

Darryl, a Cartoon-Based Measure of Cardinal Posttraumatic Stress Symptoms in School-Age Children

ABSTRACT

Objectives. This report examines the reliability and validity of *Darryl*, a cartoon-based measure of the cardinal symptoms of posttraumatic stress disorder (PTSD).

Methods. We measured exposure to community violence through the reports of children and their parents and then administered *Darryl* to a sample of 110 children aged 7 to 9 residing in urban neighborhoods with high crime rates.

Results. *Darryl's* reliability is excellent overall and is acceptable for the reexperiencing, avoidance, and arousal subscales, considered separately. Child reports of exposure to community violence were significantly associated with child reports of PTSD symptoms.

Conclusions. *Darryl* possesses acceptable psychometric properties in a sample of children with frequent exposure to community violence. (*Am J Public Health*. 1999;89:758-761)

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Children living in impoverished urban areas in the United States have single and multiple traumatic exposures to community violence.¹⁻⁷ While the mental health effects of these exposures have received clinical and public health attention,¹⁻¹⁶ most research measures of posttraumatic stress symptoms assess the impact of a single traumatic event. Furthermore, these measures typically do not include all the symptoms of posttraumatic stress disorder (PTSD) listed in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*.¹⁷ Finally, except for the Child Posttraumatic Stress Reaction Index,³ information on scale reliability and validity is sparse.

We designed *Darryl*, a cartoon-based instrument, to measure all the cardinal PTSD symptoms among school-age children experiencing one or more traumatic events. We report on *Darryl's* internal consistency reliability and on construct validity, as indicated by the association between children's exposure to community violence and *Darryl* symptom levels. Evaluation of criterion validity is precluded on 2 grounds. First, there is no established "gold standard" among extant symptom checklists. Second, *Darryl* departs from other measures in not requiring that reported symptoms all be anchored in the same event and thus is intentionally not directly comparable with other measures of PTSD symptoms.

Methods

The children were drawn from an original cohort of 560 singletons born in 1985 and 1986 at a New York City hospital located in an area of poverty and high crime. By design, half of the original cohort comprised a consecutive series of singletons who screened positive at birth for prenatal exposure to maternal cocaine use.¹⁸ The remaining children were selected from among singletons born free of evidence of prenatal exposure to maternal cocaine use. From this original cohort, 206 children were located again in the 1990s and asked to participate in a neuropsychological study (1992-1995). The last 115 children who entered the neuropsychological investigation, together with one adult caregiver for each child, were invited to partici-

pate in the current study. Of these 115 child-adult pairs, 110 children (96%) and 92 adults (80%) completed measures of the child's exposure to community violence independently of each other. The children then completed *Darryl*.

Measures

The PTSD diagnosis¹⁷ has 2 key components: the occurrence of a traumatic event (Criterion A) and its symptomatic sequelae (Criteria B-D). Symptoms must persist beyond 1 month (Criterion E) and cause clinically significant distress or social impairment (Criterion F).

Measurement of traumatic events (Criterion A). Community violence is measured with a modified version of Things I Have Seen and Heard (TSH-M). This instrument, administered to the child, is an event checklist that establishes the frequency with which the child has witnessed or been directly victimized by acts of violence in the community (e.g., "seen a dead body," "been stabbed").¹⁰ (In the present data, TSH-M's internal consistency reliability, as measured by the Cronbach α , is 0.74.) We generated 2 exposure indices: the arithmetic sum of item scores and a 4-category variable grouping children into those reporting no violent events and, among those reporting events, into tertiles representing low, moderate, and high exposure to violence. The instrument that questioned the

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Reexperiencing. "Here is Darryl. Since something scary happened, he sometimes feels like it's happening all over again, even though he knows it really isn't. How often do you feel like Darryl?"



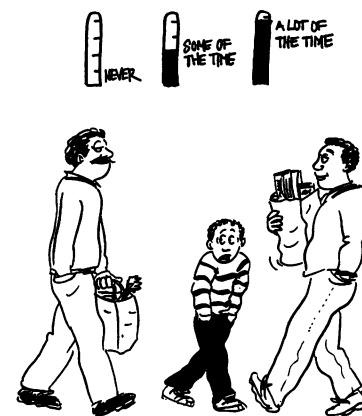
DSM-IV. PTSD. Criterion B. REEXPERIENCING (3). Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated.)

Avoidance. "Darryl used to like playing games with his friends and having fun. Since something scary happened, he doesn't feel like playing games any more. How many times have you felt like Darryl?"



DSM-IV. PTSD. Criterion C. AVOIDANCE/NUMBING (4). Markedly diminished interest or participation in significant activities.

Arousal. "Ever since something scary happened, Darryl is always looking around like he expects something bad to happen. How often do you feel like Darryl?"



DSM-IV. PTSD. Criterion D. INCREASED AROUSAL (4). Hyperarousal.

Note. *DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (Washington, DC: American Psychiatric Association; 1994).

FIGURE 1—Items from the *Darryl* cartoon-based measure of posttraumatic stress disorder (PTSD) symptoms exemplifying symptoms of reexperiencing, avoidance, and arousal.

adult on the child's exposure to violence asked simply whether or not the child had (1) witnessed violence, (2) been victimized directly, or (3) been informed of a traumatic event, with yes coded as 1 and no coded as 0.^{21,22} The score on this measure was the sum of the 3 responses.

Measurement of posttraumatic stress symptoms. *Darryl* contains 19 items, divided into reexperiencing (7 items), avoidance/affective blunting (7 items), and arousal (5 items). *DSM-IV* describes 5 types of reexperiencing symptoms, all of which are included among *Darryl's* 7 items. Nightmares specifically about the event represent one of *DSM-IV's* reexperiencing symptoms. However, by contrast with adults, children's nightmares count toward the diagnosis regardless of content. *Darryl's* 2 additional reexperiencing items depict nightmares lacking event-specific content.

The cartoons feature Darryl, an 8- or 9-year-old boy of indeterminate ethnicity, with each cartoon depicting a PTSD symptom (Figure 1). For each cartoon, the interviewer reads a script describing the symptom content. The response choices and their scores are "never" (0), "some of the time" (1), and "a lot of the time" (2). The script vocabulary and the visual nature of the cartoon material make *Darryl* suitable for children 6 years and older. *Darryl's* wording easily accommodates multiple traumatic exposures. The generic phrase referring to the traumatic event, "something scary" happening to Darryl (Figure 1), allows the child to consider any event, whether reported or concealed, as the trigger for a symptom and also to report symptoms linked to different events. Several *DSM-IV* PTSD symptoms reflect socially undesirable feelings and behaviors, such as irritability. Cartoons pertaining to such symptoms are placed toward the end of *Darryl*.

The eliciting of information on exposures and symptoms by means of cartoons has been adopted by several other investigators.²³⁻²⁷ *Darryl* is much indebted in concept, phrasing, and some imagery to 2 such tools, Dominique²³ and Levonn,²⁷ which measure psychological distress and some PTSD symptoms.

In general, the study interviewers were graduate students in nonclinical fields. Interviewers were provided with 2 hours of training; the first hour consisted of didactic discussion of PTSD symptoms and their link with *Darryl's* script and cartoons, and the second hour demonstrated how to administer *Darryl*, with an adult playing the role of a school-aged child. Interviewers then practiced administering *Darryl* to 2 or 3 school-aged children drawn from a sample of convenience. *Darryl* interviews in the project were tape recorded to monitor compliance with the study protocol.

We derived the following indices from *Darryl*: the sum of symptoms reported; the

TABLE 1—Association of Child Reports of Traumatic Events With Child Reports of Posttraumatic Stress Disorder (PTSD) Symptoms^a in a Sample of Urban Children Aged 7–9 Years

No. of Reported Traumatic Events ^b	n	% Reporting >9 Symptoms ^{c,e}	% Reporting Any Reexperiencing Symptoms ^{c,f}	% Reporting >2 Avoidance Symptoms ^{c,g}	% Reporting >1 Arousal Symptom ^{c,h}	% With Probable PTSD Diagnosis ^{c,d,i}
0 (None)	7	0	0	0	0	0
1–6 (Low)	34	11.8	9.1	17.6	32.4	6.1
7–13 (Medium)	34	20.6	25.0	23.5	47.1	12.5
14–40 (High)	34	38.2	29.4	44.1	61.8	14.7

^aThe pattern of results is unchanged when symptoms are counted as present only if reported “a lot of the time” or when the simple sum of item scores (0–3) is used as the index of exposure.

^bData on exposure was missing for 1 child.

^cBecause many symptoms cannot logically be reported unless the child has experienced a traumatic event, r_s correlations were calculated after restricting the sample to children reporting at least one event on the checklist ($n = 102$). Calculations based on the entire sample produced equivalent results.

^dThis diagnosis is based on symptom criteria only and excludes information on symptom duration and associated impairment of social functioning.

^e $r_s = 0.23, P < .02$

^f $r_s = 0.39, P < .0001$

^g $r_s = 0.24, P < .02$

^h $r_s = 0.24, P < .02$

ⁱ $r_s = 0.22, P < .03$

proportion of children whose number of symptoms (summed as just described) was in the top quintile (>9 symptoms); and the proportion reporting at least 1 reexperiencing symptom, more than 2 avoidance symptoms, and/or more than 1 arousal symptom. Finally, we computed the proportion reporting at least 1 reexperiencing symptom, more than 2 avoidance symptoms, and more than 1 arousal symptom, representing children likely to meet *DSM-IV* symptom criteria for PTSD (“probable PTSD”). In computing each of these indices, we counted a symptom as present if it was reported either some or all of the time.

Statistical Analysis

We assessed *Darryl*'s reliability with the Cronbach α , a measure of internal consistency reliability. We evaluated validity by examining the association between exposure and symptom levels in several ways. The association between the sum of reported events and the sum of reported symptoms—both scores nonnormally distributed—was estimated with the Spearman rank correlation coefficient (r_s). The associations of the categorical exposure variables, based on reports of the child and the adult, with the dichotomous symptom measures were also estimated with r_s . Statistical significance of associations was assessed by the P value for r_s . Statistical significance was set at $P < .05$ (2-tailed).

Sample Characteristics

The 110 children in the study sample were aged 7 to 9 years; 56% were boys and 94% were Black. Among the adult care-

givers, 70% were the child's biological mother, 35% were older than 40 years, 30% had not graduated from high school, and 60% received public assistance.

Mothers of children in the current sample were significantly younger (by 1.2 years) than women in the remainder of the original 1985–1986 cohort, and a larger proportion worked outside the home (26.6% vs 16.7%, respectively). Otherwise, the 2 groups did not differ significantly according to maternal sociodemographic, reproductive history, or pregnancy characteristics (e.g., education, parity, Medicaid status); prenatal, perinatal, or neonatal characteristics (e.g., length of gestation, birthweight); or toxicology results (e.g., toxicology positive for opiate use).

Among children and adults in the neuropsychological project eligible for the current investigation ($n = 115$), participants (110 children, 92 adults) and nonparticipants (5 children, 23 adults), did not differ according to any caregiver or child sociodemographic characteristics, measured neuropsychological parameters, or cocaine exposure status.¹⁸

Results

In this sample of children, 93.6% reported 1 or more events involving witnessing violence and 26.9% reported having been victimized directly.

Reliability

Darryl's overall reliability (19 items) and the reliability of the reexperiencing, avoidance, and arousal subscales consid-

ered separately are adequate to excellent ($\alpha = 0.92, 0.78, 0.83, \text{ and } 0.80$, respectively). These reliability results do not vary by the child's sex, age, or prenatal cocaine exposure or the caregiver's public assistance status.

Validity

Children's summed event scores were significantly associated with summed symptom scores ($r_s = 0.48, P < .0001$). The proportion of children with symptom scores higher than 9 increased monotonically and significantly with increasing event levels, as did the proportion of children with at least 1 reexperiencing symptom, more than 2 avoidance symptoms, and more than 1 arousal symptom (Table 1). The proportion of children with “probable PTSD” also increased significantly with ascending exposure levels (Table 1). Further, levels of physiological PTSD symptoms (e.g., hyperarousal, irritability) did not differ between children with and without documented prenatal cocaine exposure.

The score on the adult measure of the children's experiences was also correlated with summed *Darryl* scores ($r_s = 0.29, P < .006$). The score on the adult measure was associated with the proportion of children with symptom scores higher than 9 ($r_s = 0.25, P < .02$), the proportion of children with at least 1 reexperiencing symptom ($r_s = 0.27, P < .009$), the proportion of children with more than 2 avoidance symptoms ($r_s = 0.16, P < .17$), and the proportion of children with more than 1 arousal symptom ($r_s = 0.25, P < .02$).

Discussion

Darryl's overall internal consistency reliability compared favorably with the range for the Child Posttraumatic Stress Reaction Index (0.83–0.88).^{7,28} The correlation between summed events and symptoms, an indicator of construct validity, also compared favorably with the correlations of 0.38 and 0.57 reported in previous studies.^{8,9} Similarly, symptoms and rates of “probable PTSD” were positively associated with traumatic events. Because children’s symptoms were also associated with scores on the adult measure of children’s experiences, these results cannot be attributed to response bias. We also note in passing that while the original study sample was not formally selected as a representative community sample, the rates of a number of the reported exposures are quite similar to those provided in studies using population-based samples of urban inner-city children.^{11,12}

Children living in major US urban centers are exposed to numerous forms of community violence. One or more of these experiences may trigger posttraumatic stress symptoms. *Darryl*, which covers the full range of *DSM-IV* PTSD symptoms, was expressly designed to accommodate the social reality of these children. Accordingly, recorded symptoms were not arbitrarily restricted to those triggered by a single event but could include symptoms prompted by different traumatic incidents.

Darryl was intended both as a measure, in its own right, of the frequency of posttraumatic stress symptoms and as a possible screening instrument to identify children with a high probability of meeting the *DSM-IV* diagnosis of PTSD. *Darryl* should, in future work, be field tested in more sociodemographically heterogeneous populations, and its relationship to diagnostic tools should be elucidated. *Darryl* needs to be assessed as a stage-1 screening instrument for community-based studies of urban violence and PTSD, with a clinical assessment conducted in stage 2. We also plan to elaborate *Darryl* further so that it may serve directly as a diagnostic tool. For this purpose, *Darryl* requires supplemental probes to assess symptom duration (Criterion E), associated distress and social impairment (Criterion F), and children’s initial subjective reactions to the exposure. □

Contributors

R. Neugebauer, G. A. Wasserman, P. W. Fisher, and J. Kline planned elements of the study design. All authors contributed to the conceptualization and interpretation of the data analyses and to the writing

of the paper. R. Neugebauer and P. A. Geller performed the data analyses. All authors take public responsibility for the content of the paper.

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