

Pathways to PTSD, Part II: Sexually Abused Children

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Objective: The goal of this research was to develop and test a prospective model of posttraumatic stress symptoms in sexually abused children that includes pretrauma, trauma, and disclosure-related pathways.

Method: At time 1, several measures were used to assess pretrauma variables, trauma variables, and stress reactions upon disclosure for 156 sexually abused children ages 8 to 13 years. At the time 2 follow-up (7 to 36 months following the initial interview), the children were assessed for posttraumatic stress disorder (PTSD) symptoms.

Results: A path analysis involving a series of hierarchically nested ordinary least squares multiple regression analyses indicated three direct paths to PTSD

symptoms: avoidant coping, anxiety/arousal, and dissociation, all measured during or immediately after disclosure of sexual abuse. Additionally, age and gender predicted avoidant coping, while life stress and age at abuse onset predicted symptoms of anxiety/arousal. Taken together, these pathways accounted for approximately 57% of the variance in PTSD symptoms.

Conclusions: Symptoms measured at the time of disclosure constitute direct, independent pathways by which sexually abused children are likely to develop later PTSD symptoms. These findings speak to the importance of assessing children during the disclosure of abuse in order to identify those at greatest risk for later PTSD symptoms.

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Child sexual abuse is an all too common event in the lives of children and can produce severe psychological damage to victims both at the time of the abuse and years later (1, 2). Many researchers have identified posttraumatic stress disorder (PTSD) as a core manifestation of sexual abuse trauma because of the high frequency with which this disorder and related symptoms appear in sexually abused children (3). A number of retrospective studies of adults have examined the long-term effects of child sexual abuse on later PTSD symptoms (4, 5), but significantly fewer have studied children to examine more immediate PTSD outcomes resulting from child sexual abuse. Even fewer have examined possible mediating mechanisms, such as the children's reactions upon disclosure, in the development of later PTSD symptoms. To our knowledge, the current study is the first to examine pretraumatic vulnerabilities, trauma characteristics, and stress reactions at the time of disclosure as pathways to PTSD symptoms in sexually abused children. Prospective longitudinal designs that assess children shortly after a stressful event, such as this, are ideal for the advancement of the understanding of risk factors for PTSD symptoms (6).

It is important to note that all children in the current study were observed while undergoing a forensic interview, during which the child was asked to recollect and discuss potentially traumatic memories of the sexual abuse. As disclosure of sexual abuse can be an extremely stressful event, responses immediately after such disclosure may offer important information about future risk

and resilience. The present study was designed to assess these responses in the service of identifying a model of risk factors for PTSD symptoms in children who disclose sexual abuse.

Research has identified a variety of risk factors for PTSD that are exhibited in the immediate aftermath of a trauma. Dissociation has been found to be particularly important in predicting PTSD (7). Specifically, studies of adults (8–10) and a more recent study of children, reported in this issue of the *Journal* (11), have indicated that individuals who dissociate either during or soon after a trauma are at greater risk of developing PTSD.

Evidence has also suggested that anxiety/arousal responses other than dissociation may predict later PTSD. For example, in a study of adult victims of violent crime, Brewin et al. (12) found that a simple count of reexperiencing symptoms after the trauma independently predicted later PTSD. This finding is consistent with previous research that has linked intrusive symptoms with later problem outcomes, including PTSD (13, 14). Although both dissociative and anxiety/arousal symptoms are included in the diagnosis of acute stress disorder, considerable controversy exists over whether dissociation or anxiety/arousal is more predictive of PTSD (15).

Avoidant coping is a critically important feature of the anxiety/arousal response and has been identified as a risk factor for PTSD (16, 17). Retrospective studies of adult child abuse victims indicate that avoidance strategies such as denial or minimizing are associated with poor psy-

TABLE 1. Pretrauma, Trauma, Disclosure, and Posttrauma Variables for 156 Sexually Abused Children

Variable	Mean	SD	Range
Pretrauma			
Gender (male=1, female=0)	0.17	0.38	0.00–1.00
Age at initial assessment (years)	10.70	1.80	7.92–13.92
Score for previous life stress, based on parent report of number and severity of stressful events (0=did not happen, 2=major change)	6.38	4.55	0.00–16.00
Trauma: age at onset of child sexual abuse (years)			
	8.01	2.67	2.00–13.00
Disclosure (initial assessment)			
Avoidance (score on avoidance scale from principal-component factor analysis)	0.65	0.63	0.00–3.00
Dissociation (score on dissociation scale of Trauma Symptom Checklist for Children [22])	8.16	5.04	0.00–20.00
Anxiety (score on anxiety scale of Trauma Symptom Checklist for Children [22])	7.90	5.26	0.00–24.00
Posttrauma			
Interval between initial and follow-up assessments (years)	1.57	0.69	0.58–3.00
PTSD symptoms at follow-up (score on PTSD scale from Child Behavior Checklist [26])	8.48	5.43	0.00–24.00

chological and psychosocial adjustment in adulthood (18, 19). In addition, research on traumatized youth has shown that cognitive suppression and avoidance often lead to problems in multiple domains of functioning (20). Measurement of avoidant coping strategies is complicated by the fact that, by definition, it is difficult to ascertain these symptoms from child self-reports (21). In the current study we surmounted this obstacle by using a behavioral coding system to rate the children's avoidant behaviors during videotaped forensic interviews.

The current study utilized path analytic techniques to evaluate the ways in which pretrauma variables, trauma characteristics, and stress reactions upon disclosure of sexual abuse are related to later PTSD symptoms in children. As described, anxiety and dissociative reactions in the wake of a trauma have been identified as important components of the acute trauma response, although there is considerable controversy over which is more strongly related to deleterious long-term outcomes. Consequently, a main goal of the current study was to assess the relative importance of dissociation and anxiety in the immediate aftermath of the disclosure of sexual abuse.

Method

Participants and Procedure

The participants in the current study had been referred to a treatment facility that offers services to children considered possible victims of sexual abuse. Each of the participants had been medically examined, interviewed, and videotaped for forensic purposes. The occurrence of sexual abuse was rated by a multidisciplinary evaluation team as confirmed, probable, suspicious, unknown, or "no evidence." All of the interviews were written up

in report form by the interviewers. The inclusion criteria for the current study consisted of the following:

1. The abuse was rated as suspicious, probable, or confirmed.
2. The child was between the ages of 8 and 13 years at the time of the interview.
3. The interview took place between January 1998 and August 2000.
4. The child was from one of three counties in North Carolina.

Of the possible participants, 156 children met the criteria for the study. The study group comprised 129 girls and 27 boys, with a mean age of 10.7 years (SD=1.8). Of the subjects, 56% were African American, 23% were Caucasian, 12% were Native American, 5% were biracial, and 4% were Hispanic. Abuse was rated as confirmed for 54% of the participants, probable for 18%, and suspicious for 28%.

The information gathered at time 1 came from the clinicians' written reports, the videotapes, and the Trauma Symptom Checklist for Children (22) collected at the time of the initial forensic interview. Contact with the families for the follow-up at time 2 was initiated through a letter explaining the purpose of the study. After complete description of the study to the subjects, written informed consents were obtained from the parents and informed assents were obtained from the children.

Measures

The following measures, with the exception of the parent's report of prior life stress and the parent's report of the child's PTSD symptoms, were assessed at time 1.

Written reports. In addition to demographic variables (i.e., age, gender), the other variable of interest in the written report following the initial forensic interview was the age at onset of abuse. These items were extracted from the written reports on the children and subsequently coded by the principal investigator (J.B.K.) and a trained research assistant. The reliability estimates were satisfactory, with kappas ranging from 0.59 to 0.90. Discrepant ratings were discussed by the principal investigator and the research assistant until a consensus was reached.

Videotaped interviews. Semistructured investigative interviews were conducted by skilled clinicians trained in the evaluation of sexually abused children, and all interviews were videotaped. A detailed coding system was developed and used to analyze the child's emotional and behavioral responses throughout the interview, which would be operationalized as child coping variables in the study. The interviews of the participants selected for interrater reliability were randomly sampled intermittently throughout the coding period, and agreement between each of the two coders' ratings and those of the principal investigator was estimated for 40% of the study participants. The reliability estimates were satisfactory, with kappas ranging from 0.63 to 0.82 and Pearson's correlation coefficients ranging from 0.41 to 0.98.

Because of the high correlations among many of the items, a principal-component factor analysis was conducted. The most readily interpretable loading pattern was found by using varimax rotation. Each item was assigned to the factor on which it had the highest loading, and no item was allowed to contribute to more than one factor. The scores for the items on each scale were summed and averaged, with higher scores reflecting higher levels of the particular construct. The analysis identified 14 behaviors that factored onto three scales. Of interest to the current study is the avoidance scale, consisting of four items: 1) attempting to distract the interviewer, 2) appearing avoidant (e.g., by not answering questions), 3) appearing distracted, and 4) appearing fidgety ($\alpha=0.79$).

Anxiety and dissociation. The Trauma Symptom Checklist for Children (22) is a 54-item self-report instrument that evaluates

TABLE 2. Correlations Among Pretrauma, Trauma, Disclosure, and Posttrauma Variables for 156 Sexually Abused Children

Variable	Correlation (r)						
	Life Stress	Age at Onset of Abuse	Avoidance	Dissociation	Anxiety	Interval Between Assessments	PTSD Symptoms
Pretrauma							
Age at initial assessment	0.06	0.44**	-0.22*	0.11	-0.01	-0.39**	0.03
Previous life stress		0.29*	0.15	-0.06	0.14	-0.15	0.20
Trauma: age at onset of child sexual abuse			-0.17	-0.06	-0.14	-0.20	-0.08
Disclosure (initial assessment)							
Avoidance				-0.11	-0.04	0.01	0.24*
Dissociation					0.68**	0.10	0.67**
Anxiety						-0.16	0.52**
Posttrauma							
Interval between initial and follow-up assessments							-0.04
PTSD symptoms at follow-up							

* $p < 0.05$. ** $p < 0.01$.

posttraumatic symptoms, including anxiety/arousal symptoms and dissociation, in children and adolescents ages 8 to 16. Various studies that have used the checklist indicate that it is reliable (with alpha values in the mid to high 80s for all scales) and has convergent and predictive validity in groups of both traumatized and nontraumatized children and adolescents (23, 24). Dissociation in this study was measured by the 10-item dissociation scale of the Trauma Symptom Checklist for Children, and anxiety was measured by the nine-item anxiety scale.

Previous life stress. At the follow-up interview, the parent was asked to report on the number of stressful events that had taken place during the child's life and how each event may have affected the child. Each item was rated on a scale from 0 to 2 (0=did not happen, 1=minor change, 2=major change). A total life stress score was derived from the sum of all of the items.

Parent report of child posttraumatic stress. At the follow-up interview, the parent also completed the Child Behavior Checklist (25), a parent-report measure of the child's internalizing and externalizing symptoms. The PTSD scale (26), derived from 19 items on the Child Behavior Checklist, has been shown to have good internal consistency ($\alpha = 0.86$; Becker, unpublished 2000 paper) and is highly correlated with the total PTSD scale of the Trauma Symptom Checklist for Young Children (27) ($r = 0.69$).

Data Analysis

In order to make use of all data available, we approached the issue of missing data at time 2 by using maximum likelihood estimation techniques for missing data (28). Evidence suggests that there is far less risk of bias with retention of missing cases and use of this method than with listwise deletion in complete case analysis (29). (For a thorough review of methods for handling missing data, see the discussion by Graham et al. [30].) The current study used a path analytic strategy similar to that used by Shalev et al. (31) in their prospective study of acutely traumatized individuals. As this strategy follows a prospective longitudinal method, the directionality of paths is constrained by the time at which the variables are assessed. Accordingly, we divided variables into four categories: 1) PTSD symptoms (dependent variable), 2) disclosure reactions (variables measured upon disclosure of abuse), 3) trauma variables (variables specific to the trauma itself), and 4) pretrauma variables (variables describing the child prior to the trauma).

A series of hierarchically nested ordinary least squares multiple regression analyses were used to estimate direct and indirect effects among variables. Guided by theory and previous empirical research, we chose combinations of variables that accounted for a high percentage of the variance in PTSD symptoms (high R^2). Accordingly, we chose three primary variables (i.e., anxiety, avoid-

ance, and dissociation) that together accounted for 57% of the variance in PTSD symptoms ($R^2 = 0.57$). Once these variables were chosen, we began to include antecedent variables that would allow anxiety, avoidance, and dissociation to serve as potential mediators. In order to constrain the number of paths in this model, bivariate relationships between any variable and PTSD that did not reach conventional levels of significance ($p < 0.05$) were deleted. In addition, the model was further constrained by temporal relationships. The final path analytic model provided excellent fit indices (comparative fit index=1.00, Tucker-Lewis index=1.00, root mean square error of approximation=0.00).

Results

Preliminary Analyses

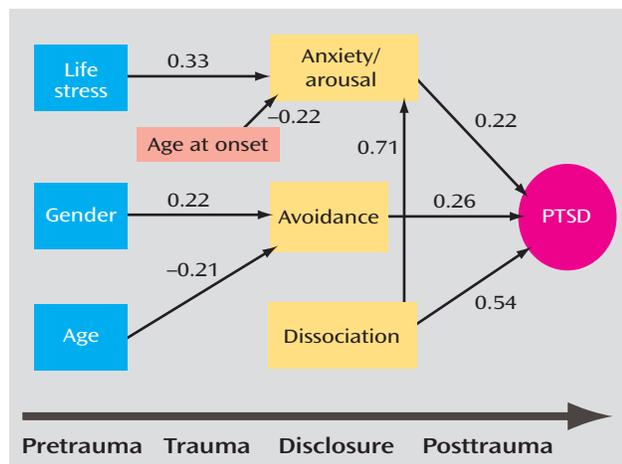
Table 1 displays descriptive statistics for all variables of interest to the current study. A series of t tests and analyses of variance revealed no significant differences in time 2 PTSD symptoms as a function of gender, race, or county.

Table 2 presents Pearson's correlation coefficients for the associations among pretrauma and trauma variables, disclosure reactions, and later PTSD symptoms.

Path Analysis

Figure 1 illustrates the results of the path analysis, with partial correlation coefficients (beta weights) given for each path remaining after nonsignificant paths were removed. The results indicate three direct paths to PTSD symptoms from the disclosure reactions: avoidance, dissociation, and anxiety. They also show four indirect paths to PTSD symptoms from pretrauma and trauma variables: age, gender, life stress, and age at onset of abuse. More specifically, anxiety/arousal served as a mediator between life stress and PTSD and between age at onset and PTSD. In addition, avoidance served as a mediator between age and PTSD and between gender and PTSD. Dissociation was not only a direct predictor of PTSD but also an indirect predictor of PTSD symptoms by way of anxiety symptoms. Taken together, these pathways accounted for 57% of the variance in PTSD. Given the high explanatory value of these pathways, the model helps to shed light on the relatively unknown course of PTSD in sexually abused children.

FIGURE 1. Path Analytic Model for the Development of PTSD in 156 Sexually Abused Children^a



^a The values in the model are partial correlation coefficients (beta weights). $R^2=0.57$.

Discussion

To our knowledge, this is the first study to examine the utility of a prospective model incorporating pretrauma, trauma, and disclosure variables in pathways leading to PTSD in sexually abused children. The results of this study demonstrate that sexually abused children who exhibit symptoms of avoidance, anxiety/arousal, or dissociation either during or immediately following disclosure of abuse are at increased risk of developing PTSD symptoms at a later date. These findings speak to the importance of assessing children's reactions as soon as possible after disclosure.

Given the overwhelming stress experienced by sexual abuse victims during the time of the event as well as during disclosure, it is not surprising that childhood sexual abuse is strongly associated with dissociative responses (7, 32, 33). However, because of previous reliance on retrospective reports of adult sexual abuse victims, the prospective relation between dissociative symptoms and later PTSD symptoms in childhood has remained unclear. This study serves as confirmation that children who report dissociative symptoms immediately after disclosure of abuse are at greater risk for later PTSD symptoms. In fact, dissociation appeared to be the strongest predictor of PTSD symptoms in this group of children. It has been theorized that dissociative responses may prevent the open expression of emotions and cognitions associated with the trauma, which is likely to lead to insufficient processing of the trauma, more reexperiencing symptoms, and consequently, worse PTSD symptoms (34–36).

Dissociation may also represent the phenotype of a biobehavioral vulnerability to traumatic events. A number of researchers have drawn connections between the anxiety/hyperarousal symptoms and the sympathetically mediated fight-or-flight response and between symptoms of

dissociation and the parasympathetically mediated “freeze” or “immobilization” response (37–40). Although the current study did not directly measure these biobehavioral systems, i.e., sympathetic and parasympathetic activity, the independent contributions made by the dissociation and anxiety/arousal pathways in predicting PTSD suggest independence of the biobehavioral processes.

Further, as dissociation by this theory is presumed to be a more primitive response that occurs only after the fight-or-flight arousal system has been overwhelmed, it makes sense that there is a unidirectionality of the relationship between dissociation and anxiety/arousal found in this study. Dissociation is significantly associated with anxiety/arousal, whereas anxiety/arousal is not significantly associated with dissociation. In other words, if a child must initially experience arousal/anxiety to reach a dissociated state, then children with dissociation would necessarily experience some symptoms of arousal/anxiety.

Anxiety/arousal symptoms following trauma have been identified in the adult literature as critical in predicting later PTSD (12, 41); however, almost no studies to date have examined the predictive utility of these symptoms in relation to later PTSD in children. The results of the current study demonstrate that anxiety/arousal symptoms immediately after disclosure of sexual abuse make a unique contribution to the development of PTSD symptoms.

It is noteworthy that life stress positively predicted anxiety/arousal symptoms. In addition, age at onset of the abuse negatively predicted anxiety/arousal symptoms, indicating that the earlier the abuse began, the more likely the child was to demonstrate these symptoms at the time of the disclosure. Rutter (42) hypothesized that the accumulation of multiple stressors in children's lives dramatically increases the risk of permanent developmental damage and the manifestation of PTSD symptoms.

Although children's use of coping strategies has been identified as a particularly promising area of study (43), this field of inquiry has been hampered by the traumatic nature of sexual abuse and its legal and clinical implications. We believe that this study is the first to demonstrate a positive relation between avoidant coping immediately after the discovery of trauma and later PTSD symptoms in sexually abused children. These findings are consistent with studies of adults suggesting that strategies such as denial, minimization, or purposeful forgetting are associated with greater psychological difficulties in the long term (19, 44).

The model also demonstrates that boys are more likely to exhibit avoidant behaviors upon disclosure. This finding is consistent with a number of studies showing higher levels of emotional expression in girls (45, 46) and women (47) than in boys and men, respectively. The current study also indicated that younger children are more likely to be avoidant upon disclosure. Peterson (48) described coping as a process that is significantly influenced by development. Younger children are less likely to have the language

capacity and emotion identification abilities that older children have, thereby making it more difficult for them to express their thoughts and feelings.

Limitations

Although the current study exhibits important strengths, there are several limitations that should be noted. The findings generalize to the population of children identified by county social service departments as possibly victimized by sexual abuse, but their generalizability to the total population of abused children is unclear. It is also possible that the forensic interview represented the first disclosure of abuse for some children, whereas other children may have disclosed it in great detail to other people prior to the interview. The findings of studies on the relationship between disclosure and psychological functioning have been equivocal (49). Consequently, one must consider the possibility that the child's reactions observed upon disclosure are mainly a response to the interview itself and are unrelated to the child's attempt to cope with traumatic reminders.

Clinical Implications

This research has crucial implications for all providers conducting clinical or forensic evaluations and treatments for sexually abused children by helping to identify children who appear to be the most at risk for developing PTSD symptoms. The findings lend support to the notion that children who exhibit avoidance, anxiety/arousal, and especially, dissociation during disclosure are likely to need treatment in order to prevent the development of later PTSD symptoms. Coping is by definition a consciously chosen means of dealing with stress and thereby amenable to modification. Therefore, coping strategies such as avoidance are directly relevant as intervention targets in therapy (50). Consistent with reports of the outcomes of PTSD treatment (34, 51), the current findings suggest that treatments encouraging open expression of thoughts and feelings surrounding the abuse can help to deter growth in PTSD symptoms over time. Further, the relative independence of dissociative and anxiety/arousal pathways to PTSD symptoms suggests the possibility for targeted treatments aimed at particular biobehavioral systems.

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