and 80% will suffer PTSD 2 years posttrauma (Harvey & Bryant, in press-a, 1999b).

The introduction of this new diagnosis has raised the need for standardized instruments to measure ASD. The only measure that has been subjected to standard psychometric study is the Acute Stress Disorder Interview (ASDI; Bryant, Harvey, Dang, & Sackville, 1998). The ASDI is a 19-item structured clinical interview that is based on *DSM–IV* criteria. The ASDI possesses sound test–retest reliability over a period of 2 to 7 days ($r = .95$). The ASDI also has good sensitivity (91%) and specificity (93%) compared with independent clinical diagnosis based on *DSM–IV* criteria. The ASDI has been shown to successfully predict subsequent PTSD in acutely traumatized populations (Bryant & Harvey, 1998; Harvey & Bryant, 1998). The only self-report measure of ASD is

the Stanford Acute Stress Reaction Questionnaire (SASRQ; Cardeña, Classen, & Spiegel, 1991), which has been modified to a 30-item inventory that indexes ASD symptoms (see Stam, 1996). To date, however, there is no available data supporting its utility in identifying individuals who meet ASD diagnostic criteria or who subsequently satisfy PTSD criteria.

The aim of this project was to develop a self-report measure that would provide (a) identification of ASD, (b) a self-report version of the ASDI, and (c) a predictor of subsequent PTSD. These multiple goals derive from the dual purposes of the ASD diagnosis to describe severe acute trauma reactions and also to identify acutely traumatized people who are at risk of PTSD. There is a significant need for a validated self-report measure of ASD because structured clinical interviews are often not feasible in the aftermath of large-scale disasters. Self-report measures that permit identification of those acutely traumatized individuals who are at risk of chronic PTSD would provide opportunities for early intervention of people at risk. In developing a self-report measure of ASD, we recognize a number of difficulties. First, the diagnostic criteria of ASD have not been adequately validated (Bryant & Harvey, 1997). Most problematic for the ASD diagnosis is the finding that many acutely traumatized people who do not display dissociative symptoms subsequently develop PTSD (Harvey & Bryant, 1998, 1999b). Second, there is robust evidence that most people who are symptomatic in the weeks after a trauma naturally remit in the following months (Blanchard et al., 1996; Riggs, Rothbaum, & Foa, 1995; Rothbaum, Foa, Rigs, Murdock, & Walsh, 1992). Third, the reactive and acute nature of ASD may predispose it to a fluctuating course that may impede accurate and reliable measurement. Fourth, the ASD criteria permit dissociative symptoms that may occur at the time of the trauma or at any time during the month after the trauma. Retrospective reporting of ASD symptoms has been demonstrated to be inaccurate (Harvey & Bryant, in press-b). Considering the documented limitations of the ASD criteria, the development of this measure recognized the need to both identify ASD caseness and also to index the acute precursors of PTSD that may go beyond the current definition of ASD. This article presents the results of five studies that evaluated the

content and concurrent validity, reliability, factor structure, and predictive ability of the Acute Stress Disorder Scale (ASDS).

Study 1: Content Validity

Item Generation

The item content of the ASDS and ASDI are identical because the items for each were generated through the same process, and the ASDS was designed to be a self-report version of the ASDI. The ASDS items were generated by (a) basing the item content on DSM–IV criteria and (b) canvassing six experienced clinical psychologists to provide items that diagnose ASD. These clinicians each had at least 5 years experience in assessing acutely traumatized populations in specialist trauma clinics. Specifically, each clinician was provided with the DSM–IV criteria for ASD and requested to generate the minimum number of items required to comprehensively address each of the criteria. On the basis of the generated items, the authors identified 19 items that encompassed the symptoms nominated by the clinicians. The 19 items that comprise the ASDS included 5 dissociative, 4 reexperiencing, 4 avoidance, and 6 arousal symptoms (see Appendix). The wording of the ASDS differed from the ASDI in that items on the ASDS were phrased in order to facilitate self-report responses. The ASDS requires respondents to rate the extent to which each symptom is present on a 5-point scale ($1 = $ not at all, $5 = $ very much). The ASDS is scored by summing the scores for all items.

Item Review

The ASDS items were then rated by 5 experts in ASD.[1] These raters were selected on the basis of their expertise in assessment of ASD–PTSD, and included 2 members of the DSM–IV PTSD committee and 2 authors of the Stanford Acute Stress Reaction Questionnaire (SASRQ). Each expert rated the items on a 5-point scale ($1 = $ not at all, $5 = $ extremely) for relevance (the extent to which the item measures an ASD symptom), specificity (the extent to which the item measures a symptom that is specific to ASD), and clarity (the extent to which the item is clearly described). The ratings from the experts indicated the strength of the relevance (range $= $ 3.00–5.00, $M = $ 4.86, $SD = $ 0.93), specificity (range $= $ 3.00–5.00, $M = $ 4.44, $SD = $ 0.43), and clarity (range $= 2.00–5.00, M = 4.51, SD = 0.27$) of the items. The mean ratings across experts for each ASDS item was uniformly high, with the lowest mean rating for relevance, specificity, and clarity being 4.20, 4.33, and 4.01, respectively. Accordingly, each item was retained, and three items were marginally rephrased to enhance clarity.

Study 2: Convergent Validity

Method

Following Haynes, Richard, and Kubany (1995), we tested the convergent validity of the ASDS by comparing the items against existing measures of dissociation, reexperiencing, avoidance, and arousal symptoms. The convergent validity of the ASDS was then evaluated by comparing the total scores of the dissociative, reexperiencing, avoidance, and arousal clusters with psychometrically sound measures of dissociation, reexperiencing, avoidance, and arousal.

Participants. Ninety-nine (65 men, 34 women) adults of mean age 31.59 years ($SD = $ 11.28) who were consecutive referrals to the PTSD Unit at Westmead Hospital following motor vehicle accidents ($n = $ 54), nonsexual assault ($n = $ 26), or industrial accidents ($n = $ 19) participated in the study. Inclusion criteria included experience of a trauma within 28 days of assessment, proficiency in English, aged between 17 and 65 years of age, no evidence of traumatic brain injury, and no prescription of narcotic analgesia (with the exception of codeine). The sample comprised 65 White, 12 Asian, and 22 Mediterranean participants.

Procedure. Participants were initially administered the ASDI by 1 of 3 clinical psychologists between 2 and 24 days posttrauma ($M = $ 6.81, $SD = $ 5.67). Between 2 and 10 days later ($M = $ 2.56, $SD = $ 2.37), participants were instructed to complete a battery of self-report measures. Dissociation was indexed with the Dissociative Experiences Scale—Taxon (DES–T; Waller, Putnam, & Carlson, 1996). The DES–T is an 8-item version of the original 28-item DES scale. The DES has been shown to have strong internal consistency ($\alpha = $ .93) and test–retest reliability (.84 to .96; Carlson & Armstrong, 1994). The DES–T indexes pathological dissociation, and it has been shown to differentiate between psychiatric presentations that contain dissociative symptoms and those that do not (Waller et al., 1996). Reexperiencing and avoidance were assessed using the Intrusion and Avoidance scales of the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). The IES–Intrusion and IES–Avoidance scales have sound internal consistency (.79 to .91 and .82 to .91, respectively) and test–retest reliability (.86 to .89 and .88 to .90, respectively; Zilberg, Weiss, & Horowitz, 1982). The IES has been shown to correctly classify 82% of individuals with PTSD (Kulka et al., 1990). Arousal was assessed using the Beck Anxiety Inventory (BAI; Beck & Steer, 1990). The BAI is 21-item self-report measure of anxiety symptoms. It possesses good concurrent validity (.58) with the State–Trait Anxiety Inventory—Trait scale (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), internal consistency (Cronbach's $\alpha = $ .92), and test–retest reliability (.75; Frydrich, Dowdall, & Chambless, 1992).

Results

Table 1 presents the intercorrelations of the ASDS with the psychopathology measures. There were strong correlations between ASDS reexperiencing scores and IES–Intrusions, ASDS Avoidance scores and IES–Avoidance, and ASDS arousal scores and BAI scores. Moreover, ASDS total score correlated strongly with ASDI severity, IES, and BAI scores. The ASDS reexperiencing score correlated more with the IES–Intrusion than the ASDS avoidance score, $t(98) = $ 3.04, $p < $ .01. Conversely, the ASDS avoidance score correlated more with the IES–Avoidance than the ASDS intrusion score, $t(98) = 3.82, p < .01$. Higher scores on the ASDS cluster of dissociation was associated with higher ASDI dissociation scores but not with DES–T scores. That is, whereas the reexperiencing, avoidance, and arousal clusters correlated strongly with relevant psychopathology measures, the dissociative cluster correlated poorly.

We then compared the ASDS against the ASDI because the ASDS was intended to serve as a self-report version of the ASDI. The psychometric properties of the ASDI are described above. Diagnostic decisions of ASD are made on the ASDI by requiring the requisite symptom clusters of the ASD criteria to be affirmed. Twenty-eight (28%) of the sample met criteria for ASD on the basis of satisfying the ASD criteria on their ASDI responses. The

---

[1]Expert raters included Edward Blanchard, Etzel Cardeña, Terence Keane, Roger Pitman, and David Spiegel.

Table 1

Intercorrelations of the Acute Stress Disorder Scale (ASDS) With Validity Measures

Scale	ASDS items				
	Total	Dissociation	Reexperiencing	Avoidance	Arousal
ASDI Total	.86*	.70*	.82*	.77*	.84*
ASDI Dissociation	.65*	.69*	.59*	.54*	.61*
ASDI Reexperiencing	.78*	.59*	.81*	.71*	.75*
ASDI Avoidance	.80*	.64*	.74*	.79*	.76*
ASDI Arousal	.76*	.55*	.72*	.66*	.80*
DES–T	.18	.11	.19	.12	.19
IES–Intrusion	.81*	.60*	.83*	.71*	.81*
IES–Avoidance	.87*	.71*	.76*	.88*	.83*
BAI	.78*	.66*	.79*	.64*	.80*

Note. ASDI = Acute Stress Disorder Interview; DES–T = Dissociative Experiences Scale—Taxon; IES = Impact of Event Scale; BAI = Beck Anxiety Inventory.
*p < .001.

mean ASDS score for the sample was 44.93 (SD = 22.24, range = 19–70). Participants with ASD (M = 65.11, SD = 14.74) scored higher on the ASDS than those without ASD (M = 36.97, SD = 19.54), $t(97)$ = 6.88, p < 001. Sensitivity and specificity were calculated for different scores on the ASDS relative to the diagnosis of ASD. We found that the optimal formula for scoring the ASDS relative to the ASD diagnosis was to consider the dissociative and other clusters separately. That is, using a cutoff for the dissociative cluster of ≥9 combined with a cutoff of ≥28 for the cumulative scores on the reexperiencing, avoidance, and arousal clusters provided sensitivity of .95, specificity of .83, positive predictive power (of the ASDS cutoff identifying ASD) of .80, negative predictive power (of the ASDS cutoff identifying no ASD) of .96, and efficiency (the percentage correctly identified as meeting or not meeting ASD criteria) of .87.

Study 3: Reliability

Method

Participants. One hundred and seven (49 men, 58 women) adults of mean age 38.56 years (SD = 16.88) participated in this study. All participants were survivors of bushfires that occurred in Sydney or Hobart, Australia. Bushfire survivors were used to provide a second trauma population in which the generalizability of the ASDS could be evaluated. In each bushfire, participants were recruited by the relevant emergency authority identifying those 45 specific households that were threatened by the fires. In terms of participation rate, the 36 households that responded represented 80% of the 45 households invited to participate. The sample comprised 69 White, 15 Asian, and 23 Mediterranean participants.

Procedure. Participants were contacted between 19 and 24 days after the bushfires and asked to complete the ASDS by 1 of 4 clinical psychologists. All participants were contacted between 2 and 7 days (M = 2.56, SD = 2.37) after initial completion of the ASDS and were asked to complete the ASDS a second time. This retest interval was decided because of concerns that a longer interval may result in the second completion of the ASDS indexing changes in symptomatology rather than stability of the ASDS.

Results

Internal consistency. Internal consistency was indexed by calculating alpha coefficients for the ASDS total score and for each of

the symptom clusters. Alpha was .96 for the ASDS total score, .84 for dissociation, .87 for reexperiencing, .92 for avoidance, and .93 for arousal.

Test–retest reliability. The ASDS total scores correlated .94 between the two assessments. The test–retest reliability remained unchanged in a subsequent correlation analysis that partialed out the effect of test–retest interval (.94). To identify the reliabilities of each cluster of symptoms, we calculated the test–retest reliabilities of each cluster severity score. The test–retest correlation coefficients were strong for the dissociation (.85), reexperiencing (.94), avoidance (.89), and arousal (.94) clusters.

Study 4: Factor Structure

Method

Participants. To index the factor structure of the ASDS, we included the ASDS responses of the accident and assault victims from Study 2 (n = 99) and the initial completion of the ASDS of the fire victims from Study 3 (n = 107).

Procedure. The ASDS responses of these two samples were subjected to separate principal-components analyses that yielded varimax-rotated solutions. These samples were analyzed separately because they represented distinct trauma populations drawn from two different settings (an inpatient hospital population in Study 2 and a community sample in Study 3).

Results

Table 2 presents the factor loadings for each sample. In terms of the Study 2 sample, the model yielded three factors that accounted for 74% of the variance. The first factor accounted for 42% of the variance (eigenvalue = 7.95), and it comprised items pertaining to reexperiencing, avoidance, and arousal symptoms. The second factor accounted for 23% of the variance (eigenvalue = 4.40) and comprised items pertaining to dissociative symptoms. The third factor accounted for 9% of the variance (eigenvalue = 1.73), and it comprised the single item of dissociative amnesia. The Study 3 sample (fire victims) yielded four factors that accounted for 66% of the variance. The first factor accounted for 25% of the variance (eigenvalue = 4.77), and it comprised items pertaining to arousal, as well as intrusive memories, nightmares, distress on trauma

Table 2

Factor Loadings of the Acute Stress Disorder Scale (ASDS) Items

Item	Accident/Assault			Fire			
	1	2	3	1	2	3	4
Emotional numbness	.10	**.96**	.09	.31	.19	**.67**	.19
Feeling in a daze	.08	**.79**	.19	**.62**	.08	**.57**	.23
Things seem unreal	.23	**.73**	.11	.25	.12	**.76**	.10
Feeling different	.13	**.82**	.08	.10	.03	**.85**	.14
Amnesic of trauma	.10	.07	**.92**	.09	**.47**	**.44**	−.34
Intrusive memories	**.68**	.25	.05	**.65**	.24	.14	.12
Nightmares	**.47**	.32	.05	**.60**	**.52**	.11	.16
Sense of reexperiencing	**.96**	−.15	−.23	.27	.11	.10	**.75**
Distress on trauma reminders	**.76**	.06	.18	**.52**	**.59**	.24	.27
Avoid thinking about trauma	**.74**	.07	.14	.22	**.73**	.12	.29
Avoid talking about trauma	**.63**	.11	.23	.25	**.68**	.07	.14
Avoid reminders of trauma	**.81**	.10	.07	.26	**.72**	.21	−.14
Avoid emotions of trauma	**.89**	.09	.10	**.54**	.08	**.49**	.29
Difficulty sleeping	**.72**	.11	.10	**.75**	.09	.34	.11
Feeling irritable	**.65**	.06	.29	**.84**	.24	.23	.10
Difficulty concentrating	**.65**	.23	.12	**.76**	.29	.39	.10
Feeling more alert to danger	**.75**	.13	−.23	.09	.22	.23	**.72**
Feeling jump since trauma	**.88**	.08	−.12	**.63**	.18	.22	**.46**
Physiologically reactivity	**.93**	.05	.09	**.59**	.19	.34	.09

Note. Numbers in boldfaced type indicate items loading on each factor.

reminders, and feeling dazed. The second factor accounted for 16% of the variance (eigenvalue = 3.09) and comprised items pertaining to avoidance symptoms, as well as dissociative amnesia and distress on trauma reminders. The third factor accounted for 15% of the variance (eigenvalue = 2.85), and it comprised dissociative symptoms. The fourth factor accounted for 10% of the variance (eigenvalue = 1.89) and comprised hypervigilance to danger, being jumpy since the trauma, and a sense of reliving the trauma.

Study 5: Predictive Validity

Method

Participants. Eighty-two (32 men, 50 women) adults of mean age 39.91 years (*SD* = 15.93) participated in this study. These participants represented 77% of the 107 participants who initially completed the ASDS in Study 2. Participants did not differ from nonparticipants in terms of age, initial trauma-assessment interval, ASD diagnostic status, or ASDS total score. Six (7%) participants had received formal counseling as a result of the fires.

Procedure. Participants were contacted between 6 and 7 months after the bushfires (*M* = 6.32, *SD* = 0.31). Each participant was informed that a follow-up assessment was being conducted to evaluate longer term adjustment to the fires. All assessments were conducted by 1 of 4 clinical psychologists who were unaware of participants' scores on the ASDS. PTSD was assessed with the Clinician Administered PTSD Scale, Form 2 (CAPS-2; Blake et al., 1995). The CAPS-2 assesses frequency and severity of each PTSD symptom in the context of the last week. It possesses strong diagnostic sensitivity (84%) and specificity (95%), compared with the Structured Clinical Interview for *DSM–III–R* (Spitzer, Williams, Gibbon, & First, 1990), and sound internal consistency (α = .94) and test–retest reliability (.90 to .98; Blake et al., 1995). Symptom endorsement was defined as a frequency score of ≥1 and intensity score of ≥2. Participants were also asked about any therapeutic assistance they had received following the fires.

Results

Eleven (13%) of the sample met criteria for PTSD at 6 months posttrauma. Table 3 presents the correlation coefficients between the ASDS and CAPS-2 scale scores. The correlation between ASDS scores and PTSD cluster scores was significantly positive for all ASDS cluster scales. The main aim of this study was to determine the extent to which ASDS scores could predict subsequent PTSD. We initially determined predictive ability of an initial ASD diagnosis, based on the ASDS cutoff formula described in Study 1. On the basis of this calculation (note that percentages when participants who received therapy were excluded from analyses appear in parentheses), 90% (86%) of those who developed PTSD were initially diagnosed with ASD, and 80% (80%) of those who did not develop PTSD did not present with ASD. Less impressively, this formula also resulted in individuals who were identified as having ASD but who did not develop PTSD in 58% (20%) of cases. This formula resulted in individuals who were not identified as having ASD but who did develop PTSD in 2% (2%) of cases.

We attempted to increase the effectiveness of the predictive ability of the ASDS by focusing on overall severity of ASDS scores rather than requiring a minimum level of dissociative symptoms. This decision was guided by evidence that acute stress severity can be a more accurate predictor of PTSD than the requirement of acute dissociation (Brewin et al., 1999; Harvey & Bryant, 1998, in press-b). We investigated the sensitivity and specificity of ASDS total scores in predicting PTSD. Table 4 presents the sensitivity, specificity, predictive values, and effectiveness of the ASDS for five alternative cutoff scores. The optimal cutoff score was 56, which identified (note that percentages when participants who received therapy were excluded from analyses appear in parentheses) 91% (86%) of those who developed

Table 3
Correlation Coefficients of Acute Stress Disorder Scale (ASDS) Scores and Clinician Administered Posttraumatic Stress Disorder Scale, Form 2 (CAPS-2) Scores

CAPS-2	ASDS				
	Total	Dissociation	Reexperiencing	Avoidance	Arousal
Total					
Frequency	.65	.37	.71	.96	.67
Intensity	.66	.42	.72	.44	.66
Reexperiencing					
Frequency	.63	.36	.72	.40	.64
Intensity	.68	.44	.75	.47	.66
Avoidance					
Frequency	.62	.39	.65	.45	.62
Intensity	.65	.42	.68	.45	.64
Arousal					
Frequency	.62	.33	.68	.41	.66
Intensity	.61	.37	.67	.38	.62

Note. All correlation coefficients $p < .001$.

PTSD and 93% (93%) of those who did not. The main flaw with this cutoff was that it falsely identified 33% (20%) of people as being at risk of developing PTSD but who did not develop PTSD.

General Discussion

The ASDS was developed to provide (a) a self-report version of the ASDI and (b) a self-report measure of acute stress reactions that would identify people who would subsequently develop PTSD. In terms of the first goal, the ASDS demonstrated reasonable internal consistency, convergent validity, and test–retest reliability. The described cutoff score was able to identify 95% of participants who were diagnosed with ASD on the ASDI and 83% of those who were not diagnosed with ASD. We emphasize that the items on the ASDS mimic those on the ASDI, and therefore we would expect strong convergence between these two indexes. The ASDS should be validated against independent clinician diagnosis of ASD. Unfortunately, there is currently no gold standard for assessing ASD, and the development of a reliable measure is hindered by continued debate about the conceptual basis of this diagnostic structure. One implication of the empirical basis of our formula for identifying an ASD diagnosis is that it needs to be replicated across a range of trauma populations to establish the utility and generalizability of these findings. We suggest that the ASDS be considered cautiously until it can be validated against behavioral, physiological, and established diagnostic indicators of

acute trauma response. This qualification notwithstanding, the ASDS cluster scores correlated impressively with established measures of intrusive, avoidance, and arousal symptoms.

In terms of the second goal of the ASDS, there was limited success in predicting PTSD. We tested two formulae because they reflect two distinct approaches that are currently adopted in predicting PTSD. The method that focused on meeting the ASD criteria (i.e., cutoff for the dissociative cluster of ≥9 combined with a cutoff of ≥28 for the cumulative scores on the reexperiencing, avoidance, and arousal clusters) resulted in marginally poorer predictive ability than adopting a cutoff score of 56 on the ASDS. This pattern is consistent with evidence that predicting PTSD in the acute trauma phase is enhanced by not requiring the presence of dissociative symptoms (Brewin et al., 1999; Harvey & Bryant, 1998, in press-b). These two scoring methods for the ASDS reflect the dual purposes of the instrument, in that it is intended to provide an index of ASD diagnosis as well as a predictor of PTSD. Although the ASDS cutoff of 56 correctly identified 91% of people who developed PTSD and 93% of those who did not develop PTSD, one third of participants who scored over the cutoff did not develop PTSD. That is, whereas the ASDS was able to identify virtually all trauma survivors who subsequently developed PTSD, it did not filter these individuals out from a significant proportion who did not develop PTSD. It appears that the ASDS may serve a useful purpose as a self-report instrument to identify those people who are at risk of developing

Table 4
Predictive Values of Acute Stress Disorder Scale (ASDS) Scores for Identifying Subsequent Posttraumatic Stress Disorder

ASDS score	Sensitivity	Specificity	PPP	NPP	Efficiency
50	.83	.86	.50	.97	.85
52	.91	.86	.50	.98	.86
54	.91	.89	.56	.98	.89
56	.91	.93	.67	.98	.93
58	.55	.93	.55	.93	.89

Note. PPP = positive predictive power; NPP = negative predictive power.

PTSD. The results of the ASDS should be supplemented, however, by clinician assessments to more accurately identify acutely traumatized individuals who are at risk of developing PTSD.

The dissociation cluster score on the ASDS correlated poorly with the DES–T. This result may be attributed, in part, to documented limitations of the DES to index pathological dissociation (Nash, Hulsey, Sexton, Harralson, & Lambert, 1993; Sandberg & Lynn, 1992). This limitation may also apply to the DES–T because there is minimal evidence pertaining to its capacity to index dissociative psychopathology. This result may also be attributed to the description of the dissociative symptoms defined in the ASD criteria. Bryant and Harvey (1997) have criticized the description of the ASD dissociative symptoms because of (a) the loose requirement that the symptoms can be either transient experiences that occur at the time of the trauma or ongoing reactions, (b) the lack of conceptual distinctiveness between symptoms, and (c) the lack of parameters between normal and pathological dissociative reactions. Finally, it is possible that the descriptors of the dissociative items on the ASDS were not clearly understood by respondents. Future research needs to clarify the extent to which the dissociative questions on the ASDS correlate with other measures of dissociation, such as the Peritraumatic Dissociative Experiences Questionnaire (Marmar, Weiss, & Metzler, 1997).

The factor structure of the ASDS in the Study 3 sample was partially consistent with the *DSM–IV* conceptualization of ASD. The dissociative symptoms loaded on a factor that we termed *Dissociation* and suggest that acute dissociative symptoms are distinct from other acute posttraumatic stress symptoms. Arousal and reexperiencing symptoms loaded on a factor we term *Intrusion–Arousal*. The observed clustering of reexperiencing and arousal symptoms is consistent with the proposal that acute arousal is strongly related to distress associated with intrusive and distressing memories (Bryant & Harvey, 2000). Consistent with *DSM–IV*, a third factor that we termed *Avoidance* included avoidance symptoms, distress on reminders, and dissociative amnesia. These loadings may be explained in terms of avoidance being a reaction to distress associated with trauma reminders. The inclusion of dissociative amnesia on this factor may have occurred because this item may have been interpreted in the self-report format as active cognitive avoidance. A final factor that we termed *Reactivity* included hypervigilance, heightened startle response, and a sense of reliving the trauma. These items are conceptually linked by the notion that the experience of reliving the trauma results in excessive psychophysiological reactivity and sensitivity to external stimuli (Pitman, 1993). Although the factor structure of the Study 2 sample also loaded dissociative symptoms on a Dissociation cluster, dissociative amnesia loaded on a separate factor in this sample. The remaining symptoms all loaded on a single factor, suggesting that the reexperiencing, avoidance, and arousal symptoms were strongly interrelated. This finding is consistent with the significant interrelationships reported in Table 1 between ASDS cluster scores and both related and unrelated psychopathology scales. These patterns suggest that in the Study 2 sample the responses loaded predominantly on a higher order construct that does not distinguish between the *DSM–IV* clusters. The difference factor structures between the samples may be associated with (a) the more severe injuries sustained by the hospitalized Study 2 sample, (b) the inpatient hospital context in which the Study 2 sample was assessed, or (c) the influence of having been admin-

istered the ASDI prior to the ASDS in the Study 2 sample. These discrepant findings point to the need for studies to replicate the factor structure of the ASD symptoms across a range of trauma populations to empirically determine the factor structure of this construct.

We recognize a number of limitations in the current studies. First, Study 3 had a moderate prevalence rate of PTSD, which may have affected the predictive performance of the ASDS (Baldessarini, Finkelstein, & Arana, 1983). Previous studies have demonstrated the importance of validating measures of PTSD in populations that have varying prevalence rates (Gerardi, Keane, & Penk, 1989). Further, the incidence of ASD in Study 1 (28%), in which many participants were referrals to a treatment service, is somewhat higher than previously reported incidence rates in consecutive community samples (Brewin et al., 1999; Harvey & Bryant, 1999a). The ASDS needs to be subjected to further testing with larger samples from a range of trauma populations. Second, evidence that acute stress reactions can fluctuate markedly (Feinstein, 1989; Rothbaum et al., 1992) may have influenced results. For example, the administration of the ASDI between 2 and 10 days before completion of the ASDI may have resulted in assessment of different trauma reactions. Similarly, the test–retest interval in Study 3 was intentionally short because of concerns that longer intervals may result in changes in test–retest responses that reflect symptom changes rather than the stability of the ASDS. This issue is an inherent problem in measures of ASD because of the fluctuating nature of symptoms in the acute phase.

Development of measures of ASD is complicated by the limited conceptual and empirical foundations of the ASD diagnosis. As evidence accumulates that the current diagnostic criteria are not the optimal means to identify people at risk of PTSD (Bryant & Harvey, 2000), there may be a need to develop measures that extend beyond the current description of ASD. We recognize that the identification of ASD and the prediction of PTSD are overlapping, but distinct, goals. Accordingly, future research with the ASDS should evaluate both of these goals across a range of populations that traverse trauma types, gender, age, and context of assessment. It is possible that developing a self-report measure that identifies acutely traumatized people whose symptoms will not remit remains a difficult task because of the tendency for most people to recover in the months after a trauma. Early treatment of trauma survivors with ASD can effectively prevent PTSD in many cases (Bryant, Harvey, Sackville, Dang, & Basten, 1998; Bryant, Sackville, Dang, Moulds, & Guthrie, 1999). Accordingly, development of screening instruments that facilitate identification of people who will develop PTSD can have significant implications for managing traumatized populations.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Baldessarini, R. J., Finkelstein, S., & Arana, G. W. (1983). The predictive power of diagnostic tests and the effect of prevalence of illness. *Archives of General Psychiatry, 40,* 569–573.

Beck, A. T., & Steer, R. A. (1990). *Beck Anxiety Inventory—Manual.* San Antonio, TX: Psychological Corporation.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a

clinician administered PTSD scale. *Journal of Traumatic Stress, 8*, 75–90.

Blanchard, E. B., Hickling, E. J., Barton, K. A., Taylor, A. E., Loos, W. K., & Jones-Alexander, J. (1996). One-year prospective follow-up of motor vehicle accident victims. *Behaviour Research and Therapy, 34*, 775–778.

Brewin, C. R., Andrews, B., Rose, S., & Kirk, M. (1999). Acute stress disorder and posttraumatic stress disorder in victims of violent crime. *American Journal of Psychiatry, 156*, 360–366.

Bryant, R. A., & Harvey, A. G. (1997). Acute stress disorder: A critical review of diagnostic issues. *Clinical Psychology Review, 17*, 757–773.

Bryant, R. A., & Harvey, A. G. (1998). Relationship of acute stress disorder and posttraumatic stress disorder following mild traumatic brain injury. *American Journal of Psychiatry, 155*, 625–629.

Bryant, R. A., & Harvey, A. G. (2000). *Acute stress disorder: A handbook of theory, assessment, and treatment.* Washington, DC: American Psychological Association.

Bryant, R. A, Harvey, A. G., Dang, S., & Sackville, T. (1998). Assessing acute stress disorder: Psychometric properties of a structured clinical interview. *Psychological Assessment, 10*, 215–220.

Bryant, R. A, Harvey, A. G., Sackville, T., Dang, S., & Basten, C. (1998). Treatment of acute stress disorder: A comparison of cognitive–behavioral therapy and supportive counseling. *Journal of Consulting and Clinical Psychology, 66*, 862–866.

Bryant, R. A., Sackville, T., Dang, S. T., Moulds, M. L., & Guthrie, R. M. (1999). Treating acute stress disorder: An evaluation of cognitive–behavior therapy and supportive counseling techniques. *American Journal of Psychiatry, 156*, 1780–1786.

Cardeña, E., Classen, C., & Spiegel, D. (1991). *Stanford acute stress reaction questionnaire.* Stanford, CA: Stanford University Medical School.

Carlson, E. B., & Armstrong, J. (1994). The diagnosis and assessment of dissociative disorders. In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 159–174). New York: Guilford Press.

Feinstein, A. (1989). Posttraumatic stress disorder: A descriptive study supporting *DSM–III–R* criteria. *American Journal of Psychiatry, 146*, 665–666.

Frydrich, T., Dowdall, D., & Chambless, D. (1992). Reliability and validity of the Beck Anxiety Inventory. *Journal of Anxiety Disorders, 6*, 55–61.

Gerardi, R., Keane, T. M., & Penk, W. (1989). Utility: Sensitivity and specificity in developing diagnostic tests of combat-related posttraumatic stress disorder (PTSD). *Journal of Clinical Psychology, 45*, 691–701.

Harvey, A. G., & Bryant, R. A. (1998). Relationship of acute stress disorder and posttraumatic stress disorder following motor vehicle accidents. *Journal of Consulting and Clinical Psychology, 66*, 507–512.

Harvey, A. G., & Bryant, R. A. (1999a). Acute stress disorder across trauma populations. *Journal of Nervous and Mental Disease, 187*, 443–446.

Harvey, A. G., & Bryant, R. A. (1999b). The relationship between acute stress disorder and posttraumatic stress disorder: A two-year prospective evaluation. *Journal of Consulting and Clinical Psychology, 67*, 985–988.

Harvey, A. G., & Bryant, R. A. (in press-b). Memory for acute stress disorder symptoms: A two-year prospective study. *Journal of Nervous and Mental Disease.*

Harvey, A. G., & Bryant, R. A. (in press-a). A two-year prospective evaluation of the relationship between acute stress disorder and posttraumatic stress disorder following mild traumatic brain injury. *American Journal of Psychiatry.*

Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment, 7*, 238–247.

Horowitz, M. J., Wilner, N., & Alvarez, W. (1979). The Impact of Event Scale: A measure of subjective stress. *Psychosomatic Medicine, 41*, 209–218.

Kulka, R. A., Schlenger, W. E., Fairbank, J. A., Hough, R. L., Jordan, B. K., Marmar, C. R., & Weiss, D. S. (1990). *Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study.* New York: Brunner/Mazel.

Marmar, C. R., Weiss, D. S., & Metzler, T. J. (1997). The Peritraumatic Dissociative Experiences Questionnaire. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 412–428). New York: Guilford Press.

Nash, M. R., Hulsey, T. L., Sexton, M. C., Harralson, T. I., & Lambert, W. (1993). Long-term sequelae of childhood sexual abuse: Perceived family environment, psychopathology, and dissociation. *Journal of Consulting and Clinical Psychology, 61*, 276–283.

Pitman, R. K. (1993). Biological findings in posttraumatic stress disorder: Implications for *DSM–IV* classification. In J. R. T. Davidson & E. B. Foa (Eds.), *Posttraumatic stress disorder: DSM–IV and beyond* (pp. 173–190). Washington, DC: American Psychiatric Press.

Riggs, D. S., Rothbaum, B. O., & Foa, E. B. (1995). A prospective examination of symptoms of posttraumatic stress disorder in victims of non-sexual assault. *Journal of Interpersonal Violence, 10*, 201–213.

Rothbaum, B. O., Foa, E. B., Riggs, D. S., Murdock, T., & Walsh, W. (1992). A prospective examination of post-traumatic stress disorder in rape victims. *Journal of Traumatic Stress, 5*, 455–475.

Sandberg, D. A., & Lynn, S. J. (1992). Dissociative experiences, psychopathology and adjustment, and adolescent maltreatment in female college students. *Journal of Abnormal Psychology, 101*, 717–723.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State–Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychologists Press.

Spitzer, R. L., Williams, J. B., Gibbon, M., & First, M. B. (1990). *User's guide for the structured clinical interview for DSM–III–R: SCID.* Washington, DC: American Psychiatric Association.

Stamm, H. (1996). *Measurement of stress, trauma, and adaptation.* Lutherville, MD: Sidran Press.

Waller, N. G., Putnam, F. W., & Carlson, E. B. (1996). Types of dissociation and dissociative types: A taxometric analysis of dissociative experiences. *Psychological Methods, 1*, 300–321.

Zilberg, N. J., Weiss, D. S., & Horowitz, M. J. (1982). The Impact of Event Scale: A cross validation study and some empirical evidence supporting a conceptual model of stress response syndromes. *Journal of Consulting and Clinical Psychology, 50*, 407–414.

(Appendix follows)

Appendix

Acute Stress Disorder Scale

Name: Date:

Briefly describe your recent traumatic experience:

Did the experience frighten you?   Yes or No

Please answer each of these questions about how you have felt since the event. Circle one number next to
   each question to indicate how you have felt.

1 *Not at all*
2 *Mildly*
3 *Medium*
4 *Quite a bit*
5 *Very much*

During or after the trauma, did you ever feel numb or distant from your emotions?
During or after the trauma, did you ever feel in a daze?
During or after the trauma, did things around you ever feel unreal or dreamlike?
During or after the trauma, did you ever feel distant from your normal self or like you were watching it
   happen from outside?
Have you been unable to recall important aspects of the trauma?
Have memories of the trauma kept entering your mind?
Have you had bad dreams or nightmares about the trauma?
Have you felt as if the trauma was about to happen again?
Do you feel very upset when you are reminded of the trauma?
Have you tried not to think about the trauma?
Have you tried not to talk about the trauma?
Have you tried to avoid situations or people that remind you of the trauma?
Have you tried not to feel upset or distressed about the trauma?
Have you had trouble sleeping since the trauma?
Have you felt more irritable since the trauma?
Have you had difficulty concentrating since the trauma?
Have you become more alert to danger since the trauma?
Have you become jumpy since the trauma?
When you are reminded of the trauma, do you sweat or tremble or does your heart beat fast?