# Predicting Posttraumatic Stress After Hospitalization for Pediatric Injury

W. BURLESON DAVISS, M.D., DAVID MOONEY, M.D., ROBERT RACUSIN, M.D., JULIAN D. FORD, PH.D., AMY FLEISCHER, M.S.W., AND GREGORY J. MCHUGO, PH.D.

**ABSTRACT**

**Objective:** To determine the prevalence and predictors of posttraumatic stress disorder (PTSD) in children after hospitalizations for accidental injuries. **Method:** Forty-eight children (aged 7–17 years) and their parents were assessed during hospitalization with measures of children's prior traumatization, prior psychopathology, injury severity, parental acute distress, and child acute distress. At outpatient follow-up at least 1 month later, children were evaluated for current PTSD diagnosis and PTSD symptomatology (PTSDS) by a child structured interview and for PTSDS by a parent questionnaire. **Results:** A total of 12.5% had the full syndrome of PTSD at follow-up, and an additional 16.7% had partial (subsyndromal) PTSD. Full PTSD was associated with a higher level of prior psychopathology, higher parental acute distress, and higher rates of prior sexual abuse, compared with partial or no PTSD. Prior psychopathology, parental distress, and, to a lesser extent, children's acute distress as reported by parents and breadth of prior traumatization, predicted subsequent PTSDS. **Conclusions:** Full or partial PTSD is relatively common in youths 1 month or more after hospitalization for injuries. Parents' acute distress as well as children's prior psychopathology, prior traumatization, and acute distress may be useful predictors of such injured children's subsequent PTSD or PTSDS. *J. Am. Acad. Child Adolesc. Psychiatry,* 2000, 39(5):576–583. **Key Words:** predictors, posttraumatic stress, injury.

Posttraumatic stress disorder (PTSD) after childhood injury has received less research attention than other childhood traumas, even though injuries are a common experience of childhood, resulting in more than 600,000 admissions of pediatric patients to hospitals annually in the United States (Division of Injury Control, 1990). A review of 25 recent empirical studies of childhood PTSD (Foy et al., 1996), for example, included no studies specifically of injured children, although some studies have suggested PTSD may follow childhood injuries. In burned patients, Stoddard and colleagues (1989) found current and lifetime PTSD rates of 6.7% and 30.0%, respectively. Rossman and colleagues (1997) found elevated dissociation and other PTSD symptoms in children injured in dog attacks. DiGallo and colleagues (1997) found that moderate to severe PTSD symptoms occurred 2 to 3 months after injury in 14% of children hospitalized for injuries due to traffic accidents.

Research in children with noninjury traumatic exposure has provided strong evidence for the association of certain risk factors with subsequent PTSD. Variables most consistently predictive of childhood PTSD have included child acute stress, parental distress, and the degree of the current traumatic exposure (Foy et al., 1996). Two additional risk factors, prior child trauma exposure (Boney-McCoy and Finkelhor, 1995; Nader et al., 1990) and prior child psychopathology (Boney-McCoy and Finkelhor, 1996; Earls et al., 1988), have also been suggested.

Studies examining predictors of PTSD diagnosis or symptomatology in injured children have identified many of the same risk factors reported in the general childhood PTSD literature, including acute child distress (DiGallo et al., 1997; Martini et al., 1990; Max et al., 1998), acute parental distress (Martini et al., 1990; Rossman et al.,

*Accepted November 9, 1999.*

*From Dartmouth Medical School, Lebanon, NH. Dr. Ford is also with the National Center for PTSD, White River Junction, VT, and Drs. Daviss and McHugo are with the Psychiatric Research Center, Dartmouth Medical School.*

*This study was funded by a grant from the Hitchcock Foundation of Dartmouth Medical School. A portion of Dr. Daviss' time was funded by a RISP grant through the NIMH. The authors thank those who helped in recruitment, data collection, and data entry, including research assistants Cristina Coren, Anna Adachi, Jessica Friedman, and Jessica Reisser, as well as Anne Baird, M.S.W.*

*Reprint requests to Dr. Daviss, Department of Psychiatry, 1 Medical Center Drive, Lebanon, NH 03756-0001; e-mail: William.B.Daviss@dartmouth.edu.*

0890-8567/00/3905-0576©2000 by the American Academy of Child and Adolescent Psychiatry.

1997), prior child psychopathology (Martini et al., 1990), and degree of traumatic exposure (Max et al., 1998; Rossman et al., 1997). However, the generalizability of such findings is limited by the use of small case studies (Martini et al., 1990), samples with mixtures of injured and noninjured youths (Rossman et al., 1997), limited types of injuries or accidents (DiGallo et al., 1997; Martini et al., 1990; and Rossman et al., 1997), or traumatic brain injuries only (Max et al., 1998). Only 2 have used longitudinal rather than cross-sectional designs (DiGallo et al., 1997; Max et al., 1998), and none have considered prior traumatization as a predictor.

In this report, we present findings of a prospective study intended to assess PTSD after hospitalization for accidental pediatric injuries. Our objective was to estimate the prevalence of PTSD 1 month or more after the hospitalization and to determine what factors measured during the hospitalization predicted PTSD. We hypothesized that PTSD diagnosis and PTSD symptomatology (PTSDS) after hospitalization would be associated with prior trauma exposure, prior behavioral problems, acute injury severity, and children's and parents' acute stress symptoms during the hospitalization.

## METHOD

### Subjects

Our study's protocol and consent form were approved by the Committee for the Protection of Human Subjects at Dartmouth Medical School. Subjects were recruited from a consecutive sample of injured pediatric patients admitted at least overnight to Dartmouth Hitchcock Medical Center between August 1, 1996, and September 15, 1997. Subjects ranging in age from 7 to 17 years were eligible. Exclusion criteria included delirium, pervasive developmental disorders, mental retardation, or living more than a 90-minute drive away. The parents of potential participants were approached by a pediatric surgeon (D.M.) and told that the study was investigating how children adjusted emotionally to their physical injuries. Families were paid $25 for participating.

The enrolled sample has previously been described (Daviss et al., 2000). Of the 54 subjects who completed hospital assessments, 3 subjects or their parents withdrew, 2 teenage patients ran away from their parents' homes, and another family moved without leaving a forwarding address. There were no significant differences between those who dropped out and the others who completed the study with regard to demographic variables or the other predictor variables (as described below), including previous traumatization, prior psychopathology, injury severity, children's acute stress, or parents' acute stress. The final sample consisted of 48 youths: 17 girls and 31 boys (mean age = 13.5, SD = 3.2). Ethnicity was predominantly white (95.8%), with one subject Asian and one Native American, thus reflecting the ethnicity of our geographic region. Twenty-five children lived with 2 parents, 13 with a single parent, 9 with a parent and stepparent, and 1 with foster parents. Thirty-two children (66.7%) had insurance, while 16 (33.3%) had either no insurance or Medicaid.

A variety of accident types led to the current hospitalization, including those involving automobile and auto–pedestrian collisions, falls, sports, gunshots, and burns/explosions (Daviss et al., 2000). Two subjects' (4.2%) parents died in the same accident, 4 subjects (8.3%) had family members seriously injured, and 8 (16.7%) had at least one friend seriously injured. Fifteen (31.3%) sustained lasting physical damage or disfigurement. Nineteen (39.6%) experienced a head injury. Twenty-two subjects (45.8%) underwent at least one significant medical procedure. The pediatric surgeon rated the children's injuries using the Injury Severity Score (ISS) (Baker et al., 1974). The ISS yields possible total scores ranging from 0 to 75, with higher scores signifying greater levels of injury. ISS of this sample ranged from 1 to 33 (mean = 12.6, SD = 9.2).

### Procedure

Data were obtained in 2 rounds from the injured child, one of his or her parents, and the child's primary nurse. Round 1 occurred while the patient was in the hospital. Round 2 occurred 1 month or more after round 1, during a specially scheduled outpatient visit. For 10 subjects, outpatient visits were not possible, so their round 2 interviews were done by telephone and parents returned completed questionnaires by mail. Because several subjects missed one or more round 2 appointments before finally being interviewed, the intervals between round 1 and round 2 ranged from 30 to 256 days (mean = 95 days, SD = 49 days; median = 78.5 days).

### Round 1 (In-Hospital) Measures

The psychometric properties of the round 1 measures obtained during the hospitalization are described in detail in another article (Daviss et al., 2000). These measures will be reviewed briefly here.

*Prior and Current Traumatization.* The child was interviewed by a clinician using the Traumatic Events Screening Inventory for Children (TESI-C) (Ford and Rogers, 1997). The TESI-C is a 15- item, semi-structured interview that inquires about a variety of traumatic events and determines whether any reported events qualify as trauma according to criterion A for PTSD. The parent of each child completed a parallel questionnaire, the TESI-P (Ford and Rogers, 1997). Any event type rated by either TESI-C or TESI-P as meeting criterion A was counted. We used a count of the number of different types of prior traumatic events as a summary measure, types of prior traumatization. We also did an exploratory analysis, examining specific rates of previous physical abuse, sexual abuse, and any other nonabuse trauma, as well as whether in the current accident the patient had experienced a family member or friend's injury or death.

*Prior Psychopathology.* Parents completed the Child Behavior Checklist (CBCL), describing behavior over the 6 months prior to the injury and hospitalization (Achenbach, 1991a). The CBCL includes 118 symptoms that yield a dimensional score of psychopathology, Total Problems, which was calculated as a *T* score using the 1991 Data Entry and Scorer software (Achenbach, 1991b).

*Injury Severity Scores.* ISS, described above, were used as an additional predictor of PTSDS. We also explored other injury- and accident-related factors gathered from medical record reviews, including whether the child had experienced brain injury or lasting impairment or disfigurement (labeled *permanent injury*).

*Children's Acute Distress as Observed by Parents and Nurses.* Parents completed the Child Stress Reaction Checklist (CSRC-P) (Saxe et al., 1997). Total scores for the 30 items ranged from 0 to 60, with higher scores suggesting more symptoms of acute stress disorder (ASD). Two investigators (W.B.D. and R.R.) categorized individual items from the CSRC-P into groups of symptom clusters according to *DSM-IV* crite-

ria for ASD (i.e., dissociative, reexperiencing, avoidance, and hyperarousal/anxiety) with perfect interrater agreement for each item ($\kappa$ = 1.0). Each child's primary nurse also rated ASD symptomatology with a 25-item version of the CSRC (CSRC-N) (Saxe et al., 1997) within a week of the child's admission or at the time of discharge, whichever came first (range of possible scores: 0–75).

*Parents' Acute Distress.* Parents completed a revised version of the Stanford Acute Stress Reaction Questionnaire (SASRQ-R) (Classen et al., 1998) to measure the parental distress surrounding the child's injury and hospitalization. The version of the SASRQ used here had 30 items and, after discussion with one of its authors, was modified by using 4 of the 6 original Likert-type response options, preserving their numerical values ("never" = 0, "occasionally" = 2, "often" = 4, and "very often" = 5). Higher total scores reflected higher parental distress (range of possible scores: 0–150).

### Round 2 (Follow-up) Measures

*Children's Self-Reported PTSD and PTSDS.* Children were interviewed at round 2 by one of the investigators (W.B.D., R.R., A.F., J.D.F.) using the Clinician Administered PTSD Scale, Child and Adolescent version (CAPS-CA) (Nader et al., 1996). The CAPS-CA is a structured interview, modified from an adult version (Blake et al., 1990) that has shown adequate psychometric properties (Blake et al., 1995). The CAPS-CA inquires about all *DSM-IV* PTSD symptoms, using developmentally appropriate language and visual aids (Nader, 1997). Children were asked to rate PTSD symptoms over the previous month by picking from a choice of several cartoon icons that quantified each symptom's frequency (0 = "none of the time" to 4 = "daily or almost every day") and intensity (0 = "no symptoms" to 4 = "a whole lot"). Following the authors' recommendations, a symptom was considered present if its frequency was rated at least 1 ("once or twice") and its intensity at least 2 ("some"). The CAPS-CA provides both a categorical diagnosis of PTSD as well as a total symptom severity score, calculated by summing the frequency and intensity ratings for the 17 symptoms (range of possible total scores: 0–136). Based on clinical impressions about the child's reported PTSDS and distress, the clinician administering the CAPS-CA assigned an Overall PTSD Severity Score on a 5-point scale (0 = "asymptomatic," 1 = "mild, minimal," 2 = "moderate," 3 = "severe," and 4 = "extreme"). All clinicians doing the CAPS-CA interviews completed a half-day symposium on CAPS-CA procedures. TESI-C responses in the hospital concerning the injury and hospitalization were used to determine whether criterion A was met for PTSD. In 10 cases, parents or patients were unable or unwilling to come in for the face-to-face interview at round 2; they were interviewed by telephone, a procedure with demonstrated reliability and validity for assessing psychiatric symptoms (Wells et al., 1988). Subjects interviewed by telephone were all at least 11 years of age and judged by the principal investigator to have sufficient language skills to complete a telephone interview. They were provided the same visual aids (mailed ahead of time) to quantify symptom severity. For both face-to-face and telephone interviews, subjects were interviewed apart from their parents to ensure independent ratings. Internal consistency was adequate for the CAPS-CA total symptom score ($\alpha$ = .89) and for each subscale (Reexperiencing $\alpha$ = .78, Avoidance/Numbing $\alpha$ = .73, Hyperarousal/Anxiety $\alpha$ = .78). Twenty of the face-to-face and 3 of the telephone interviews were recorded and rerated by at least 1 of 3 other investigators, with 100% interrater agreement on PTSD diagnosis ($\kappa$ = 1.00).

*Parents' Report of Children's Subsequent PTSDS.* For each child, a parent completed the PTSD Checklist (PCL-C/PR) (Ford and Rogers, 1997), rating each of 17 PTSD symptoms for degree of disturbance caused over the previous month on a 5-point scale ranging from 1 = "Not at all" to 5 = "Extremely" (total score's possible range: 17–85). In our sample, the PCL-C/PR was internally consistent for total score ($\alpha$ = .92) and subscale scores: Reexperiencing ($\alpha$ = .88), Avoidance/Numbing ($\alpha$ = .80), and Hyperarousal ($\alpha$ = .79). Convergent validity was suggested by the PCL-C/PR's correlation with CAPS-CA for total score ($r$ = 0.47, $p$ < .0005, one-tailed), Reexperiencing ($r$ = 0.53, $p$ < .0005), and Hyperarousal/Anxiety ($r$ = 0.51, $p$ < .0005). The correlation of CAPS-CA and PCL-C/PR subscale scores for Avoidance/Numbing was marginal ($r$ = 0.20, $p$ = .17). The PCL-C/PR total score demonstrated excellent 1-week retest reliability (intraclass correlation coefficient = 0.82, $F$ = 10.18, $p$ < .0005) in a sample of 21 youth psychiatric patients at intake evaluations.

*Subsequent General Psychopathology.* Parents again completed the CBCL but were asked only to describe behavior *since* the hospitalization. Total Problems $T$ scores were used in analyses.

### Statistical Analyses

Data were analyzed using the SPSS 6.1 software (SPSS, 1994). Three PTSD diagnostic groups were defined on the basis of the CAPS-CA interview. "Full PTSD" met all *DSM-IV* criteria for PTSD; "partial PTSD" did not meet full PTSD criteria but had at least one symptom of criterion B, criterion C, and criterion D and all other *DSM-IV* criteria (Stein et al., 1997); and "no PTSD" met neither full PTSD nor partial PTSD criteria. Chi-square analyses were used to compare nominal variables, and one-way analyses of variance were used for continuous variables, followed by post hoc Student-Newman-Keuls tests to further delineate differences ($p$ < .05) between diagnostic groups. A paired $t$ test compared round 1 and round 2 CBCL Total Problems scores for each diagnostic group.

Pearson correlations were calculated to measure relationships between child- and parent-rated levels of children's PTSDS and various predictors. An exploratory analysis also compared subsequent child- and parent-rated PTSDS scores with each ASD symptom subgroup's score (i.e., dissociative, reexperiencing, avoidance, and hyperarousal/anxiety). Because correlational hypotheses were directional, one-tailed tests were used here at a significance level of $p$ < .05 to increase statistical power.

## RESULTS

### Prevalence of PTSD

Forty-five children (93.8%) described their current experiences as meeting criterion A for PTSD, in contrast to only 30 (62.5%) of 48 parents for their children. Six subjects (12.5%) met criteria for full PTSD, while 8 others (16.7%) met criteria for partial PTSD based on the CAPS-CA interview. Round 2 CAPS-CA and PCL-C/PR scores confirmed that full PTSD was the most symptomatic group, followed by partial PTSD and no PTSD (Table 1). Overall PTSD Severity Scores as rated by clinicians were most severe in the full PTSD group (mean from moderate to severe), followed by the partial PTSD group (mean from mild to moderate). The PTSD diagnostic groups did not differ by round 2 CBCL Total Problems, and there were no significant changes from round 1 to round 2 in CBCL Total Problems, either for the overall sample or for any of the 3 diagnostic groups.

**TABLE 1**
Comparison of PTSD Diagnostic Status by Predictors

| Variable | Overall ($N$ = 48) | No PTSD ($n$ = 34) | Partial PTSD ($n$ = 8) | Full PTSD ($n$ = 6) | Statistical Test |
|---|---|---|---|---|---|
| Round 1 predictors | | | | | |
| Prior psychopathology (CBCL Total Problems) | 52.3 ± 11.7 | 51.2 ± 10.5[a] | 48.6 ± 14.3[b] | 63.2 ± 10.9[ab] | $F_{2,45}$ = 3.42* |
| Exposure to prior trauma meeting criterion A | | | | | |
| No. of types prior traumatic events | 1.4 ± 1.5 | 1.2 ± 1.4 | 1.6 ± 1.2 | 1.8 ± 2.1 | $F_{2,45}$ = 0.62 |
| Physically abused (%) | 25.0 | 23.5 | 25.0 | 33.3 | $\chi^2_2$ = 0.26 |
| Sexually abused (%) | 8.3 | 2.9 | 12.5 | 33.3 | $\chi^2_2$ = 6.39* |
| Exposed to other nonabuse trauma (%) | 60.4 | 58.8 | 75.0 | 50.0 | $\chi^2_2$ = 1.02 |
| Injury Severity Score | 12.6 ± 9.2 | 11.8 ± 8.2 | 15.6 ± 13.7 | 13.4 ± 8.3 | $F_{2,44}$ = 0.58 |
| Permanent injury (%) | 31.3 | 29.4 | 37.5 | 33.3 | $\chi^2_2$ = 0.21 |
| Brain injury (%) | 39.6 | 41.2 | 25.0 | 50.0 | $\chi^2_2$ = 1.02 |
| Other family/friend(s) injured or killed (%) | 22.9 | 20.6 | 12.5 | 50.0 | $\chi^2_2$ = 3.09 |
| Ratings of child acute distress | | | | | |
| CSRC-P | 8.7 ± 8.7 | 6.8 ± 5.7 | 11.8 ± 10.7 | 14.3 ± 16.5 | $F_{2,43}$ = 2.61 |
| CSRC-N | 13.9 ± 12.1 | 13.6 ± 12.7 | 14.8 ± 12.0 | 14.2 ± 11.1 | $F_{2,42}$ = 0.03 |
| Parent stress (SASRQ-R) | 26.3 ± 23.8 | 20.4 ± 18.0 | 37.3 ± 27.7 | 44.5 ± 34.9 | $F_{2,44}$ = 4.14* |
| Demographic and miscellaneous variables | | | | | |
| Age (years) | 13.5 ± 3.2 | 13.4 ± 3.4 | 12.25 ± 2.9 | 15.7 ± 0.8 | $F_{2,45}$ = 0.13 |
| Gender (% female) | 35.4 | 29.4 | 37.5 | 66.7 | $\chi^2_2$ = 3.11 |
| Time span from rounds 1 and 2 (days) | 95.2 ± 48.6 | 102.1 ± 49.5 | 82.3 ± 45.4 | 73.0 ± 44.2 | $F_{2,45}$ = 1.27 |
| Round 2 measures | | | | | |
| PTSD symptomatology | | | | | |
| Per child (CAPS-CA total score) | 24.4 ± 22.7 | 13.8 ± 3.4[ab] | 35.3 ± 14.4[bc] | 69.8 ± 22.5[ac] | $F_{2,45}$ = 53.96*** |
| Per parent (PCL-C/PR total score) | 26.7 ± 11.2 | 23.9 ± 7.5[a] | 29.4 ± 13.5 | 38.8 ± 17.4[a] | $F_{2,45}$ = 5.85** |
| Per clinician (Overall PTSD Severity) | 1.0 ± 1.0 | 0.6 ± 0.7[ab] | 1.5 ± 0.8[bc] | 2.5 ± 0.6[ac] | $F_{2,45}$ = 24.22*** |
| General psychopathology (CBCL Total Problems) | 52.0 ± 11.9 | 51.7 ± 11.5 | 50.5 ± 13.3 | 55.5 ± 13.9 | $F_{2,45}$ = 0.32 |

*Note:* Values represent groups' means ± SD or percentages. Superscript letters show pairs that are significantly different ($p < .05$) based on post hoc testing. PTSD = posttraumatic stress disorder; CBCL = Child Behavior Checklist; CSRC-P = Child Stress Reaction Checklist-Parent version; CSRC-N = Child Stress Reaction Checklist-Nurse version; SASRQ-R = Stanford Acute Stress Reaction Questionnaire-Revised; CAPS-CA = Clinician Administered PTSD Scale, Child and Adolescent version; PCL-C/PR = PTSD Checklist.
* $p < .05$; ** $p < .01$; *** $p < .001$ (2-tailed).

### Comparing PTSD Diagnostic Groups by Predictors

Table 1 compares the no PTSD, partial PTSD, and full PTSD groups regarding various round 1 predictors and other variables. There were no significant differences in demographic variables, insurance status, or mean time spans from round 1 to round 2, though there was a trend toward more females, older subjects, and shorter time spans in the full PTSD group. There were no significant differences in breadth of prior traumatization, though exploratory analysis found that the frequency of sexual abuse differed significantly across the 3 groups (Table 1), with the full PTSD group having the highest rate. Prior psychopathology and parents' acute distress differed significantly across the groups. Post hoc testing found that full PTSD had significantly higher prior psychopathology than both partial PTSD and no PTSD. Each more symptomatic PTSD group had higher parental acute distress, but post hoc testing found that no differences between groups reached significance. No other round 1 predictors differed significantly across the 3 groups, though differences in children's acute stress as rated by parents approached significance ($F_{2,43}$ = 2.61, $p$ = .09).

Given the trend observed in our sample toward longer time spans between round 1 and round 2 in the less symptomatic groups and the potential confounding effect of such varying time spans (Foy et al., 1996), we repeated these group comparisons while eliminating 8 subjects whose time spans exceeded 20 weeks. The remaining sample of 40 subjects was similar in its proportion of females (35%) and various PTSD groups (full PTSD: 12.5%; partial PTSD: 16.5%; no PTSD: 70%) to the original sample. The previously significant differences between groups remained significant for prior psychopathology, prior sexual abuse, and parental distress.

### Bivariate Correlates of PTSDS

Four round 1 variables correlated significantly though modestly with child-rated PTSDS, especially prior psy-

chopathology and parents' acute distress and, to a lesser extent, types of prior traumatization and parents' reports of children's acute stress (Table 2). Each of these predictors, especially parental distress, correlated even more significantly with parent-rated PTSDS. Additional, modest correlates of parent-rated PTSDS included nurse-rated ASD symptomatology, brain injury, and (inversely) time span from round 1 to round 2. Because of the potential confounding effect of varying time spans, a set of partial correlations was performed, controlling for time span. In these analyses, 3 of 4 previously significant correlates of child-rated PTSDS remained significant, the exception being parent ratings of children's acute stress ($r = 0.22, p = .07$), and all previously significant correlates of parent-rated PTSDS remained significant.

An exploratory analysis of zero-order correlations between various ASD symptom clusters (from the CSRC-P) and subsequent child-rated PTSDS (CAPS-CA total scores) found that hyperarousal/anxiety symptoms correlated modestly ($r = 0.33, p = .01$), while dissociative ($r = 0.13, p = .19$), reexperiencing ($r = 0.20, p = .09$), and avoidance symptoms ($r = 0.20, p = .10$) did not. In contrast, all ASD symptom clusters correlated significantly with parent-rated PTSDS (PCL-C/PR total scores), including dissociative ($r = 0.40, p = .002$), reexperiencing ($r = 0.50, p < .0005$), avoidance ($r = 0.41, p = .002$), and hyperarousal/anxiety ($r = 0.42, p = .002$).

## DISCUSSION

Traumatic stress was endemic in this sample of injured pediatric inpatients. Virtually all children (93.8%) reported the injury or hospitalization as meeting criterion A for PTSD. The 12.5% rate of PTSD at round 2 was similar to that found in 1 longitudinal study of injured children (14%; DiGallo et al., 1997), but higher than the rate found in 2 other studies (4%; Max et al., 1998; 6.7%; Stoddard et al., 1989). We observed 8 other children (16.7%) with subsyndromal (partial) PTSD, having a mean Overall PTSD Severity Score between mild and moderate. Studies of other types of childhood traumatization have described similar groups with subsyndromal but clinically significant PTSD (Giaconia et al., 1995; McLeer et al., 1992). Our findings suggest that although full-fledged PTSD may be infrequent after injuries, subsyndromal PTSD may also be associated with clinically significant psychiatric morbidity.

Several hypothesized predictors correlated significantly with *both* child and parent ratings of children's subsequent PTSDS, suggesting some convergent validity in our findings. These common predictors included prior psychopathology, parental distress, and, to a lesser extent, breadth of prior traumatization and parent ratings of children's acute distress. These predictors all had higher correlations with parent-rated PTSDS than with child-rated PTSDS. Child-rated PTSDS would be considered the "gold standard" in this study because it was determined from a struc-

**TABLE 2**
Correlation Coefficients of PTSD Measures and Predictors

| | CAPS-CA | PCL-C/PR |
|---|---|---|
| Dependent variables of PTSD symptomatology | | |
| Per child interview: CAPS-CA | 1.00 | |
| Per parent questionnaire: PCL-C/PR | 0.47*** | 1.00 |
| Predictors and potential confounds | | |
| Types of prior trauma meeting criterion A | 0.26* | 0.32* |
| Prior psychopathology (CBCL Total Problems) | 0.34** | 0.41** |
| Child acute distress | | |
| CSRC-P ($n = 46$) | 0.25* | 0.49*** |
| CSRC-N ($n = 45$) | 0.13 | 0.28* |
| Parent acute stress (SASRQ-R) ($n = 47$) | 0.31* | 0.73*** |
| Injury Severity Score ($n = 47$) | 0.13 | 0.18 |
| Brain injury | 0.14 | 0.29* |
| Permanent injury | −0.06 | 0.07 |
| Other family/friend(s) injured or killed | 0.16 | 0.21 |
| Time span between rounds 1 and 2 (days) | −0.21 | −0.26* |

*Note:* Numbers in columns are Pearson correlation coefficients. $N = 48$, except as noted in parentheses for variables with missing data. PTSD = posttraumatic stress disorder; CAPS-CA = Clinician Administered PTSD Scale, Child and Adolescent version; PCL-C/PR = PTSD Checklist; CBCL = Child Behavior Checklist; CSRC-P = Child Stress Reaction Checklist-Parent version; CSRC-N = Child Stress Reaction Checklist-Nurse version; SASRQ-R = Stanford Acute Stress Reaction Questionnaire-Revised.
* $p < .05$; ** $p < .01$; *** $p < .001$ (1-tailed).

tured interview with a clinician, whereas parent-rated PTSDS was measured with a written questionnaire.

That prior psychopathology was a strong predictor of PTSDS is consistent with previous studies of other types of childhood trauma (Boney-McCoy and Finkelhor, 1996; Earls et al., 1988). There are several possible explanations. Prior psychopathology might truly predispose injured children to subsequent PTSDS. PTSD after injury might also simply be a continuation of prior psychopathology, especially because our sample had experienced a fairly high rate of previous traumatization. It is interesting that round 2 CBCL Total Problems did not distinguish PTSD diagnostic groups, nor did CBCL Total Problems change significantly from round 1 to round 2 in the overall sample or in any of the diagnostic groups. CBCL Total Problems may thus function better as a predictor of subsequent PTSD than as a measure sensitive to current PTSDS. However, because parents were instructed to report behavioral problems observed *since* the hospitalization when completing the round 2 CBCL, this may have led them to underreport their children's general psychopathology after the hospitalization.

Parental distress was another especially strong predictor, consistent with previous studies of injury (Martini et al., 1990; Rossman et al., 1997) and other types of childhood traumas (Foy et al., 1996), and the single strongest predictor of parent-rated PTSDS. The strong intercorrelation of parental distress with other parent-rated predictors during the hospitalization (Daviss et al., 2000) may suggest a rater bias, with more highly stressed parents rating more previous or current psychopathology in their children. Yet parental distress also correlated with child-rated PTSDS, suggesting more than merely a measurement bias. Because parental distress was easily measured here with a short parent questionnaire completed during the hospitalization, it may be a particularly useful predictor of subsequent PTSD and PTSDS in injured youths.

Parents' and nurses' ratings of children's acute distress were weaker predictors of PTSDS in children. That only acute hyperarousal/anxiety symptoms correlated with child-rated PTSDS, unlike dissociative, reexperiencing, and avoidance symptoms, does not affirm the widely held theoretical link between acute stress (especially dissociative) symptoms and subsequent PTSD. Our results contrast with those of 2 other longitudinal studies of injured children (DiGallo et al., 1997; Max et al., 1998) and with much of the noninjury trauma literature in general (Foy et al., 1996). There are several possible explanations for this difference, including possible symptom overlap with delirium in this acutely injured population or a lack of awareness on parents' or nurses' parts of children's internalizing symptoms of ASD. In rating ASD symptomatology, parents may be influenced by their own acute distress and by children's prior psychopathology, and nurses may be influenced primarily by injury- and accident-related factors (Daviss et al., 2000). Moreover, relative to other injury studies (DiGallo et al., 1997; Max et al., 1998), our ASD measures were completed sooner after the injury, when ASD symptomatology would be higher and perhaps less specific as a predictor. Children so uniformly rated the current trauma as meeting at least criterion A for ASD/PTSD, for instance, that such a categorization in an inpatient setting would not distinguish those who later reported PTSD. Perhaps a measure that uses children's *self-reports* specifically to quantify their subjective distress related to the injury and their other ASD symptomatology would prove more useful in predicting subsequent PTSDS.

Unlike other studies of injured children, in this study we examined prior traumatization as a potential predictor. Not only was the rate of any type of prior traumatization surprisingly high (66.7%) in this nonpsychiatric sample, but the breadth of traumatic events correlated modestly with PTSDS, as rated by both children and parents. Moreover, we found a significantly higher rate of prior sexual abuse in our full PTSD and partial PTSD groups relative to the no PTSD group, especially in female patients. Prior traumatization has previously been linked to PTSDS after acute exposure to *noninjury* traumas (Boney-McCoy and Finkelhor, 1995; Nader et al., 1990). Our results suggest that prior traumatization may be associated with PTSDS after *injury* trauma as well, though once again current PTSDS could also be a continuation of prior psychopathology.

There were some interesting nonfindings and trends with other variables. First, except for a modest bivariate correlation between brain injury and parent-rated PTSDS, none of the injury-related or accident-related factors proved predictive of subsequent PTSD or PTSDS. This contrasts with a previously noted link between ASD symptomatology and brain injury, injury severity, permanent injury, and injury or death to family or friends (Daviss et al., 2000), as well as with other empirical research in injured children (Max et al., 1998). Perhaps other trauma-related factors not measured here need to be considered. Second, there was a trend toward higher PTSDS in our female patients, which could suggest a greater vul-

nerability in injured females. However, this may also reflect a gender link with other significant predictors such as females' higher rate of prior sexual abuse.

### Limitations

A potential confound was the varied time span between round 1 and round 2 assessments. Other empirical research has noted a decline in PTSDS over longer periods of time (Foy et al., 1996). Patients followed up sooner tended toward higher PTSDS. Unfortunately, measuring PTSDS at only one time point, we cannot say whether patients who were followed up later may have been more symptomatic earlier, or whether their longer delay was *because* they were persistently nonsymptomatic and less motivated for follow-up. It is worth noting that the same predictors differed significantly across diagnostic groups even when subjects with prolonged time spans were excluded from the analyses. Moreover, when we controlled for time span with partial correlations, the same correlates of PTSDS remained significant with one exception (parent-rated PTSDS and parent-rated children's acute distress). Future investigators, however, will want to examine postinjury PTSD over multiple, more uniform time intervals.

Several additional limitations also render this study's findings preliminary. Sampling biases may have led us to include more vulnerable patients with not only higher ISS but also perhaps fewer psychosocial resources to cope with the current trauma on an outpatient basis. Lacking a control group of noninjured or non–accident-victim children, we are unable to exclude the possibility that round 2 PTSD symptoms were simply a continuation of preexisting symptoms, especially given the high rate of prior trauma exposure and the lack of a preinjury measure specific for PTSDS. Moreover, because our clinical assessments focused primarily on PTSDS, we may have missed other psychiatric disorders emerging after the injury and hospitalization. Given the dearth of psychometric measures for childhood ASD and PTSD research (Nader, 1997), we necessarily used several new measures with limited psychometric data and did not include a *child-rated* measure specific for ASD symptomatology as a predictor. Our sample was too small to explore adequately other potential predictors and confounds. These limitations, along with the homogeneous ethnocultural characteristics of our sample, suggest a need for replication in a larger, independent sample.

### Clinical Implications

Injuries requiring hospitalization were described by most children as traumatic and, in almost 30% of our sample, were followed by either full or subsyndromal PTSD. Full PTSD, though relatively uncommon in children after hospitalization for injury, may represent only the most extreme degree of psychiatric morbidity in this population. Hospital measures of baseline psychopathology and acute parental distress may be especially useful in identifying injured children at greatest risk for subsequent PTSD. Prior traumatization and acute child distress, while weaker predictors of PTSD diagnosis in this sample, may also correlate with subsequent PTSDS. Above all, this study suggests the need to devise possible therapeutic interventions for this seemingly vulnerable group of youths.

## REFERENCES


Achenbach TM (1991a), *Manual for the Child Behavior Checklist/4–18 and 1991 Profile*. Burlington: University of Vermont Department of Psychiatry

Achenbach TM (1991b), *Program Manual for the 1991 CBCL/4–18 Profile IBMPC Version*. Burlington: University Associates in Psychiatry

Baker SP, O'Neill B, Haddon W, Long WB (1974), The Injury Severity Score: a method for describing patients with multiple injuries and evaluating emergency care. *J Trauma* 14:187–196

Blake DD, Weathers FW, Nagy LM et al. (1990), A clinician rating scale for assessing current and lifetime PTSD: the CAPS-1. *Behav Ther* 18:187–188

Blake DD, Weathers FW, Nagy LM, Kaloupek DG (1995), The development of a clinician-administered PTSD scale. *J Trauma Stress* 8:75–90

Boney-McCoy S, Finkelhor D (1995), Psychosocial sequelae of violent victimization in a national youth sample. *J Consult Clin Psychol* 63:726–736

Boney-McCoy S, Finkelhor D (1996), Is youth victimization related to trauma symptoms and depression after controlling for prior symptoms and family relationships? A longitudinal, prospective study. *J Consult Clin Psychol* 64:1406–1416

Classen C, Koopman C, Hales R, Spiegel D (1998), Acute stress disorder as a predictor of posttraumatic stress symptoms. *Am J Psychiatry* 155:620–624

Daviss WB, Racusin R, Fleischer A, Mooney D, Ford JD, McHugo GJ (2000), Acute stress disorder symptomatology during hospitalization for pediatric injury. *J Am Acad Child Adolesc Psychiatry* 39:569–575

DiGallo A, Barton J, Parry-Jones WL (1997), Road traffic accidents: early psychological consequences in children and adolescents. *Br J Psychiatry* 170:358–362

Division of Injury Control (1990), Centers for Disease Control: childhood injuries in the United States. *Am J Dis Child* 144:627–652

Earls F, Smith E, Reich W, Jung KG (1988), Investigating psychopathological consequences of a disaster in children. *J Am Acad Child Adolesc Psychiatry* 27:90–95

Ford JD, Rogers K (1997), Empirically-based assessment of trauma and PTSD with children and adolescents. In: *Proceedings From the International Society for Traumatic Stress Studies Annual Meeting*, Montreal, November

Foy DW, Madvig BT, Pynoos RS, Camilleri AJ (1996), Etiologic factors in the development of posttraumatic stress disorder in children and adolescents. *J Sch Psychol* 34:133–145

Giaconia RM, Reinherz HZ, Silverman AB, Pakiz B, Frost AK, Cohen E (1995), Traumas and posttraumatic stress disorder in a community population of older adolescents. *J Am Acad Child Adolesc Psychiatry* 34:1369–1380

Martini DR, Ryan C, Nakayama D, Ramenofsky M (1990), Psychiatric sequelae after traumatic injury: the Pittsburgh Regatta accident. *J Am Acad Child Adolesc Psychiatry* 29:70–75

Max JE, Castillo CS, Robin DA et al. (1998), Posttraumatic stress symptomatology after childhood traumatic brain injury. *J Nerv Ment Dis* 186:589–596

McLeer SV, Deblinger E, Henry D, Orvaschel H (1992), Sexually abused children at high risk for post-traumatic stress disorder. *J Am Acad Child Adolesc Psychiatry* 31:875–879

Nader K, Pynoos R, Fairbanks L, Frederick C (1990), Children's PTSD reactions one year after a sniper attack at their school. *Am J Psychiatry* 147:1526–1530

Nader KO (1997), Assessing traumatic experiences in children. In: *Assessing Psychological Trauma and PTSD,* Wilson JP, Keane TM, eds. New York: Guilford, pp 291–348

Nader KO, Kriegler JA, Blake DD, Pynoos RS, Newman E, Weather FW (1996), *Clinician Administered PTSD Scale, Child and Adolescent Version.* White River Junction, VT: National Center for PTSD

Rossman BBR, Bingham RD, Emde RN (1997), Symptomatology and adaptive functioning for children exposed to normative stressors, dog attack, and parental violence. *J Am Acad Child Adolesc Psychiatry* 36:1089–1097

Saxe G, Stoddard F, Ford J et al. (1997), The Child Stress Reaction Checklist: a measure of ASD and PTSD in children. In: *Proceedings From the International Society for Traumatic Stress Studies Annual Meeting,* Montreal, November

SPSS (1994), *SPSS 6.1 Base System User's Guide, Part 1, Macintosh Version.* Chicago: SPSS Inc

Stein MB, Walker JR, Hazen AL, Forde DR (1997), Full and partial posttraumatic stress disorder: findings from a community survey. *Am J Psychiatry* 154:1114–1119

Stoddard FJ, Norman DK, Murphy JM, Beardslee WR (1989), Psychiatric outcome of burned children and adolescents. *J Am Acad Child Adolesc Psychiatry* 28:589–595

Wells K, Burnam M, Leake B, Robbins L (1988), Agreement between face-to-face and telephone-administered versions of the depression section of the NIMH Diagnostic Interview Schedule. *J Psychiatr Res* 22:207–220

---

**Quality of Care at a Children's Hospital: The Parents' Perspective.** Charles J. Homer, MD, MPH, Barbara Marino, RN, PhD, Paul D. Cleary, PhD, Hillel R. Alpert, MPM, Barbara Smith, MBA, Constance M. Crowley Ganser, MS, RNC, Robert M. Brustowicz, MD, Donald A. Goldmann, MD

*Objectives:* To develop a measure of parental perceptions of pediatric inpatient quality of care, to identify processes of care that influence these perceptions, and to describe these perceptions of care. *Design:* An interdisciplinary team modified an existing measure of inpatient care for adults using focus groups and expert review. The resulting survey was administered by telephone. *Setting:* Tertiary care pediatric hospital. *Patients:* Trained telephone interviewers obtained reports from parents of children discharged from the hospital during specified months. This report is based on the answers to 122 questions provided by 3622 (77%) of 4724 parents who responded when surveyed from 1991 through 1995. *Main Outcome Measures:* Parents provided reports about specific clinical experiences, overall ratings of care, and patient demographic and illness characteristics 2 weeks after patient discharge from the hospital. The analysis classified reports about pediatric care as either problems or not problems. Problems in different areas of care were averaged to create scores for the dimensions. *Results:* Parents most often noted problems related to hospital discharge planning (18%) and pain management (18%) and less often reported problems concerning communication about surgery (10%) or transmission of information to children (6%). Problems in communication between clinicians and parents correlated most strongly with overall quality ratings by parents ($r = 0.59$). Parents' specific reports of problems with care accounted for 42% of the variation in their overall assessments of the inpatient care experience. *Conclusions:* Parental assessment of inpatient pediatric care rests heavily on the quality of communication between the clinician and parent. Specific processes of care strongly influence overall assessments. Such reports could be used to focus the quality-improvement activities of hospitals and increase the accountability of providers of care to children and families. **Arch Pediatr Adolesc Med** 1999;153:1123–1129. Copyright 1999, American Medical Association.