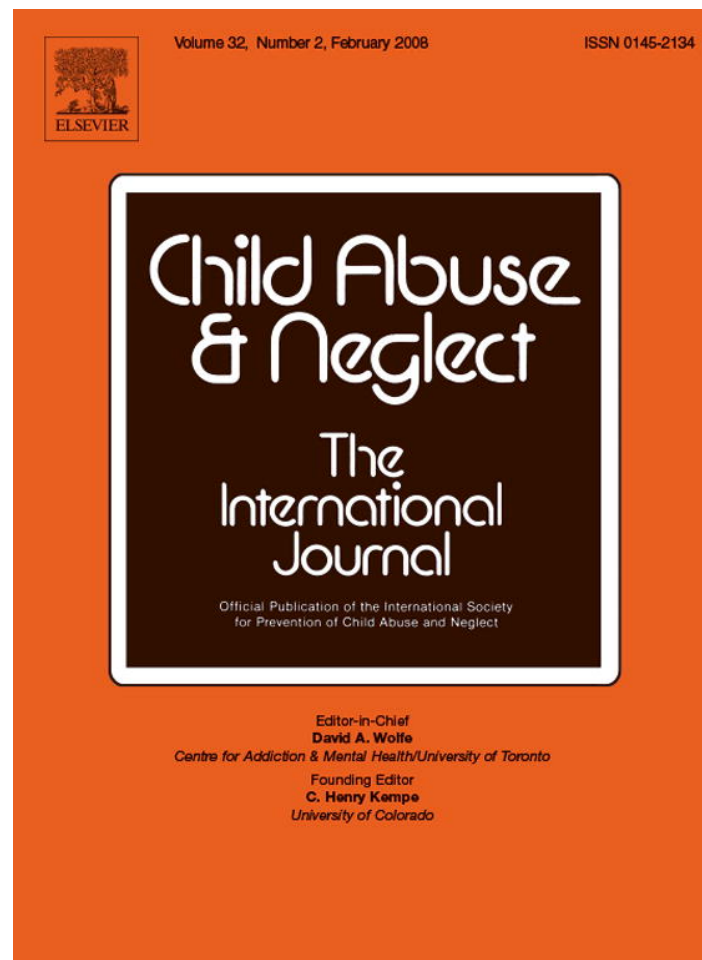


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Dissociation predicts later attention problems in sexually abused children[☆]

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Abstract

Objective: The goals of this research are to develop and test a prospective model of attention problems in sexually abused children that includes fixed variables (e.g., gender), trauma, and disclosure-related pathways.

Methods: At Time 1, fixed variables, trauma variables, and stress reactions upon disclosure were assessed in 156 children aged 8–13 years. At the Time 2 follow-up (8–36 months following the initial interview), 56 of the children were assessed for attention problems.

Results: A path analysis involving a series of hierarchically nested, ordinary least squares multiple regression analyses indicated two direct paths to attention problems including the child's relationship to the perpetrator ($\beta = .23$) and dissociation measured immediately after disclosure ($\beta = .53$), while controlling for concurrent externalizing behavior ($\beta = .43$). Post-traumatic stress symptoms were only indirectly associated with attention problems via dissociation. Taken together, these pathways accounted for approximately 52% of the variance in attention problems and provided an excellent fit to the data.

Conclusions: Children who report dissociative symptoms upon disclosure of CSA and/or were sexually abused by someone within their family are at an increased risk of developing attention problems.

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Practice implications: Findings from this study indicate that children who experienced sexual abuse at an earlier age, by someone within their family, and/or report symptoms of dissociation during disclosure are especially likely to benefit from intervention. Effective interventions should involve (1) providing emotion regulation and coping skills; and (2) helping children to process traumatic aspects of the abuse to reduce the cyclic nature of traumatic reminders leading to unmanageable stress and dissociation.

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Keywords: Dissociation; Sexual abuse; Attention problems

Introduction

Official statistics indicate that approximately 100,000 children are sexually abused each year (Sedlak & Broadhurst, 1996). In a thorough review of population studies of the prevalence of child sexual abuse (CSA), Fergusson and Mullen (1999) found estimates of CSA ranging from 3% to 15% for males and 15% to 30% for females. CSA adversely affects children's emotional, cognitive, and social development (Fergusson & Mullen, 1999). Attention problems in particular are one of the most frequently diagnosed deficits associated with CSA (Weinstein, Staffelbach, & Biaggio, 2000). Attention problems in childhood increase the risk of a range of longer-term negative outcomes such as adolescent antisocial behavior (Bor, McGee, & Fagan, 2004) and adult substance abuse (Biederman, Wilens, Mick, Faraone, & Spencer, 1998). Genetic studies have been shown to be important in explaining the development of attention deficits (Biederman et al., 1992; Zametkin, 1989). However, less is known about the ways in which environmental factors, such as CSA (in conjunction with genetic factors), may give rise to attention problems in childhood. Understanding the risk factors driving the relationship between CSA and attention problems is necessary to inform intervention and, therefore, remains an important public health goal. This article examines risk factors for the development of attention problems in a prospective study of sexually abused children.

The association between CSA and attention problems has been well documented. For example, McLeer, Deblinger, Henry, & Orvaschel (1992) found that two of the most predominant diagnoses in a sample of clinically referred sexually abused children were Post-traumatic Stress Disorder (PTSD, 44%) and Attention-Deficit Hyperactivity Disorder (ADHD, 33%), and a later study indicated that ADHD was the most frequent diagnosis among sexually abused children (McLeer, Callaghan, Henry, & Wallen, 1994). In a study comparing sexually abused children to a community sample, Merry and Andrews (1994) found the rate of ADHD in the sexually abused sample to be double that of the community sample.

Although it is clear that CSA is associated with attention problems, the mediating mechanisms involved in this relationship are relatively unknown. Characteristics of the CSA itself, such as age of onset of abuse, severity, frequency, or the child's relationship with the perpetrator may increase the risk of attention problems. Although these factors have not generally been examined in relation to attention problems in sexually abused children, research has shown that these abuse-related factors might impact other domains of later functioning. For example, a recent study found that an earlier age of onset of sexual abuse predicted the development of later anxiety/hyperarousal symptoms (Kaplow, Dodge, Amaya-Jackson, & Saxe, 2005), and in a study of adult victims of child maltreatment (physical abuse, sexual abuse, and neglect), an earlier age of onset of child maltreatment was associated with higher levels of depressive and anxiety

symptoms in adulthood (Kaplow & Widom, 2007). Trickett, Reiffman, Horowitz, and Putnam (1997) found that the severity of the abuse predicted depression and destructive behavior in sexually abused girls. In addition, they found that being abused by a biological father was predictive of disruptive and acting-out behaviors. Trickett, Noll, Reiffman, and Putnam (2001) found various characteristics of abuse were differentially predictive of long-term adjustment. Thus, multiple variables (e.g., duration, age of onset, or abuse by biological father vs. “other father figure”) must be taken into account in order to predict later functioning.

Based on these findings, one might assume that the earlier the abuse begins and the more severe and frequent the abuse is the more likely it is that the child will experience problems including attention deficits. Similarly, a child who is abused by a biological father is likely to experience stronger feelings of betrayal and violation than a child who is abused by someone outside of his or her family, and thus have more extreme reactions to the abuse, potentially including attention problems. One of the goals of the current study is to examine the unique contributions of each of these abuse-related variables in the direct and/or indirect prediction of later attention problems.

A further possibility is that CSA-related attention problems are mediated by the child’s stress reactions (e.g., PTSD symptoms). The prospective relations between maltreatment, attention problems, and PTSD have been difficult to tease apart for at least two reasons. First, symptoms of PTSD may closely resemble those of attention deficits or ADHD (Famularo, Kinscherff, & Fenton, 1992; Weinstein et al., 2000). For example, symptoms such as difficulty concentrating or hypervigilance, appear to be common to both disorders (Blank, 1994). Thus, following maltreatment, children may demonstrate behaviors in response to traumatic reminders that resemble symptoms of ADHD or attention problems but may actually be a manifestation of post-traumatic arousal (Famularo et al., 1992; Glaser, 2000). Second, many of the symptoms of the two disorders (i.e., PTSD and ADHD) may co-occur (Blank, 1994; Weinstein et al., 2000). On the other hand, post-traumatic stress symptoms may produce changes in the brain (Beers & De Bellis, 2002) that lead to executive functioning problems, such as attention and concentration difficulties.

Recent neuropsychological studies provide support for the hypothesis that exposure to extreme stress may lead to attention problems. Stress reactions are subserved by several interrelated biological systems including the sympathetic nervous system, which mediates the fight-flight response and the parasympathetic nervous system, which mediates the freeze or surrender response (Perry, Pollard, Blakley, Baker, & Vigilante, 1995). PTSD, with its hyperarousal symptoms, has been viewed as more characteristic of the sympathetic fight-flight response, and it is thought that PTSD may mediate the association between CSA and attention problems.

Studies of adults have linked PTSD with subjective complaints of poor concentration (Klonoff, McDougall, Clark, Kramer, & Horgan, 1976) and measurable impairment of memory and attention (Buckley, Blanchard, & Neill, 2000; Uddo, Vasterling, Brailey, & Sutker, 1993). De Bellis (2001) suggested that PTSD-related neurobiological dysregulation following a severe stressor in childhood may lead to behavioral problems such as motor restlessness and learning and attention deficits. Beers and De Bellis (2002) found that children with maltreatment-related PTSD demonstrated significant deficits with regard to attention and executive function when compared to sociodemographically similar children without PTSD, who had not been maltreated. The children with PTSD performed poorly on tests designed to measure frontal lobe function, suggesting that CNS changes in the frontal cortex may be responsible for executive functioning deficits. Similarly, Cuffe, McCullough, and Pumageria (1994) hypothesized that an increase in the activity of the sympathetic nervous system seen in PTSD can indirectly impair attention

such that a child in a highly aroused state may perceive trivial stimuli as significant and may consequently have difficulty filtering incoming information. This may lead to an overloading of cognitive processes, which impairs attention.

Dissociation, which is often comorbid but not synonymous with PTSD, may also lead to problems with inattention. Dissociative symptoms, commonly seen in traumatized children, are thought to be indicative of the freeze or surrender response (Perry et al., 1995). During the process of this “defeat” (freeze) response, the vagus nerve, the parasympathetic part of the autonomic nervous system, becomes activated leading to a slowing of heart rate, a drop in blood pressure, and an increased potential for fainting, in spite of hyperarousal and catecholamine activation (Glaser, 2000).

Dissociative symptoms are defined by Putnam (1997) as disruptions in the usually integrated functions of consciousness, memory, identity, or perception of the environment that interfere with the associative integration of information. Thus, by definition, it is likely that dissociation seen in CSA victims will be associated with attention deficits. Although dissociation in the immediate aftermath of a traumatic event does appear to be critically important in the prediction of later PTSD symptoms in children (Kaplow et al., 2005; Saxe et al., 2005), no studies to date have examined the specific relation between dissociation and later attention problems. Given the dearth of prospective studies that have examined the respective roles of PTSD and dissociation in predicting later attention problems in children, one of the main goals of the current study is to examine the predictive utility of these important variables.

The current study utilized assessments of children from forensic interviews. During such interviews, CSA victims are asked to recollect and discuss potentially traumatic memories of the abuse. As disclosure of sexual abuse can produce various stress reactions in children, including dissociation and PTSD symptoms, responses in the immediate aftermath of disclosure may offer important information about future risk and resilience that can inform clinical practice. The present study is designed to assess these responses in the service of identifying a model of risk factors for attention problems in children who disclose sexual abuse. The most feasible research strategy for investigators interested in understanding the mechanisms leading to CSA-related psychopathology is to assess children as soon as possible after their disclosure of CSA and follow their progress longitudinally. Because the disclosure period is often a crucial point of entry for clinical attention, this study design is ideally suited to identify targets for prevention and intervention.

Whereas a number of studies have examined the development of various externalizing behavior problems in child sexual abuse victims (e.g., Garnefski & Diekstra, 1997; Kaufman & Widom, 1999; McCloskey, 2003), systematic research regarding predictors of attention problems in sexually abused children is lacking. Studies that suggest which causal models are most viable in the prediction of attention problems in particular are critical in order to develop effective prevention and intervention programs tailored to the needs of the large number of sexually abused children with attention deficits. Because attention problems often co-occur with other externalizing behaviors, it is difficult to tease these constructs apart. However, it is plausible that certain causal mechanisms are unique to attention problems, and thus, studies that examine externalizing behaviors in general, as opposed to disaggregating different dimensions of externalizing such as attention problems, may inadvertently overlook important predictor variables.

The purpose of the current study is to develop and test a prospective model of attention problems in sexually abused children including fixed (e.g., gender), trauma (e.g., age of abuse onset, child’s relationship to perpetrator, frequency of abuse, and severity of abuse), and disclosure-related variables (e.g., dissociation and post-traumatic stress symptoms).

Method

Participants

Participants had been referred to a treatment facility that offers services to child victims of sexual abuse. Each of the participants had been medically examined, interviewed and videotaped for forensic purposes. All interviews were written up in report form by the interviewers. Inclusion criteria for the study consisted of: (1) interviewers' conclusions regarding the abuse allegations could *not* be rated as "unknown" or "no evidence;" (2) the child's interview took place between January 1998 and August 2000; (3) the child was between the ages of 8 and 13 at the time of the interview; and (4) the child lived in one of three counties in North Carolina.

Of the possible sample of 1550 children who were interviewed and videotaped for forensic purposes, 156 children met criteria for the study. All of these 156 children comprised the Time 1 sample. Of these children, only 74 could be contacted at Time 2 (i.e., 8–36 months following the Time 1 interviews) due to the large number of families that had relocated and left no forwarding address. Of the 74 families contacted, 56 consented to participate at the Time 2 follow-up, resulting in a 76% response rate. Analyses indicated that the follow-up sample of 56 participants did not significantly differ from the 100 original participants who were unable to be located at Time 2 with regard to gender, age of onset, relationship to perpetrator, frequency of abuse, dissociation at Time 1, and PTSD symptoms at Time 1. Maximum likelihood estimation techniques for missing data through Mplus (Muthen & Muthen, 1998) made it possible to utilize the entire sample of 156 children in the analyses. Thus, the sample was comprised of 129 girls and 27 boys. The mean age of the sample was 10.7 years; 56% were African American, 23% were Caucasian, 12% were Native American, 5% were Bi-racial, and 4% were Hispanic.

Procedure

Time 1 information was gathered from interviewers' written reports and the Trauma Symptom Checklist for Children [TSCC; (Briere, 1996)] collected at the time of the forensic interview. Following approval from the Duke University Medical Center Institutional Review Board, contact with families for Time 2 follow-up (8–36 months after the forensic interview) was initiated through a letter explaining the purpose of the study. After complete description of the study to the subjects, written informed consent was obtained. Participating families were administered questionnaires in person. Administration of questionnaires ranged from 40 to 60 minutes, and participants were compensated monetarily.

Measures

Although numerous child- and parent-report measures were administered, only those measures relevant to the current study are discussed here.

Written reports. Demographic (e.g., gender) and abuse characteristics were extracted from written reports of children following their forensic interview at Time 1 and subsequently coded by the principal investigator and a trained research assistant. Discrepant ratings were discussed between the principal investigator and the research assistant until a consensus was reached, and all measures of interest to the current study demonstrated good inter-rater reliability. Inter-rater reliability estimates were calcu-

lated using Pearson correlation coefficients for continuous data and coefficient kappa for categorical data. Age of onset of abuse (Pearson $r = .87$) ranged from 2 to 13 years, with a mean age of 8.0 years ($SD = 2.7$). Because most children had difficulty providing information regarding the specific number of times that the abuse had occurred, the frequency of the abuse (kappa = .79) was coded dichotomously (0 = once, 1 = more than once). The majority of children in the sample (79.4%) reported abuse that occurred more than once. Using a scoring system similar to that of Wolfe, Sas, and Wekerle (1994), the severity of the abuse (Pearson $r = .88$) was rated on a 4 point scale (0 = exposure, 1 = fondling, 2 = digital penetration, and 3 = oral, anal, or vaginal intercourse), with most children (64.8%) experiencing abuse of the highest severity, 10.9% experiencing digital penetration, 22.7% experiencing fondling, and 1.6% experiencing some form of exposure. Finally, the child's relationship to the perpetrator of the abuse (kappa = .90) was initially rated on a three-point scale [0 = stranger, 1 = extrafamilial (someone the child knows but not within the immediate family), and 2 = intra-familial (someone within the immediate family)]. However, because none of the children in the current sample were abused by a stranger, this rating scale was changed to a dichotomous scale such that 0 = extrafamilial and 1 = intrafamilial. The majority of children (62.4%) were sexually abused by someone within the family.

Post-traumatic stress and dissociation. The Trauma Symptom Checklist for Children [TSCC; (Briere, 1996)], provided at Time 1 and Time 2, is a 54-item self-report instrument that evaluates post-traumatic symptomatology, including PTSD symptoms and dissociation, in children and adolescents, aged 8–16. Each symptom item is rated according to its frequency of occurrence using a four-point scale ranging from 0 (never) to 3 (almost all of the time). Various studies that have used the TSCC indicate that it is reliable (alphas in the mid to high 80s for all scales) and has convergent and predictive validity in samples of both traumatized and non-traumatized children and adolescents (Briere et al., 2001). The current study utilized the 10-item PTSD and the 10-item Dissociation scales of the TSCC. Sample items from the PTSD scale include “bad dreams or nightmares” and “remembering scary things.” Sample items from the Dissociation scale include “pretending I am someone else” and “feeling like I am not in my body.”

In order to maximize independence of scores, both parent- and teacher-report measures were used to assess child behavioral problems.

Teacher-report of child externalizing problems. At the Time 2 follow-up interview, teachers were administered the Teacher Report Form [TRF; (Achenbach, 1991a)], a measure of the child's internalizing and externalizing symptomatology. Item scores ranged from 0 (not true of the child) to 2 (very true or often true of the child). Of interest to the current study is the Externalizing Scale score, used to measure child externalizing problems. The externalizing scale sums 27 items from two clinical syndrome scales: Delinquent Behavior (8 items) and Aggressive Behavior (19 items). The 15-day test-retest stability coefficient for externalizing problems is .92 (alpha > .90; Achenbach, 1991a). Sample items include “cruelty, bullying, or meanness to others” and “lying or cheating.”

Parent-report of child attention problems. At the Time 2 follow-up interview, parents (mainly mothers) were administered the Child Behavior Checklist for Children [CBCL; (Achenbach, 1991b)], a parent-report measure of the child's internalizing and externalizing symptomatology. The outcome variable, child attention problems, was assessed by the Attention Problems Scale, derived from 11 items on the

CBCL. This scale has been shown to have good internal consistency ($\alpha = .84$; Achenbach, 1991b), and is strongly correlated with the impulsive/hyperactive scale of the Conners Parent Questionnaire (Conners, 1973). Sample items include “can’t concentrate” and “can’t sit still, restless, hyperactive.”

Data analysis

Initial data analysis consisted of examining bivariate relations between potential predictor variables and attention problems. In order to make use of all data available (i.e., 156 subjects with complete data at Time 1, 56 subjects with complete data at Time 2), we approached the issue of missing data at Time 2 by using maximum likelihood estimation techniques for missing data (Muthen & Muthen, 1998). 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 (Curran & Hussong, 2003). (For a thorough review of methods for handling missing data, see the discussion by Graham, Cumsille, & Elek-Fiske, 2001.) The current study used a path analytic strategy similar to that used by Shalev, Peri, Canetti, and Schreiber (1996) in their prospective study of acutely traumatized adults. This strategy follows a prospective longitudinal design and, therefore, the directionality of paths is constrained by the time at which the variables are assessed. Accordingly, we divided variables into four categories: (1) attention problems (dependent variable); (2) disclosure reactions (variables measured upon disclosure of abuse); (3) trauma variables (variables specific to the trauma itself); and (4) fixed variables (variables describing the child prior to the trauma). Externalizing behavior (as measured by the Teacher Report Form) was assessed at Time 2 and included in the model as a control variable.

A series of hierarchically nested ordinary least squares multiple regression analyses were used to estimate direct and indirect effects among variables. Guided by previous empirical research, we chose combinations of variables that accounted for a high percentage of the variance in attention problems (high R^2). Accordingly, we chose three primary variables (i.e., dissociation, relationship to the perpetrator, and externalizing behavior) that together accounted for 52% of the variance in attention problems ($R^2 = 0.52$). Once these variables were chosen, we began to include antecedent variables that would allow dissociation, relationship to perpetrator, and externalizing to serve as potential mediators. We specified a fully saturated model and then removed paths that were not significant (e.g., severity of abuse, frequency of abuse). Models were compared using model fit indices, specifically the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). For the CFI, values above .95 indicate a satisfactory fit. For the RMSEA, values below .08 indicate a satisfactory fit and values below .05 indicate an excellent fit. For the SRMR, values close to .08 indicate a satisfactory fit.

Results

Descriptive statistics

Table 1 displays descriptive statistics (mean, standard deviation, and range) for all continuous variables in the current study. Mean scores for scales such as PTSD and Dissociation are consistent with other self-report survey samples of sexually abused children (e.g., Crouch, Smith, Ezzell, & Saunders, 1999).

Table 1
Descriptive information: trauma, disclosure, and post-trauma variables

Variable	Mean	Standard deviation	Range
Trauma variables			
1. Age of CSA onset	8.01	2.67	2.00–13.00
2. Severity	2.39	.89	0.00–3.00
Disclosure variables			
3. Dissociation	8.16	5.04	0.00–20.00
4. PTSD	10.72	6.75	0.00–24.00
Post-trauma			
5. Externalizing problems	16.43	15.66	0.00–58.00
6. Attention problems	5.72	4.58	0.00–17.00

Note. Severity (0 = exposure, 1 = fondling, 2 = digital penetration, and 3 = oral, anal, or vaginal intercourse).

Bivariate relations

Table 2 presents mean differences for attention problem scores among categorical variables including gender, frequency of abuse, and relationship to perpetrator. The only significant mean attention score difference was found between those children who were abused by someone within the family versus those who were abused by someone outside of the family, such that those who were abused within the family scored higher on attention problems than those who were abused by someone outside of the family.

Table 3 presents Pearson correlation coefficients among continuous variables and later attention problems. It is interesting to note that both PTSD symptoms and dissociative symptoms at Time 1 were negatively correlated with externalizing problems at Time 2, suggesting that these particular stress responses may exhibit a buffering effect on the development of externalizing problems. However, because these are only bivariate relationships and thus do not take into account other potential influences, we cannot draw firm conclusions about how they may or may not impact later functioning. Consistent with studies using similar samples of sexually abused children as well as similar measures of trauma symptoms (e.g., Crouch et al., 1999), dissociative symptoms were highly correlated with PTSD symptoms.

Table 2
Bivariate relations: differences in mean attention problem scores among categorical variables

Variable	Mean attention problem score	<i>p</i> -Value
Gender		
Females	5.38	<i>ns</i>
Males	6.92	
Frequency		
Once	4.92	<i>ns</i>
More than once	6.24	
Relationship to perpetrator		
Extrafamilial	4.00	.04
Intrafamilial	6.62	

Note. Mean attention problem score is derived from the CBCL Attention Problems Scale.

Table 3
Correlation matrix: trauma, disclosure and post-trauma variables

Measures	Dissociation	PTSD symptoms	Externalizing	Attention problems
Age of onset	-.12	-.21*	.01	-.13
Dissociation	-	.72**	-.32**	.42**
PTSD	-	-	-.25*	.28*
Externalizing	-	-	-	.40**
Attention problems	-	-	-	-

Note. N = 156; * p < .05. ** p < .01.

Path analysis

The final path analytic model provided excellent fit indices: CFI = 1.00, RMSEA = .00, SRMR = .08. Figure 1 illustrates the results, with partial correlation coefficients (standardized β weights) given for each path remaining after nonsignificant paths were removed. The results indicated one direct pathway from the child's relationship to perpetrator ($\beta = .23$) to attention problems such that intrafamilial abuse was associated with greater attention problems, one direct pathway from higher levels of dissociation ($\beta = .53$) to attention problems, and one direct pathway from higher levels of externalizing behavior ($\beta = .43$) to attention problems. Age of abuse onset predicted PTSD symptoms such that abuse at a younger age predicted higher levels of PTSD symptoms ($\beta = -.21$). Interestingly, PTSD was only indirectly related to later attention problems through its relationship with dissociation ($\beta = .71$). Taken together, these pathways accounted for 52% of the variance in attention problems.

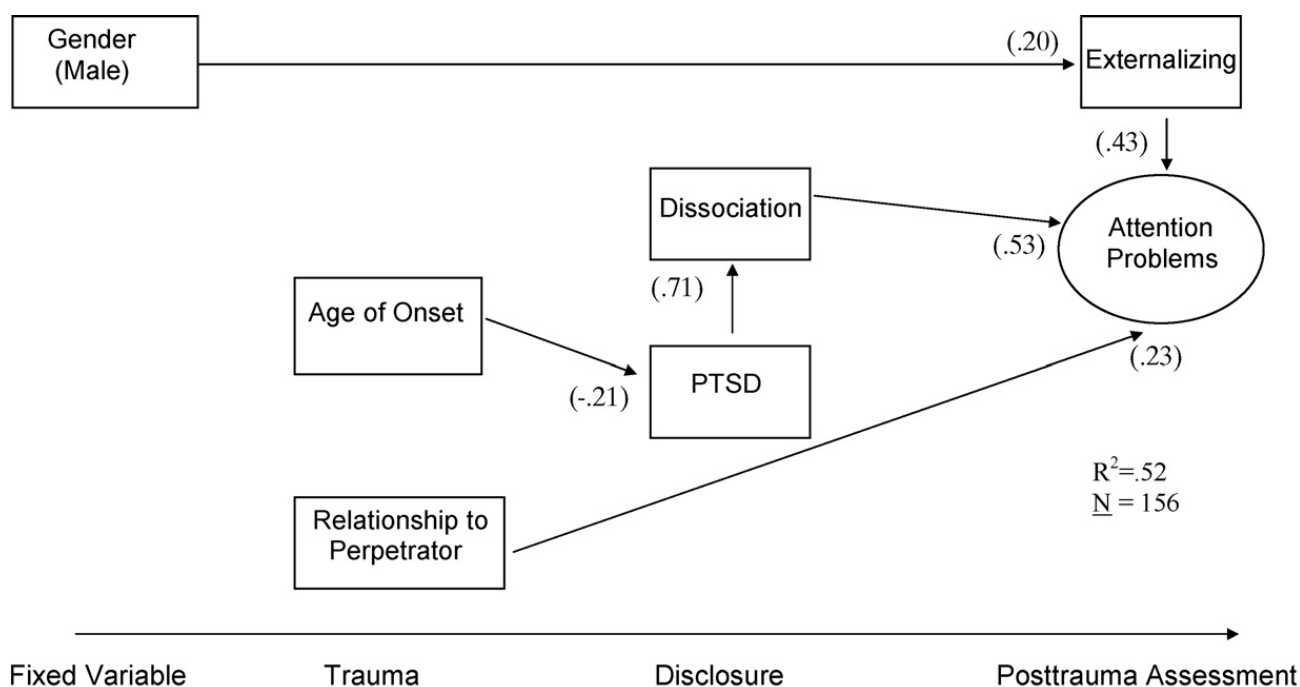


Figure 1. Path analytic model of the development of attention problems in 156 sexually abused children. Note. The values in the model are standardized partial correlation coefficients (β weights).

A potential confound could be that dissociative symptoms that are present at Time 2 are influencing attention problems at Time 2. To address this concern, we included dissociation at Time 2 in the model, and this variable was not significantly associated with attention problems at Time 2, suggesting that Time 1 dissociation plays a significant role in the development of later attention problems.

Given the number of items included in the Dissociation scale of the TSCC that appear to be attention-related (e.g., forgetting, daydreaming, etc.), one might question whether the significant predictive relation between dissociation and attention problems would hold if only the non-attentional items in the dissociation subscale are used. In order to address this potential confound, we reran the analyses using only non-attentional dissociation items as our dissociation scale (e.g., “pretending I am someone else,” “feeling like I am not in my body,” “feeling dizzy,” “feeling like things aren’t real”). That is, we eliminated items such as “going away in my mind,” “forgetting things,” “my mind going blank,” and “daydreaming.” Replacing the original dissociation scale with this non-attentional dissociation measure produced similar results in that this model was also a good fit (CFI = 1.00, RMSEA = 0.00) and all of the original pathways remained significant. More importantly, the relation between dissociation and attention problems remained significant using this new subscale ($\beta = .38$). These results suggest that the attention items in the dissociation scale were not driving the relation between dissociation and later attention problems.

Discussion

To our knowledge, this is the first study to examine the utility of a prospective model incorporating fixed variables, trauma, and disclosure-related pathways leading to attention problems in sexually abused children. The results demonstrate that children who were sexually abused by someone within their family and/or report symptoms of dissociation upon disclosure of abuse (i.e., at the time of evaluation) are at increased risk of developing attention problems 8–36 months after disclosure. These findings support the importance of assessing children’s reactions as soon as possible after disclosure. Such reactions provide essential information about later problems in functioning.

Given the overwhelming stress experienced by sexual abuse victims during the time of the abuse well as during disclosure, it is not surprising that childhood sexual abuse is strongly associated with concurrent and prospective dissociative responses (Kirby, Chu, & Dill, 1993; Putnam, 1997; Zlotnick et al., 1996). However, due to previous reliance on retrospective reports of adult sexual abuse victims, the prospective relation between dissociative symptoms and later attention problems 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 of later attention deficits. In fact, dissociation appeared to be the strongest predictor of attention problems in this sample of children.

Putnam (1997) stated that dissociation directly interferes with the child’s perception of the environment and the integration of incoming information. Thus, a child who dissociates is likely to have difficulty concentrating on his or her immediate surroundings. Studies on the psychobiological development of maltreated children may also provide a possible explanation for the significant relation between dissociation and later attention problems. The corpus callosum, the major interconnection between the two hemispheres of the brain, serves to facilitate cortical communication and integration of input (Ramaekers & Njikiktjien, 1991). It has been suggested that dissociative symptoms are associated with less “connectivity” in the corpus callosum (De Bellis, 2001; De Bellis et al., 1999), which may lead to problems

in attention and information processing. However, future research is needed in order to understand the underlying mechanisms involved in the relation between dissociation and attention.

Surprisingly, PTSD symptoms measured immediately after the child's disclosure of sexual abuse were not directly predictive of later attention problems. Rather, the results of this study suggest that dissociation mediates the relation between PTSD and attention problems in sexually abused children. In other words, despite the strong link between PTSD symptoms and attention problems in adults (e.g., Bremner, Krystal, Southwick, & Charney, 1995; Litz & Keane, 1989) and children (e.g., Merry & Andrews, 1994; Saigh, Mroueh, & Bremner, 1997), it may be the accompanying dissociative symptoms, which are so often comorbid with PTSD symptoms, that actually drive this relationship. In fact, a study of Vietnam combat veterans suggests that attentional functioning may be less influenced by PTSD status than by the presence or absence of a concurrent dissociative trait (Kaufman, 2002).

The findings of the current study suggest the victim-perpetrator relationship is a critical component of the trauma of sexual abuse in terms of predicting future functioning. It is noteworthy that the child's relationship to the perpetrator was the only trauma-related variable that directly predicted later attention problems. Specifically, severity and frequency of abuse were not significantly associated with attention problems in the current study. It may be that children who experience sexual abuse by someone within their own family have greater difficulty sustaining attention because they are so often flooded with incompatible and disruptive pieces of information (e.g., my brother loves me, my brother sexually abuses me; or the same person who is my abuser is also my caretaker), and their resulting affect dysregulation is likely to play a role in executive functioning deficits, including attention problems. On the other hand, it may be that other unmeasured constructs that are correlated with the relationship to the perpetrator may explain this positive association. For example, the experience of shame, which is more likely to be associated with sexual abuse by a parent or caregiver, often results in the disruption of behavior and confusion in thought (Feiring, Taska, & Chen, 2002; Feiring, Taska, & Lewis, 1996), potentially leading to attention difficulties. As mentioned previously, the relationship to perpetrator data in the current study was coded dichotomously (i.e., intrafamilial versus extrafamilial) which is consistent with other studies of sexually abused children (e.g., Bal, De Bourdeaudhuij, Crombez, & Van Oost, 2005). However, another study of sexually abused children found that abuse by a biological father was predictive of multiple problem outcomes, whereas abuse by an "other father figure" was not predictive of these outcomes (Trickett et al., 1997). Therefore, an important direction for future research is to examine the unique relationships between the child sexual abuse victim and perpetrator as they relate to later attention problems.

The results of this study indicate that children who were sexually abused earlier in life had higher levels of PTSD symptoms at the time of their disclosure. This is consistent with other studies of child abuse victims that found early onset of abuse to be significantly associated with a greater likelihood of later PTSD and/or anxiety (e.g., Famularo, Fenton, Kinscherff, Ayoub, & Barnum, 1994; Glod & Teicher, 1996; Kaplow et al., 2005) as well as later anxiety and depression in adulthood (Kaplow & Widom, 2007). De Bellis et al. (1999) found that intracranial volumes of maltreated children, the majority of whom were sexually abused, were positively correlated with the age of onset of the abuse and negatively correlated with PTSD symptoms. This finding suggests that there may be critical periods and dose effects for stress-related alterations in brain development (De Bellis, 2001), leading to higher levels of PTSD.

An important strength of the current study is that the findings are specific to attention problems in particular as opposed to general externalizing problems. Although externalizing was included as a control variable in the model, it is noteworthy that none of the trauma or disclosure-related variables in this study predicted externalizing behaviors. This further supports the specificity of our findings.

Limitations

There are several limitations to this study. First, the current findings only generalize to the population of children who were identified by the Department of Social Services as children suspected of being victimized by sexual abuse and identified for forensic evaluation. According to the Third National Incidence Study of Child Abuse and Neglect, only 28% of children who were abused or neglected received Child Protective Services' attention for their maltreatment (Sedlak & Broadhurst, 1996). Consequently, the current sample's generalizability to the larger population of abused children is unclear. Second, the current study did not assess children's attention problems prior to the disclosure. Consequently, the extent to which prior attention problems may be driving the relationships between the predictors in the model and later attention problems is unclear. Third, the Dissociation scale of the TSCC is a child-self-report measure and because dissociation can be difficult for children to self-report accurately, this measure may not be completely reliable. Future studies that are able to control for previous attention problems as well as include other reliable, external measures of dissociation are needed.

Fourth, it is also important to note that the attention problems scale of the CBCL is not a diagnostic measure and thus, it is unclear whether the variables included in our model would also be predictive of a diagnosis of ADHD. Future studies that examine these variables in relation to later ADHD would help to clarify this issue. Fifth, the time that had elapsed from the Time 1 interview to the Time 2 follow-up interview ranged from 8 to 36 months, which in theory, could have biased the results. However, when we controlled for the time to follow-up in our model, the results remained unchanged. Finally, only 56 children had complete data at Time 2, which may have been another source of bias if children lost to follow-up differed from those included in the study on our key variables. However, there were no significant differences between this sample and the 100 original participants who were unable to be located at Time 2. Thus, it is unlikely that attrition would have biased our results.

Clinical implications

This research has crucial implications for providers conducting general clinical or forensic evaluations of sexually abused children by helping to identify children who appear to be most at-risk of developing attention problems. Our results indicate that children who report dissociative symptoms at the time of the evaluation at a specialty clinic and/or were sexually abused by someone within their family are particularly at risk. Practitioners commonly assess PTSD symptoms in sexually abused children. However, PTSD symptoms measured upon disclosure were not associated with externalizing problems at Time 2, nor were they directly associated with later attention problems. These findings support the importance of also assessing dissociative symptoms in maltreated children.

Children who experienced child sexual abuse within the family and/or report symptoms of dissociation during disclosure are likely to need intervention. These interventions should involve (1) providing skills such as relaxation and breathing techniques as more adaptive means of coping with stress and (2) helping children to acknowledge and process traumatic aspects of the abuse in an effort to reduce the cyclic nature of traumatic reminders leading to unmanageable stress and dissociation. Providing this care as close as possible to the time of the first clinical or forensic interview may allow for a greater reduction in subsequent attention problems. However, this type of early intervention would have to be evaluated through prospective treatment-outcome studies that rigorously distinguish between pre-existing, peritraumatic, and prospective dissociative and attentional symptoms. Intervention pro-

grams that are able to prevent the development of attention problems in sexually abused children may ultimately help to eliminate the future risk of associated longer-term negative outcomes, such as adolescent antisocial behavior (Bor et al., 2004) as well as adult substance abuse (Biederman et al., 1998).

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