

Effects of Past Abuse Experiences on Children's Eyewitness Memory

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Relations between child maltreatment and children's eyewitness memory were examined. A matched sample of abused and nonabused 3- to 10-year-old children (n = 70) participated in a play session with an unfamiliar adult and were interviewed about the interaction 2 weeks later. Consistent with results from previous research, older compared to younger children's reports were more complete and accurate. Abused and nonabused children performed similarly with several exceptions: Nonabused children were more accurate in answering specific questions, made fewer errors in identifying the unfamiliar adult in a photo identification task, and (at least for younger boys) freely recalled more information. Most effects remained when group differences in IQ and behavioral symptomology were statistically controlled. Importantly, abused and nonabused children did not differ in their accuracy or suggestibility in response to questions that were relevant to abusive actions. Among abused children, however, those who suffered more severe sexual abuse made more omission errors to specific abuse-relevant questions. Contributions to psychological theory and legal implications for understanding children's eyewitness memory and testimony are discussed.

INTRODUCTION

Child abuse is a significant societal problem, particularly in light of its prevalence and potentially damaging effects. The best estimates indicate that at least one in 5 girls and one in 10 or more boys will experience a sexual assault before their 18th

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birthday (Finkelhor, 1979, 1984). An even larger number of children will experience physical abuse (Finkelhor & Dziuba-Leatherman, 1994). Many child abuse cases go undisclosed and unreported. If discovered, legal and social service investigations of abuse allegations are difficult because they may often be based largely, if not solely, on a child's report (Myers, 1998). Thus, the accuracy of children's reports is an issue of considerable legal concern, a fact that has prompted psychological research on children's memory and suggestibility as applied to forensic contexts.

Children's eyewitness testimony research has generally involved interviewing nonabused children about a standardized, controlled event, with some questions that are open-ended and others that are more narrowly focused and detailed. The questions often concern nonabusive events that actually occurred, as well as leading questions that test children's ability to resist suggestions about nonabusive and abusive events that did not actually occur. Such research has provided the fields of psychology and law with a great deal of information regarding what we might expect from children who are asked to give reports in legal contexts. Even so, the results generally reflect the memory and reporting abilities of the average child. Few studies have illuminated individual differences among children that might affect report accuracy (but see Quas, Qin, Schaaf, & Goodman, 1998), an issue of major concern to courts. In particular, we know relatively little about the specific strengths and weaknesses of the very children for whom child witness research was initiated—abused children. That is, with few exceptions (e.g., Eisen, Goodman, Davis, & Qin, 1998), all published studies of children's eyewitness testimony have included presumably nonabused child participants, who are not representative of many children who are actually interviewed in child abuse investigations. Of course, because some children who experience interviews in forensic contexts will not have been abused, it is important to understand the ability of nonabused children to resist misleading questions about fictitious abusive events. But many children who are given forensic interviews will have suffered abuse in the past, sometimes multiple instances of abuse. And, at times, such children, who truly have suffered abuse in the past, may be interviewed about alleged abuse that they in fact did *not* experience. Thus, it is important also to focus attention on maltreated children's eyewitness memory and suggestibility. Such research is relevant to the generalizability of previous findings to the full spectrum of children questioned in abuse investigations.

More specifically, research on the eyewitness memory abilities of maltreated children can address the following questions: (1) When children have suffered abuse, what is the likelihood that they will later insert details of their abuse experiences into reports of nonabusive events or falsely accuse an innocent person (or do both of these)? In legal cases, it is sometimes argued that the complaining child indeed suffered abuse but not in the manner reported and not by the person who stands accused. (2) Under what conditions do abused children accurately report details of their experiences? Sometimes interviewers are so convinced that a child has suffered abuse that they ask many leading and even misleading questions. How well can abused children resist such questions? (3) Are children with histories of abuse prone to make errors of omission? Perhaps such children have learned not to reveal information to adults who question them (e.g., because of threats not to tell or mistrust of adults).

In this study, we examined children's eyewitness memory as a function of whether or not they experienced maltreatment. We present our methods and findings after reviewing research and theory regarding how children's suggestibility and memory might be affected by a history of maltreatment and by child age, another factor we investigated.

Maltreatment and Memory

Although controversial, many now believe that clinically relevant factors such as a history of abuse and trauma are important influences on memory (e.g., Bremner et al., 1997; Briere, 1992; Nadel & Jacobs, 1998). In turn, such factors may be significant influences on children's eyewitness accuracy. One reason to expect that a history of maltreatment might influence children's eyewitness performance is that abuse is associated with adverse emotional reactions and delays in cognitive and language abilities. For example, abused children are sometimes intellectually delayed (Bowlby, 1973; Cohn, 1979; Green, Voeller, Gaines, & Kubie, 1981), suffer in terms of school performance (Tong, Oates, & McDowell, 1987), and score worse than nonabused children on measures of general achievement (Einbender & Friedrich, 1989) and intelligence (Basta & Peterson, 1990; Carrey, Butter, Persinger, & Bialik, 1995; Friedrich, Einbender, & Luecke, 1983; Sadeh, Hayden, McGuire, Sachs, & Civita, 1994; Tarter, Hegedus, Winsten, & Alterman, 1984). Abused children also generally perform more poorly than nonabused children on standardized tests of short-term memory and verbal skills (Friedrich et al., 1983).⁷ Poor memory for events and poor performance on intelligence tests are linked to increased suggestibility in adults (Gudjonsson, 1986) and children (Eisen et al., 1998). Thus, compared to nonabused children, maltreated children may have less accurate memories for actual past events, and they may be more suggestible about fictitious events.

Another reason to expect abused children to fare more poorly on memory interviews is the fact that certain psychological reactions to maltreatment and trauma are related to decreased memory abilities. For example, some children who have experienced traumatic events, such as sniper attacks (Nader, Pynoos, Fairbanks, & Frederick, 1990; Pynoos et al., 1987; Pynoos & Nader, 1989), violent kidnapping (Terr, 1983), witnessing the sexual assault of their mothers (Pynoos & Nader, 1987), or, more pertinent to the present discussion, suffered abuse themselves (e.g., Briere, 1992; Chu & Dill, 1990; Putnam, 1995), demonstrate symptoms such as posttraumatic stress, severe anxiety, and dissociation (see also Terr, 1991). Such psychological sequelae may be associated with impairment of the ability to properly encode and retrieve subsequent information (e.g., Bremner et al., 1997; Putnam, 1997; van der Kolk & Fisler, 1995; van der Kolk, van der Hart, & Marmer, 1996), although more empirical research is needed in this regard (Goodman et al., 1998). Internalizing (e.g., social withdrawal, depression, social anxiety) and externalizing (e.g., inappropriate aggression) behavioral problems, which are other concomitants of

⁷Even so, it should be noted that reviews of the impact of sexual abuse on children generally find that no one symptom or group of symptoms characterize a majority of sexually abused children, and that many child sexual abuse victims display no negative effects at all (e.g., Berliner & Elliott, 1996; Goodman, Emery, & Haugaard, 1998; Kendall-Tackett, Williams, & Finkelhor, 1993).

childhood abuse (e.g., Friedrich & Reams, 1987; Livingston, 1987), may also impair memory for events. Specifically, if abused children are either more socially withdrawn and anxious or more aggressive and disruptive than nonabused children, they may poorly attend to details of interpersonal interactions, and as a result, not encode the details of the interaction, which would preclude precise recall. This might also increase suggestibility, because in the absence of clear memories for an event, both adults and children are more suggestible about what might have happened (Loftus, 1979). In addition, social anxiety and lack of empowerment at the time of an interview may increase conformity to misleading questions (Davis & Bottoms, *in press*). Similarly, conformity and suggestibility might also be heightened in children who lack self-confidence, as abused children sometimes do (Tong et al., 1987).

Abused children's reports may also be less complete and accurate than those of nonabused children because of confusion and source-monitoring errors. For example, details of children's past abuse experiences may intrude into their memories for other abusive or nonabusive experiences, causing distortions that may lead to false memories or false reports (Ganaway, 1989). A nonabusive encounter with a stranger might even be confused in memory with an abusive former experience with another person. Research revealing children's source-monitoring difficulties (e.g., Ceci, Loftus, Leichtman, & Bruck, 1994; Lindsay, Johnson, & Kwon, 1991) suggests that such confusions may be possible, although no research that we know of has investigated confusions of abuse-relevant experiences specifically.

Finally, children's past victimizations could lead to misperceptions of social interactions and, in turn, subsequent inaccuracies in reports. For example, physically abused children interpret ambiguous social interactions in a more aggressive way than nonabused children do (Dodge, Bates, & Pettit, 1990). As a result of their victimization, sexually abused children have precocious sexual knowledge and awareness that nonabused children do not have (Tong et al., 1987). It might be argued that their increased sexual precociousness may lead to misperceptions of adults' activities, misperceptions that could form the basis of false reports of abuse.

There are reasons to believe, however, that maltreatment might actually promote accurate memory and decrease suggestibility for some types of information, particularly information relevant to abuse. Specifically, abuse may affect children's perceptions of the salience of various types of information, and salience may determine what is attended to, encoded, stored, and retrieved about an event. For example, as compared with nonabused children, abused children may pay greater attention to traumatic events, a hypervigilance that could result in better memory. In support, Rieder and Cicchetti (1989) found that maltreated children direct more attention to threatening, aggressive stimuli than to other stimuli. Further, Katz, Schonfeld, Carter, Leventhal, and Cicchetti (1995) studied children involved in actual sexual abuse evaluations that included ano-genital exams. Compared with children whose sexual abuse was deemed unsubstantiated, those with substantiated abuse were more likely to report the ano-genital contact when interviewed later. Thus, abusive experiences may affect children's attention and information processing, which in turn

may positively affect memory and suggestibility for abuse-related information (i.e., information related to the fact that abuse did or did not occur).

In addition, abused children's increased knowledge and awareness (gained through their own victimization and any resulting investigation) may leave them more likely than nonabused children to understand questions about sexual or physical abuse (or both). Thus, on the one hand, abused children's precocious understanding of abusive experiences may cause them to be more accurate in answering questions about abuse and less likely to confuse nonabusive events with abusive ones. On the other hand, however, abused children may find the suggestions of abuse contained within such questions to be more plausible than would nonabused children, and in turn, they might be more likely than nonabused children to acquiesce to misleading abuse-related suggestions. That is, suggestions are more readily accepted when they are plausible and consistent with one's own experiences and knowledge (Pezdek & Roe, 1994, 1995).

Thus, there are reasons to expect that abused children might perform worse than nonabused children in eyewitness memory interviews, but there are also reasons to expect that they might perform more accurately, at least in answering abuse-related questions. To our knowledge, only one other group of researchers has examined maltreated versus nonmaltreated children's memory in an eyewitness testimony paradigm. Specifically, Eisen et al. (1998) interviewed children who, because of alleged abuse victimization, had all received ano-genital examinations in the context of a 5-day inpatient abuse assessment program. Measures of general psychopathology and intelligence were significantly, though not strongly, related to children's accuracy. Typical age patterns were also obtained, with older children outperforming younger children. Of particular interest, children with substantiated abuse allegations did not significantly differ in their memory for the examination as compared with children whose allegations were not substantiated. Although this work is significant, there are reasons why more research is needed before concluding that abuse has no effect on children's eyewitness memory. For example, although their research included a control sample of presumably nonabused children, both the allegedly abused and nonabused children were undergoing an abuse investigation concurrent with the study; both samples were nearly all minority children who shared similar low socioeconomic environments wrought with poverty and violence, which may have traumatized them all in ways that also affect memory performance; and both groups were interviewed during their inpatient assessment after having been removed from their homes, which was presumably traumatic itself.

In the present study, we compared, in the context of a mock forensic interview, the memory and suggestibility of children who had experienced abuse to children who had never been alleged victims or involved in an abuse investigation. In contrast to Eisen and colleagues' (Eisen et al., 1998) sample, our sample was more stratified in terms of economic status and race, and contained children who were all in stable home environments at the time of the study, and our comparison group children were presumably much less likely to have actually been abused or traumatized in their past.

Age Differences in Children's Memory and Suggestibility

Children in our study ranged from 3 to 10 years of age. One of the most robust findings in the children's eyewitness testimony literature is that older children are more accurate and less suggestible than younger children (for reviews, see Ceci & Bruck, 1993; Davis, 1998; Goodman & Bottoms, 1993; Goodman et al., 1998; Warren & McGough, 1996). Specifically, when asked to give free narratives about what happened to them during a neutral past event, older children typically report more information than do younger children (Goodman & Reed, 1986; Leippe, Romanczyk, & Manion, 1991; Marin, Holmes, Guth, & Kovac, 1979; Spencer & Flin, 1990). Although younger children report less information overall, what they do report is generally accurate (Goodman, Aman, & Hirschman, 1987; Goodman & Reed, 1986; Marin et al., 1979; Nelson, 1986), assuming that they have not experienced potentially contaminating influences such as highly suggestive interviewing (see Poole & Lamb, 1998, for review). Compared with younger children, older children are also more accurate and less suggestible in response to more focused specific questions and highly leading questions, particularly when the questions concern central aspects of an event (Brigham, Van Verst, & Bothwell, 1986; Davies, Tarrant, & Flin, 1989; Goodman, Bottoms, Schwartz-Kenney, & Rudy, 1991; Goodman & Reed, 1986). They are also more resistant than younger children (particularly preschoolers) to suggestions about fictitious abuse-related events, such as whether they were kissed or touched inappropriately during a nonabusive target event (Goodman & Aman, 1991; Saywitz, Goodman, Nicholas, & Moan, 1991). It is important to note, however, that even in the face of these pervasive age differences, young children retain many accurate memories of events, especially the central details of events (Fivush, 1993; Fivush, Haden, & Reese, 1996), and they can be resistant to suggestions, especially about abuse that never happened (Rudy & Goodman, 1991; Saywitz et al., 1991).

OVERVIEW, DESIGN, AND HYPOTHESES

Our two-session study conformed to a 2 (age group: 3- to 6-year-olds or 7- to 10-year-olds) \times 2 (abuse status: abused vs. nonabused) \times 2 (gender) factorial design. At Session 1, children were individually engaged in a scripted social interaction (e.g., dressing up in a costume, posing for a photograph, reading a story) with an unfamiliar male confederate. At Session 2, approximately 2 weeks later, children were interviewed about various features of the social interaction, including memory for the confederate's appearance. Children were also asked misleading questions about events that did not happen, including events of an abusive nature. Our suggestibility manipulation was limited to the manner in which the questions were asked in a one-time interview. The children were not questioned about abuse incidents that they actually experienced, but rather about the nonabusive social interaction.

We predicted that, as compared with younger children, older children would be more accurate and less suggestible in their interview responses, and more accurate in their identifications of the confederate. Even though such age differences are robust

across previous child witness studies, replicating this pattern in a sample of maltreated children would be an important finding that would support the generalizability of this developmental trend in abused populations. We also predicted that, consistent with previous research on the psychological effects of abuse, abused children would have lower IQ scores than would nonabused children and would evidence more behavioral disturbance. Further, we predicted that abused children would perform more poorly on the memory and suggestibility measures concerning the nonabuse relevant aspects of the social interaction. Two opposing hypotheses were tested regarding the effects of abuse status on children's performance on abuse-related questions. As discussed earlier, the relevant literature provides past findings that could be used to predict better performance for abused versus nonabused children on such questions (e.g., due to heightened attention). Alternatively, abused compared with nonabused children may make more errors on abuse-related questions because of factors such as misperceptions of social interactions or poorer memory in general.

METHOD

Participants and Sample Description

Seventy children (28 boys and 42 girls) participated. They ranged in age from 3 years 8 months to 10 years 11 months ($M = 7$ years 6 months). For purposes of analysis, they were divided into two age groups: 3- to 6-year-olds ($N = 30$) and 7- to 10-year-olds ($N = 40$). All participants were paid and given a toy for their participation.

Thirty-five of the children had been involved as alleged victims in either criminal prosecutions of child abuse (referred to the study by District Attorneys' offices), founded social services cases, or treatment groups for child abuse victims at local clinics. All cases had been closed by the time of the study. Information collected from each child's referral source and parent(s) allows us to profile the abused sample. Two of the children (a younger boy and an older boy) allegedly experienced physical abuse only. The remaining 33 children were alleged to have experienced sexual abuse. Six of the latter children were believed to have experienced one or more prior incidents of either physical or sexual abuse. For the sexual abuse case that led to inclusion in our study, most of the cases involved genital contact: Only 6% experienced sexual contact that was nongenital, 55% experienced genital contact without penetration, and 39% experienced genital penetration. The children's alleged abusers were usually adults who were well-known to the child: a parent in 26% of the 35 cases, some other trusted caregiver in 51% of cases, an acquaintance in 17% of cases, and a stranger in 6% of cases. Only 3 of the 35 perpetrators were women. Twenty-nine per cent of the children experienced their abuse only one time, 32% experienced the abuse a limited number of times (two or three), and 39% experienced abuse over an extended period of time. The alleged abuse occurred years previously for some children and within a few months for others: Time since abuse was not systematically controlled in the study. The mean age of abuse onset was 4.41 years (range = 0–9 years), and the mean age of abuse termination was 5.00 years (range = 2–9 years).

The remaining 35 children had no known history of sexual or physical abuse. They were recruited through a variety of sources, including signs posted in neighborhoods, newspaper advertisements, and participant files maintained by the university. Screening during initial telephone contact with the families, and again at Session 1, was done to help assure that none were mentally handicapped or maltreated physically or sexually. These children were matched closely as a group to the maltreated sample in terms of age, gender, socioeconomic level, ethnicity, and the delay interval between the first and second sessions of the study (see Table 1).

The number of children per age/abuse/gender group was as follows: young abused boys, $n = 8$; young nonabused boys, $n = 8$; young abused girls, $n = 7$; young nonabused girls, $n = 7$; old abused boys, $n = 6$; old nonabused boys, $n = 6$; old abused girls, $n = 14$; old nonabused girls, $n = 14$. To find a significant difference between the abused and nonabused groups, our statistical power was .56, assuming a moderate effect. Under the same assumption, given the full design of the study, our overall statistical power was .50.

Materials

Sample Description Form

This form was used to collect basic demographic data about the entire sample (i.e., race/ethnicity, age, gender, and socioeconomic status) and to collect details about the maltreated children's alleged abuse experiences. Specifically, using information obtained from the abused children's referral source and their parent(s), abuse type was coded as 1 (*nongenital contact*), 2 (*genital touching*), and 3 (*genital penetration*). Frequency of abuse occurrence was coded as 1 (*once*), 2 (*2 or 3 times*), or 3 (*4 or more times*). Relationship of perpetrator to child was coded as 1 (*stranger*), 2 (*acquaintance*), 3 (*trusted caregiver*), or 4 (*parent*). Age of abuse onset was noted in years.

Table 1. Characteristics of Abused and Nonabused Groups

	Abused	Nonabused
Age		
<i>M</i>	7 years 6 months	7 years 5 months
Range	4 years 2 months– 10 years 11 months	3 years 8 months– 10 years 11 months
Gender	21 girls; 14 boys	21 girls; 14 boys
Socioeconomic status (<i>M</i>) ^a	4.63	3.91
Race/ethnicity	6 African American 21 Caucasian 8 Hispanic 0 Asian American	5 African American 21 Caucasian 7 Hispanic 2 Asian American
Delay between sessions	14.43	14.49
Total <i>T</i> CBCL scores		
<i>M</i>	61.43	51.89
Range	30–80	36–69
IQ		
<i>M</i>	99.71	109.26
Range	68–124	80–158

^aSocioeconomic status was scored on a revised Hollinghead scale that ranged from 1 to 7, with a higher score indicating lower socioeconomic status (Watt, 1976).

Stanford–Binet Intelligence Test

The Alpern–Kimberlin short form of the Stanford–Binet Intelligence Test (Form L-M, Terman & Merrill, 1960), which uses only two items at each age level (Alpern & Kimberlin, 1970), was administered to all children. For children with intelligence falling within the normal range, Gordon and Forehand (1972) found a correlation of .97 between the Mental Age generated by the Alpern–Kimberlin short form and the full version of the Stanford–Binet. In this study, scores ranged from 68 to 158 ($M = 104$).

Achenbach Child Behavior Checklist (CBCL)

The CBCL (Achenbach, 1991), a standardized measure of children's behavior problems and social competencies, was completed by each child's parent. Parents use a 3-point rating system ranging from 0 (*not true or never*) to 2 (*very true or almost always*) to indicate whether behaviors such as "bites fingernails" or "is cruel to animals" is characteristic of their child. The CBCL yields a global index of psychological dysfunction/behavioral disturbance as well as more specific indices of internalizing (e.g., depression, somatic complaints) and externalizing (e.g., delinquency, aggressiveness) behavior problems. Two versions, one for 2- to 3-year-olds and one for 4- to 18-year-olds, are each age-normed. The CBCL has been demonstrated to have good reliability, internal validity, and discriminant validity (e.g., Achenbach & Edelbrock, 1981; Achenbach, Edelbrock, & Howell, 1987; Wolfe & Mosk, 1983).

Memory Interview

The Session 2 memory interview consisted of 1 free recall question, 75 detailed questions, 5 affect questions, and a photo identification task designed to assess each child's memory for the social interaction that occurred during Session 1 (see Appendix for all questions).

Free Recall. The first question of the interview was a free recall question prompting children to report everything they could remember about what happened during the social interaction. The free recall question was followed by one prompt.

Detailed Questions. The 75 detailed questions were similar to those that have been used in other child witness studies (e.g., Carter, Bottoms, & Levine, 1996; Goodman, Rudy, Bottoms, & Aman, 1990; Saywitz et al., 1991).⁸ They were designed to obtain information about many aspects of the social interaction and to approximate various types of questions that might be asked in an actual forensic investigation. As such, they were varied in terms of type of response prompted and question content. Specifically, 49 questions prompted "yes/no" answers (these were approximately balanced in terms of "yes" and "no" correct answers to control for possible response biases), and 26 "open-ended" questions prompted brief answers other than "yes" or "no" from children. Many, but not all, of the open-ended questions were of the wh-variety. There were four variants of question content. *Person questions* were about the confederate (e.g., "What color hair did the person have?").

⁸There were initially 79 questions, but four questions were dropped because they could not be scored unambiguously.

Story questions concerned a story read to the child by the confederate (e.g., “In the story, was it a snowy day?”). *Time questions* concerned the time of day when the child participated in the play interaction and how long the session lasted (e.g., “About how long were you in the room with the man?”). *Room questions* concerned physical aspects of the room where the interaction took place (e.g., “Was there a telephone in the room?”). Finally, *action questions* concerned activities the child and confederate engaged in during the interaction (e.g., “Did he make you swallow something?”) and associated details (e.g., “What did the costume look like that he asked you to put on?”).

The detailed questions also varied on two other general dimensions of particular importance: suggestiveness and abuse relevance. Regarding suggestiveness, 37 questions were “misleading” questions and the remaining 38 were “specific”—less leading and more direct. We used the same operational definitions of misleading and specific questions as in previous studies (e.g., Carter et al., 1996; Goodman et al., 1991). Misleading questions suggested an incorrect response in a fairly coercive manner; for example, “All of the other kids I’ve talked to said the person in the room took his shirt off. Didn’t he do that while you were in there?” or “The walls of the room were painted blue, weren’t they?” Both these questions suggested an incorrect response, because our confederate did not undress and the play room was painted white. Specific questions, although they might be considered leading or suggestive in a court of law, were designed to be less suggestive of a particular answer than the misleading questions; for example, “Was the person in the story a girl or a boy?” or “Was there a telephone in that room?” (see Appendix for the question-type designation of all questions).

Finally, action questions (only) were classified according to whether or not they were abuse-related; that is, whether or not they were similar to questions that might be asked in an actual investigation to determine if sexual or physical abuse had occurred. For example, “Did he ask you how old you were?” was considered to be a nonabuse-related question, but “Did he kiss you?” was considered to be an abuse-related question. Other abuse-related questions included “He took your clothes off, didn’t he?” and “Did he make you swallow something?” These questions were included because of the importance of determining whether children will falsely report being abused when they have not been.

Affect Questions. The third part of the interview consisted of five affect questions that concerned how comfortable the children felt during the social interaction (for example, “How did you feel when you were in the room with the man?” and “Was he nice or mean?”).

Photo Identification. The final part of the interview was a target-present photo lineup task. The lineup consisted of six pictures: a picture of the confederate and five pictures of men chosen for their similarity in appearance to the confederate. The lineup pictures were presented to children simultaneously in a randomly ordered display with these accompanying instructions: “I am going to show you pictures of six men. I want you to look at each one of them. The man who was in the room may or may not be one of these men. You don’t have to choose one. Point to the picture only if you are very sure it is the same man who was in the room.”

Procedure

Children participated in two sessions: a social interaction (Session 1) and an interview session approximately 2 weeks later (Session 2). All research assistants (i.e., the confederate, the IQ test administrator, the interviewers, and the data scorers) were blind to the children's status as abused or nonabused. The social interaction and the interview were videotaped.

Session 1

Parents and children came to the university one pair at a time. They were greeted by a woman experimenter who informed the parent(s) about all of the session's activities (while the child was distracted). She told parents that the study concerned social interactions, rather than memory, to guard against the possibility that parents might coach their children for the memory test during Session 2. Thus, we could examine children's unrehearsed memory for an event, increasing the ecological validity of our study. After obtaining parental consent for the social interaction activities, the experimenter led the child to a room where the child interacted with a male confederate. The structured interaction consisted of such activities as blowing bubbles, dressing up in a costume and posing for a photograph, reading a story, coloring a picture, and thumb wrestling (involving innocuous hand contact between the child and the confederate). Meanwhile, the parent(s) completed the CBCL in another room. After the interaction, children were taken to a new room where they were given the Stanford-Binet intelligence measure by another female research assistant.

Session 2

Approximately 2 weeks later, child participants and their parents returned to the laboratory one pair at a time. Delays of this sort between alleged abuse and disclosure/interview are not uncommon in actual abuse cases that are prosecuted (Goodman et al., 1992).⁹ On arrival, the child and parent were informed for the first time that the child's memory for the social interaction would be assessed. Parents were shown the interview protocol privately and invited to eliminate any questions that they did not want their child to be asked. Parents rarely eliminated questions. Children were then individually interviewed by a female research assistant whom they had not seen before. Afterward, the child and parent(s) were thanked and paid for their participation.

RESULTS

We first describe preliminary analyses, then analyses considering each of our main dependent measures: performance in response to the free recall question, detailed questions (analyzed separately in terms of dimensions of suggestiveness and abuse relevance), and photo identification task. Unless otherwise stated, these variables were entered into separate 2 (age group: 3 to 6 years old vs. 7 to 10 years old) ×

⁹The 2-week delay was also chosen to avoid ceiling and floor effects.

2 (abuse group: abused vs. nonabused) \times 2 (gender) analyses of variance (ANOVA) with all factors varied between subjects.¹⁰ After these central findings, we present analyses of children's affect during the interaction and, within our abused sample, we describe the relation between abuse severity and memory performance.

Preliminary Analyses

Preliminary analyses revealed no significant effects of race/ethnicity (minority vs. non-minority) on any dependent measures and only one significant effect of socioeconomic status (SES) on the memory measures ($r = -.24$, $p < .05$, between SES and free recall incorrect), thus data were collapsed across these variables. Next, 2 (age group) \times 2 (gender) \times 2 (abuse group) ANOVAs were conducted to determine if our experimental groups differed with regard to IQ and behavioral symptomology. As expected, abused and nonabused samples differed with regard to IQ score, $F(1, 62) = 5.88$, $\eta^2 = .09$, $p < .05$. Also, abused children differed from the nonabused children in terms of total CBCL T score, $F(1, 62) = 12.53$, $\eta^2 = .17$, $p < .001$. (See Table 1 for IQ and CBCL total T score means.) The abused children had higher scores than nonabused children on both externalizing, $M_s = 60.34$ versus 50.86, respectively; $F(1, 62) = 12.87$, $\eta^2 = .17$, $p < .001$, and internalizing subscales, $M_s = 60.23$ versus 52.17, respectively; $F(1, 62) = 9.84$, $\eta^2 = .14$, $p < .01$. The number of children who scored in the clinical range (>63) on the externalizing T scale was 1 for nonabused children and 14 for abused children; for the internalizing T scale, the comparable numbers were 3 for the nonabused children and 17 for the abused children.

Free Recall

Children's responses to the free recall question were scored for correct, incorrect, irrelevant, ambiguous, and unscorable units of information. For example, if a child said "I played with a puppet," the statement would be scored as 3 correct units of information: 1 for specifying that a play action occurred, 1 for specifying that a puppet was the target of play, and 1 for indicating that the child him or herself had played. Only information that was directly verifiable from the Session 1 videotape was scored. Two independent raters scored 15% of the protocols. Because the proportion of agreement between the two raters was high, specifically .87, the remaining protocols were scored by one of the two raters.

Three outliers, defined as values that were three standard deviations above the mean, were detected in the free recall data: One older abused girl provided 56 correct units of information, one younger nonabused boy provided 58 correct units of information, and one younger nonabused boy provided 68 units of incorrect information. Removing these values did not affect the outcome of any analyses; thus, we report here the results of analyses in which the outlier values were included. Means with and without the outliers are reported in Table 2.

¹⁰Analyses of variance were conducted with age as the covariate. The results did not differ from those presented.

Table 2. Mean Units of Correct and Incorrect Information Freely Recalled in Relation to Abuse Status, Gender, and Age

Response type	Abuse status			
	Abused		Nonabused	
	Girls	Boys	Girls	Boys
Correct				
Young	15.71	9.75	13.29	24.50 (19.71)
Old	24.21 (21.77)	25.83	22.86	21.00
Incorrect				
Young	0.14	0.75	0.86	8.88 (0.43)
Old	1.50	0.50	1.14	0.33

Note: Means without outliers (values that were three standard deviations above the mean) are noted parenthetically.

Separate ANOVAs were conducted on the mean number of correct and incorrect responses made by each child (see Table 2).¹¹ (We did not analyze the infrequent ambiguous, irrelevant, or unscorable responses.) Overall, older children, $M = 23.50$, recalled significantly more correct information than did younger children, $M = 15.90$; $F(1, 62) = 9.42, \eta^2 = .13, p < .01$. Children’s status as abused, $M = 19.49$, or nonabused, $M = 21.00$, did not significantly affect the amount of correctly recalled information, $F(1, 62) = .38, \eta^2 = .006$. These effects, however, were qualified by a significant three-way interaction of age, gender, and abuse status, $F(1, 62) = 4.27, \eta^2 = .06, p < .05$. Simple effects analyses revealed that abuse status made a difference only for young boys: Young abused boys recalled fewer units of correct information than did young nonabused boys (who recalled more correct information than all other young groups did), $F(1, 62) = 8.82, p < .05$. Abuse status did not significantly affect the performance of girls or older boys. There were no significant main effects or interactions for number of incorrect units of information recalled, all F s (1, 62) $\leq 1.61, \eta^2$ ranged from .01 to .05.

Detailed Questions

Next, we conducted two separate series of ANOVAs to explore children’s accuracy in response to detailed questions about the play event. The first series of analyses considered the proportion of correct, incorrect, and don’t know responses to specific questions; the second series considered correct, incorrect, and don’t know responses to misleading questions. All analyses collapsed across question content (i.e., person, action, story, room, time) and across “abuse” and “nonabuse” questions contained in the action category. (Detailed analyses regarding performance in response to abuse questions are presented later.)

Specific Questions

Our analyses revealed significant main effects, but no significant interactions (all F s ≤ 2.60), of all three independent variables on the proportion of children’s

¹¹We also calculated and analyzed the proportion of correct and incorrect responses. The pattern of results was identical to that of analyses considering the number of correct and incorrect responses.

Table 3. Mean Proportion of Correct, Don't Know, and Incorrect Responses to Specific and Misleading Detailed Questions in Relation to Abuse Status, Gender, and Age

Response type	Abuse status			
	Abused		Nonabused	
	Girls	Boys	Girls	Boys
<i>Specific questions</i>				
Correct				
Young	.62	.67	.69	.75
Old	.74	.76	.75	.78
Don't know				
Young	.06	.14	.08	.07
Old	.06	.06	.07	.02
Incorrect				
Young	.31	.19	.23	.17
Old	.19	.18	.17	.19
<i>Misleading questions</i>				
Correct				
Young	.69	.76	.71	.75
Old	.79	.84	.77	.82
Don't know				
Young	.04	.08	.06	.04
Old	.06	.04	.07	.02
Incorrect				
Young	.23	.07	.17	.15
Old	.10	.09	.09	.13

correct responses to specific questions (see Table 3).¹² First, as expected, there were developmental differences. Older children, $M = .75$, answered more questions correctly than did younger children, $M = .68$, $F(1, 61) = 18.17$, $\eta^2 = .23$, $p < .001$. Second, boys gave more correct responses, $M = .73$, than did girls, $M = .71$, $F(1, 61) = 4.47$, $\eta^2 = .07$, $p < .05$; the mean difference was small, however. Finally, of particular interest was the potential influence of previous maltreatment. As predicted, nonabused children, $M = .74$, gave significantly more correct responses than did abused children, $M = .70$, $F(1, 61) = 6.42$, $\eta^2 = .10$, $p < .025$.

Next, we analyzed the proportion of don't know responses, finding only one significant main effect, which was for age, $F(1, 61) = 4.16$, $\eta^2 = .06$, $p < .05$, with older children, $M = .09$, more likely than younger children, $M = .06$, to respond "don't know." Boys and girls, $M_s = .08$ and $.07$, respectively, were about equally likely to make don't know responses, as were abused and nonabused children, $M_s = .08$ versus $.06$, respectively. There was, however, a significant interaction of abuse group and gender, $F(1, 61) = 4.11$, $\eta^2 = .06$, $p < .05$. Simple effects tests revealed that abused boys, $M = .10$, made more don't know responses than did nonabused boys, $M = .05$, $F(1, 61) = 5.26$, $p < .05$. Abused and nonabused girls did not significantly differ, $M_s = .06$ versus $.07$. There were no other significant effects.

¹²One older, nonabused girl was accidentally exposed to the Session 1 room just before her Session 2 interview. We omitted her data from analyses of specific and misleading questions, a number of which concerned the Session 1 room. Because none of the abuse-related questions concerned that room, we included the child's answers in analyses of the abuse-related questions.

Analyses of the proportion of children's incorrect responses revealed significant main effects of age group and gender. Older children made fewer incorrect responses, $M = .18$, than did younger children, $M = .22$, $F(1, 61) = 5.41$, $\eta^2 = .08$, $p < .025$. Girls made more incorrect responses, $M = .21$, than did boys, $M = .18$, $F(1, 61) = 5.11$, $\eta^2 = .08$, $p < .05$. These effects were qualified, however, by a significant age group \times gender interaction, $F(1, 61) = 6.12$, $\eta^2 = .09$, $p < .025$. Simple effects tests revealed that age had no effect on boys' performance, both $M_s = .18$, $F(1, 61) = .01$, but older girls made fewer incorrect responses, $M = .18$, than did younger girls, $M = .27$, $F(1, 61) = 11.50$, $p < .01$. Also, although there was no significant difference between older boys and girls, both $M_s = .18$, $F(1, 61) = .02$, younger girls made more errors than younger boys, $M_s = .27$ and $.18$, respectively, $F(1, 61) = 10.64$, $p < .01$. Finally, there was no significant difference in the proportion of incorrect responses given by abused, $M = .19$, and nonabused, $M = .21$, children, $F(1, 61) = 1.93$, $\eta^2 = .03$.

Misleading Questions

One of the most controversial topics in the study of children's testimony is whether children are particularly suggestible in response to misleading questions. Overall, children in our study resisted most suggestions about fictitious past events; however, older children, $M = .80$, gave more correct responses to the misleading questions than did younger children, $M = .73$, $F(1, 61) = 15.40$, $\eta^2 = .20$, $p < .001$ (see Table 3). In addition, boys, $M = .79$, gave significantly more correct responses than did girls, $M = .75$, $F(1, 61) = 8.27$, $\eta^2 = .12$, $p < .01$. Of particular note, children who had been abused, $M = .77$, were no more suggestible than those who had not been abused, $M = .76$, $F(1, 61) = .15$, $\eta^2 = .001$. There were no significant interactions among any variables, all $F_s \leq .37$, η^2 ranged from .001 to .005.

No significant main effects or interactions emerged from analyses of don't know responses, all $F_s(1, 61) \leq 2.12$, η^2 ranged from .001 to .03. Specifically, there were no significant differences in the means of older and younger children, $M_s = .05$ versus $.06$, boys and girls, $M_s = .06$ versus $.05$, or abused and nonabused children, $M_s = .06$ versus $.05$, respectively.

Analyses of incorrect responses revealed a main effect of age that approached significance, $F(1, 61) = 2.84$, $\eta^2 = .04$, $p < .10$. Older children, $M = .10$, made somewhat fewer errors than did younger children, $M = .15$. There were no significant differences between girls and boys, $M_s = .13$ versus $.11$, nor between abused and nonabused children, $M_s = .12$ versus $.13$, respectively. There were no other significant main effects or interactions, all $F_s < 2.50$, η^2 ranged from .001 to .04.

Abuse-Related Questions

Because of the importance of children's responses to the abuse-related questions, we analyzed performance on the seven specific and seven misleading abuse-related questions separately (they were a subset of the action questions included in the analyses reported earlier). We divided errors into commission and omission errors. In the legal arena, commission errors are often considered the most serious errors that children can make: reporting that an abusive action occurred when it did not, such as a child saying that our confederate hit him or her. Omission errors, also

Table 4. Mean Proportion of Correct, Don't Know, Commission Error, and Omission Error Responses to Abuse-Related Questions in Relation to Abuse Status, Gender, and Age

Response type	Abuse status			
	Abused		Nonabused	
	Girls	Boys	Girls	Boys
<i>Specific questions</i>				
Correct responses				
Young	0.73	0.80	0.82	0.84
Old	0.76	0.81	0.80	0.76
Omission errors				
Young	0.27	0.20	0.18	0.16
Old	0.24	0.14	0.19	0.24
Commission errors				
Young	0.00	0.00	0.00	0.00
Old	0.00	0.00	0.00	0.00
Don't know responses				
Young	0.00	0.00	0.00	0.00
Old	0.00	0.05	0.01	0.00
<i>Misleading questions</i>				
Correct responses				
Young	0.94	0.98	0.98	0.98
Old	0.97	1.00	0.99	1.00
Commission errors				
Young	0.06	0.02	0.02	0.02
Old	0.02	0.00	0.01	0.00
Don't know responses				
Young	0.00	0.00	0.00	0.00
Old	0.01	0.00	0.00	0.00

Note: No abuse-related misleading questions could have been answered with an omission response.

important in abuse investigations, consist of omitting or denying an action that did occur, such as the fact that the child and confederate touched each other (during the thumb-wrestling game).

Table 4 shows that children made exceptionally few errors in response to the abuse-related questions, especially the misleading questions. ANOVAs revealed no significant main effects or interactions on the proportion of correct responses to specific abuse-related questions, all $F_s(1, 62) \leq 1.46$, or on the proportion of omission errors to these questions, all $F_s(1, 62) \leq 2.62$; η^2 ranged from .001 to .04. There were too many cells with means of zero to support valid ANOVAs on the proportion of don't know responses or commission errors to specific questions. This was also true for don't know responses, and commission errors in response to the misleading abuse-related questions, where there was a ceiling effect. Our analysis of correct responses to misleading abuse-related questions revealed no significant differences between groups, $F(1, 62) = 1.95$.

Thus, under the conditions of this study, children's answers were unlikely to indicate abuse. In fact, many children, particularly the abused children, were quite adamant in their denials of our abuse-related suggestions, as demonstrated by the following responses: In answer to the "kiss" question, an older abused boy said,

"He didn't kiss me. Why are you doing this? Is this supposed to be funny?" and a young nonabused girl said, "He didn't kiss me at all. He's a boy." In answer to the question about whether the confederate had removed the child's clothes, an older abused boy responded, "No way, brother! Why you ask me that? That's sick." An older abused girl said, "Oh, no way. I would have had to get out of there by then . . . He didn't take his shirt off, and I didn't take none of my clothes off!" Clearly, these children were not prone to confuse the positive laboratory interaction with an abusive interaction.

Children made only 9 commission errors to all abuse-related questions. Of these, 6 errors were made by four children in the abused group, and 3 errors were made by three children in the nonabused group. Overall, two children agreed to the misleading question about being kissed, one agreed to the question about being hit, two agreed that they had been told to keep a secret, four children agreed to being tickled (this was considered an abuse-related question because of the belief that abuse is sometimes disguised as tickling games). None of the children provided sexualized or physically aggressive details in response to these questions, and none of the children spontaneously mentioned sexually or physically abusive acts.

It is informative to compare these numbers to the omission errors made (for example, saying "no" to the question "Did you touch him?" when in fact all children were touched when they played the thumb wrestling game). Fifty-seven children made a total of 100 omission errors. Specifically, there were 45 omission errors in response to the question, "When you were in the room over there (the one with the picture of the bird on the door), did that person touch you?" and there were 54 omission errors in response to the question, "Did you touch him?" One child said there were no pictures taken. Thus, under the conditions of our experiment, children were much more likely to omit information about touching that actually occurred than they were to fabricate touching that did not occur.

Photo Identification

Next, we considered whether age, abuse status, or gender would affect children's performance on the photo identification task. Because the photo lineup was target present, there were three possible responses: correct identification (pointing to the confederate's photo), incorrect identification (pointing to a photo depicting someone other than the confederate), and no identification (incorrectly indicating that the confederate's photo was not present). We analyzed each separately.

Analyses revealed a significant main effect of abuse status on the proportion of incorrect identifications, $F(1, 62) = 4.96$, $\eta^2 = .07$, $p < .05$ (see Table 5). Specifically, abused children, $M = .34$, made more than twice as many incorrect identifications than the nonabused children did, $M = .14$. There were no significant effects involving age or gender on the proportion of incorrect identifications, all $F_s(1, 62) \leq 2.27$, η^2 ranged from .001 to .04. There were no other significant main effects or interactions of either age, gender, or abuse status on the proportion of correct identifications, all $F_s(1, 62) \leq 2.99$, or proportion of times no photo was chosen, all $F_s(1, 62) < 1.53$; η^2 ranged from .001 to .032.

Table 5. Mean Proportion of Correct, Incorrect, and No Identification Responses in Relation to Abuse Status, Gender, and Age on the Photo Identification Task

Response type	Abuse status			
	Abused		Nonabused	
	Girls	Boys	Girls	Boys
Correct identification				
Young	0.29	0.63	0.86	0.63
Old	0.79	0.67	0.71	0.83
Incorrect identification				
Young	0.57	0.38	0.14	0.25
Old	0.21	0.33	0.14	0.00
No identification				
Young	0.14	0.00	0.00	0.13
Old	0.00	0.00	0.14	0.17

Analyses Covarying IQ and CBCL Scores

As noted earlier, abused and nonabused children differed significantly in terms of IQ and behavioral symptomology. Because these differences might be related to memory performance, we recomputed all analyses of memory performance where there were effects associated with abuse status, using IQ scores, externalizing CBCL scores, and internalizing CBCL scores as covariates (separately). These analyses of covariance revealed few differences in the pattern of results reported earlier. Specifically, after covarying IQ, the interaction of abuse status and gender on don't know responses to specific questions remained significant, and the main effects of abuse status on correct responses to specific questions and on incorrect photo identifications closely approached significance (at $p = .06$ and $p = .07$, respectively). Covarying CBCL scores produced one difference in results: The main effect of abuse status on incorrect photo identifications was no longer significant when either externalizing, $F(1, 61) = 2.93$, $\eta^2 = .05$, $p = .09$, or internalizing scores, $F(1, 61) = 2.45$, $\eta^2 = .04$, $p = .12$, were statistically controlled. The partial correlations, with age controlled, between incorrect photo identification and total T ($r = .22$, $p = .07$), externalizing T ($r = .23$, $p = .065$), and internalizing T ($r = .16$, $p < .10$), although short of statistical significance, suggest that behavioral disturbance may have contributed to the abused children's poorer performance on the photo identification task.

Abuse Severity, Memory, and Suggestibility

Our analyses revealed that some, though not most, memory measures were sensitive to children's abuse status. To examine this issue further, we conducted analyses investigating the relation between abuse severity and the 35 maltreated children's performance on the memory measures (free recall, misleading and specific detailed questions, misleading and specific abuse-related questions, and photo identification). Separate Pearson correlations were conducted between all dependent measures and four previously described measures of abuse characteristics that indicate severity: (a)

relationship of perpetrator to child, (b) abuse type, (c) frequency of abuse occurrence, and (d) age of abuse onset.

Overall, there were few significant relations between the abuse severity and memory measures.¹³ Interestingly, however, severity in terms of abuse type was significantly related to performance on specific (but not misleading) abuse-related questions. The more invasive the type of abuse suffered by the children, the less accurate the children were in terms of increased omission errors, $r = .45, n = 33, p = .009$, decreased correct responses, $r = -.38, n = 33, p < .03$, and decreased don't know responses, $r = -.36, n = 33, p < .039$. The only other significant effect emerged in analyses involving free recall measures. Specifically, the older the children were at the onset of their abuse, the more correct information they provided during free recall, $r = .47, n = 29, p = .01$, and the more specific questions they answered correctly, $r = .36, n = 29, p = .05$. Because of our recruiting procedures, however, most of the abused children participated not long after their abuse experiences, so child age was highly correlated with age of abuse onset, $r = .73, n = 29, p < .001$. The relation between abuse onset and free recall performance was no longer significant when the age of the children at the time of the study was accounted for in partial correlation analyses, $r = -.03, n = 26, p > .05$.

Affect Questions

Our final analyses examined children's responses to the affect questions. Children were given a score of "1" for each of the five questions that they answered with some negative affect. Positive or neutral responses were scored as "0." We analyzed the sum of the five questions. Thus, a child's score could range from 0 to 5. Children were generally very positive in their interpretations of the event: 51 children expressed no negative affect (score of 0), 15 children expressed negative affect in response to one of the five questions (score of 1), 3 children answered 2 questions negatively (score of 2), and 1 child responded to four of the five questions negatively (score of 4). Abused children did not express more negative affect, $M = .34$, than did nonabused children, $M = .37$ (the most important comparison); nor did boys, $M = .25$, differ significantly from girls, $M = .43$; $F_s(1, 62) \leq 2.67, \eta^2 = .003$ and $.04$, respectively. However, young children, $M = .57$, expressed more negativity than did older children, $M = .20, F(1, 62) = 6.30, \eta^2 = .09, p < .025$. There were no significant interactions, all $F_s(1, 62) \leq 1.48, \eta^2$ ranged from $.001$ to $.012$.

DISCUSSION

Our study represents one of the first scientific investigations of maltreated children's eyewitness memory, a topic of great basic and applied significance. The study is

¹³Additional correlational analyses revealed no meaningful relations between abuse severity and children's IQ or CBCL scores. Regarding the significant correlations reported in this paper, some may have been significant by chance, because of the relatively large number of correlations calculated. Replication of the significant relations will be important for confidence in the findings.

relevant to questions about whether abused children are more likely than nonabused children to intrude details of their abuse into reports of neutral activities, either in free recall or in response to specific and misleading questions; commit errors of omission; err on photo lineup tasks involving briefly seen strangers; possess characteristics (e.g., psychological disturbance) that may adversely affect eyewitness reports; or correctly report their experiences.

Research conducted by Eisen and colleagues (1998) failed to find significant differences in memory between abused and nonabused children. However, significant relations between memory and both psychopathology and IQ were found in Eisen et al.'s study. As noted, however, our research differs in important ways from that work, most notably in terms of the nature of our nonabused control group, and as such, our findings add significantly to the literature. We now summarize and offer explanations for findings from our study.

Maltreatment, Memory, and Suggestibility

Our primary independent variable of interest was the presence or absence of maltreatment in our child participants' personal histories. Consistent with our predictions, although there were more similarities than differences in abused and nonabused children's memory performance, when significant differences emerged, nonabused children were more accurate. In particular, maltreated children, most of whom had a history of sexual abuse, answered fewer of the specific questions correctly and (at least among young boys) were less complete in free recall. The difference in the mean performance of the two groups was not large, however. Importantly, the abused children did not make a greater proportion of errors than did the nonabused children in response to misleading questions. But the abused children did make more errors in identifying the confederate. In many abuse cases, the accused is known and identification may be a nonissue. In circumstances where identification is an issue, however, the significant difference between the two groups provides at least preliminary grounds for concern about abused children's identification of briefly seen strangers in target-present lineups. Replication of our findings should be attempted before definitive conclusions are reached.

Why would abused children show memory deficits as compared with nonabused children? Few studies have investigated autobiographical or eyewitness memory abilities in maltreated children (but see Eisen et al., 1998; Katz et al., 1995). Of those, even fewer included a matched sample of nonabused children. It is well known that abused children tend to score lower than matched nonabused children do on tests of IQ and emotional well-being, both of which could influence performance on memory tests. Indeed, the abused children in this present study differed significantly from the nonabused children on IQ and behavioral disturbance measures, even though the groups were matched on age, gender, and socioeconomic level. Reasons for such disparities in IQ and behavioral disturbance are unclear. For instance, it is not known whether abuse itself is causative or whether the abused children's family environment (aside from abuse) contributes to the discrepancies. In any case, even with IQ statistically controlled, significant differences in memory emerged between the abused and nonabused children in our study.

Another possible explanation for the maltreated children's poorer performance is that limited verbal skills, another specific cognitive deficit associated with abuse (e.g., Friedrich et al., 1983), resulted in less accurate performance. Children who have trouble understanding questions or articulating answers would be expected to have more difficulty on a verbally based memory interview. Specific measures of vocabulary were not taken in our study, so we cannot know if this was an underlying mediator of the effects. Even so, effects emerged with IQ controlled, and IQ is significantly correlated with measures of verbal abilities.

Behavioral disturbance may also have contributed to the abused children's poorer performance, a possibility that is supported by the fact that statistically controlling for preexisting CBCL score differences between the abused and nonabused groups rendered the two samples equivalent in their photo identification performance. Children with externalizing symptoms may have been more distracted than other children were during the target interaction or during the actual photo identification task. This may have interfered with encoding or retrieval of memory (or both) for the confederate's face. Abused children with internalizing symptoms may have been more nervous or fearful about being alone in a room with an unfamiliar male, a possibility that is especially likely given that most of the abused children had been victims of abuse perpetrated by men. This social anxiety may have blocked optimal encoding or consolidation in memory of the event, including the confederate's face. One might expect increased anxiety to have been reflected in the children's affect reports, but abused and nonabused children did not differ in the amount of negative affect that they attributed to the interaction. It is possible that more sensitive on-line measures of social anxiety or stress could have indexed anxiety differences between the two groups.

Finally, it is also reasonable to propose that our interview reminded the maltreated children of forensic interviews they had experienced in the past. This reminder of a potentially negative experience may have led the children to be more intimidated or socially anxious during the interview, and in turn, more likely to "shut down" during free recall, be more conforming in their answers to leading questions, and be more impulsive on the photo identification task. Other explanations may be conceived as well. For example, we did not measure a number of possible influences on abused children's memory such as level of posttraumatic stress disorder or dissociation (see Bremner et al., 1997, 1999). Interesting questions remain about the role of potential mediators in affecting abused children's memory.

It should be emphasized again, however, that the abused and nonabused children's memory performance was largely similar, a pattern that is consistent with the findings of Eisen et al. (1998). Differences that did emerge tended to be small. It is likely that a history of sexual or physical abuse (or both) does not necessarily affect memory performance.

Do past abuse experiences intrude into children's reports of nonabusive experiences? This question largely motivated the present research; it is a question of serious concern to professionals in the legal and child protective service systems. Past research and theory provide reason to argue that abused children might intrude past abuse experiences into their reports of a neutral event, as well as reason

to argue the opposite. As it turned out, there were no intrusion errors with sexual or aggressive content, and commission errors to abuse-related questions were relatively rare. Under other testing conditions, such as those in actual investigations, children might respond differently, but under the conditions of our study, abused and nonabused children were quite resistant to suggestions of false abuse. They did not evidence sexual or aggressive fantasies or produce false reports of sexualized or physically abusive touch. To the extent that no past abusive experiences intruded into our maltreated children's reports of the neutral laboratory interaction, we found no evidence that abused children are likely to confuse the source or content of their memories about a brief social interaction and a past abusive event.

Effects of Age and Gender on Memory and Suggestibility

We found age differences in children's memory abilities and suggestibility, as expected based on a wealth of memory development and child witness research (e.g., Ceci & Bruck, 1993; Cowan, 1997; Goodman et al., 1998; Kail, 1990). Older children provided more correct responses than did younger children in answer to free recall, specific, and misleading questions. Age was also a significant predictor of error rates in response to specific questions, and the effect closely approached significance for misleading questions. But, age did not affect performance on the photo identification task or, importantly, in response to abuse-relevant questions. Even the youngest children in our study knew that they had not been maltreated in our laboratory, and they resisted our suggestions to the contrary. Thus, although even our youngest participants remembered important information, older children were generally more accurate and less suggestible than younger children, at least about information that was not abuse-relevant. It is noteworthy that these typical age patterns emerged for abused as well as nonabused children, as found by Eisen et al. (1998). Age differences in memory performance may be related to a number of cognitive changes, including development of source monitoring, cognitive skill level, information processing, knowledge base, narrative and language abilities, and gist-verbatim relations (e.g., Brainerd & Reyna, 1991; Case, 1991; Chi, 1978; Fischer, 1980; Fivush, 1993; Johnson, Hashtroudi, & Lindsay, 1993; Nelson, 1986).

Unexpected gender differences also emerged in our research. Boys were more accurate than girls in their responses to specific and misleading questions, but not in terms of performance on the abuse-relevant questions, free recall questions, or photo identification task. There is some evidence that girls have a stronger need for social approval than do boys (Huston, 1983), which may translate into more conformity in an interview situation like ours. Our finding may reflect early manifestations of the tendency for adult women to be more conforming and persuadable than men in some social situations (Cooper, 1979; Eagly & Carli, 1981). Even so, the literature as a whole reveals that gender differences in children's eyewitness memory tend to be sporadic and inconsistent within and across studies, with at least one study finding that girls were more accurate than boys (Tobey & Goodman, 1992). Thus, we do not believe our findings support an assumption of consistent gender differences in eyewitness

memory. We encourage future researchers to examine the specific conditions under which gender differences do and do not emerge, and to determine the underlying constructs responsible for gender differences.

Issues of Ecological Validity and Generalizability

We achieved considerable realism in our study, which increases the applicability of our findings to law and social policy concerns. For example, we examined children's memory for a real-life, engaging social interaction that involved touching rather than memory for stories or stimuli presented via videotape or slides (e.g., Cassel, Roebbers, & Bjorklund, 1996; Ricci, Beal, & Dekle, 1996). We employed forensically relevant questioning techniques, and we tested a diverse sample of children, half of whom had documented histories of child maltreatment. Despite these strengths, however, applications and generalizations of our findings should be made with caution, for a number of reasons that we discuss next.

Memory and suggestibility typically vary considerably with testing conditions, and are not necessarily traits that are characteristic of a certain class of individuals. Moreover, in our study, we did not question children about actual abuse or other highly emotional events, and thus we cannot infer abused children's memory performance when recounting abusive or traumatic incidents. We do not know if intrusion errors of past abuse would be more likely if the event experienced in our study approximated children's past traumas. We did not examine memory for specific acts of abuse (as did Bidrose & Goodman, 2000, and Orbach & Lamb, 1999, in case studies), but rather the effects of abuse experiences on memory and suggestibility in general. Also if the children had been touched in a more salient way, our findings may have differed, and we do not know how well adults would report the type of touching we imposed.

Furthermore, we did not lead our child participants to believe they were involved in an actual maltreatment investigation, and their parents had no reason to be concerned. In fact, some of the children in the study had experienced actual forensic interviews previously. Unfortunately, we did not have sufficient information about the children's legal involvement to examine the effects of these previous interviews on the children's performance in our study. Another issue is that the delay between the event and interview was shorter than that in some, although not all, forensic or child protective service evaluations. We did not question children repeatedly, and our interview questions were less leading than those in some actual cases and undoubtedly more leading than in others.

Additionally, we did not separately analyze responses to yes-no questions. Although there is some indication that young preschoolers may have difficulty with such questions (Fivush, Peterson, & Schwarzmueller, *in press*), the limited number of young preschoolers in our study precluded meaningful analysis.

Finally, in child maltreatment research, children's classification as abused or nonabused is often questioned, especially when the abuse is sexual, which often lacks corroborative evidence. Despite our best screening efforts, it is possible that some of the "abused" children were not actual abuse victims, and that some of

the “nonabused” children in our sample had suffered undetected or undisclosed maltreatment. Such classification errors, however, would lead to a conservative test of our hypotheses concerning differences between abused and nonabused children. In any case, our classification reflects labels applied to the children in the social services and legal systems. As may be evident, overcoming all such limitations would be pragmatically difficult, ethically challenging, or both (Herrmann & Yoder, 1998).

Future Directions

Our research suggests that maltreated children, on average, may have certain deficits that can influence their performance on forensic interviews. Overall, however, the memory differences were small. We believe it is important for researchers to expand this line of investigation and determine the specific strengths and weaknesses of maltreated children’s memory reports. In particular, future research should test the robustness of our findings. If our results are replicable, it will be important to determine possible causes of maltreated children’s memory deficits, while keeping in mind that the maltreated children’s memory performance was in most ways equivalent to that of the nonmaltreated children. Measures we did not include in the present research, such as measures of posttraumatic stress disorder, dissociation, parent–child attachment, and family pathology/stability, should be considered in future investigations (see Bremner et al., 1997; Eisen et al., 1998; Eisen & Goodman, 1999). It would also be of interest to examine repeated questioning and false memory effects in maltreatment samples, although, again, the ethics of such studies would need to be carefully considered.

Finally, researchers should use the findings of research on abused samples to develop practical techniques to bolster the eyewitness memory abilities of maltreated children. Maltreated children are especially likely to be subjected to forensic interviews, and research in this area has the potential to discover ways to make their experience easier and their performance more accurate. In turn, this should aid forensic investigators in their efforts to evaluate abuse allegations and discover information that can expedite the protection of maltreated children, while also preventing false accusations of innocent adults.

APPENDIX: MEMORY INTERVIEW QUESTIONS

Free recall question

I want you to think about your visit here a couple of weeks ago when you were in the room over there, the one with the picture of the bird on the door. Please tell me everything you can remember about what happened when you were in that room. *Prompt:* Anything else?

Person questions

- | | | |
|--------------------|------------------|--|
| 1. | (yes) | When you first got to the room, was there already somebody inside? |
| 2. | (man) | Was that person a man or a woman? |
| 3. | (Andrew) | What was the person's name? |
| 4. ^a | (yes, he did) | He didn't stay in the room with you the whole time, did he? |
| 5. | (blonde/brown) | What color hair did the person have? |
| 6. | (white) | What color skin did the person have? |
| 7. ^a | (he wore no hat) | What color was his hat? |
| 8. ^a | (no) | He wore glasses, right? |
| 9. | (thin) | Was he fat or thin? |
| 10. ^{a,b} | (not scored) | He didn't have a beard and a mustache, right? |
| 11. ^a | (they were blue) | Were his eyes brown or green? |
| 12. ^a | (yes, he was) | He wasn't taller than me, was he? |
| 13. | (late 20s/30s) | About how old was the person? |
| 14. ^a | (he had no scar) | How long was the scar on his cheek? |
| 15. ^a | (no) | He was a teenager, right? |
| 16. ^a | (no) | The person who was in that room with you was your uncle/aunt, right? |
| 17. | (no) | Did you know him before you went into that room? |

Action and action-associated detail questions

- | | | |
|--------------------|---------------|---|
| 1. ^c | (yes) | When you were in the room over there (the one with the picture of the bird on the door), did that person touch you? |
| 2. ^{a,c} | (none) | How many times did he kiss you? |
| 3. | (yes) | Did he ask you to put on a costume? |
| 4. ^c | (yes) | Did he take any pictures of you? |
| 5. ^{a,c} | (no) | He took your clothes off, didn't he? |
| 6. ^a | (yes, we did) | You didn't blow bubbles, did you? |
| 7. ^c | (no) | When you were in the room over there, did the person put anything in your mouth? |
| 8. | (two) | How many puppets were there in the room? |
| 9. ^a | (yes, we did) | You didn't get a toy to take home from the man, did you? |
| 10. ^{a,c} | (none) | How many times did he hit you? |
| 11. ^a | (no) | He showed you some movies, didn't he? |
| 12. | (joker/clown) | What did the costume look like that he asked you to put on? |
| 13. | (day clothes) | What were you wearing when you were in the room over there, day clothes or pajamas? |
| 14. ^c | (no) | Did he make you swallow something? |
| 15. ^{a,c} | (no) | He made you lie down, didn't he? |
| 16. ^a | (yes, we did) | You didn't play Simon Says, did you? |
| 17. ^{a,c} | (no) | All of the other kids I've talked to said the person in the room took his shirt off. Didn't he do that while you were in there? |
| 18. ^{a,c} | (no) | He told all the other kids to keep a secret. Didn't he tell you to keep a secret, too? |
| 19. | (no) | Did he give you anything to eat? |
| 20. ^c | (yes) | Did you touch him? |
| 21. ^a | (yes, I was) | When he took your picture, you weren't standing up, were you? |
| 22. ^a | (yes, he did) | The person who was in the room over there, he didn't know your name, did he? |
| 23. | (yes) | Did he ask you how old you were? |
| 24. ^a | (yes, he did) | He didn't read you a story, did he? |
| 25. ^c | (no) | Did he hurt you and make you cry? |
| 26. | (yes) | Did he tell you his name? |
| 27. ^{a,c} | (no) | He asked you to tickle him, didn't he? |
| 28. ^c | (no) | While you were in the room, did the person in the room with you take off his clothes? |
| 29. | (no) | Did he take you into the bathroom? |

Story questions

Now I want you to think about the story you heard in the room, the one the man read to you:

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|-----------------|--------|--|
| 1. | (girl) | Was the person in the story a girl or a boy? |
| 2. ^a | (no) | The little girl in the story had pancakes for breakfast, didn't she? |

- | | | |
|-------------------|---------------------|--|
| 3. | (no) | In the story, was it a snowy day? |
| 4. ^{a,b} | (not scored) | What color was the cat in the story? |
| 5. | (yes) | Did the little girl eat lunch before she took a nap? |
| 6. | (cookies) | What did the little girl have for a snack? |
| 7. ^a | (yes, she did) | The little girl in the story didn't watch television, did she? |
| 8. ^{a,b} | (not scored) | The little girl in the story used paints to make a pretty picture, didn't she? |
| 9. | (yes) | Did the little girl in the story take a nap with a teddy bear? |
| 10. ^a | (there was no pool) | How long did the little girl in the story play in the swimming pool? |
| 11. | (no) | Did the little girl in the story take her dolls outside? |
| 12. ^a | (yes, she did) | The little girl in the story didn't have a red toothbrush, did she? |
| 13. | (yes) | Did the little girl in the story dig with her shovel? |

Room questions

That's all the questions about the story, but now I need to ask you some more about what happened in the room over there (the one with the bird picture on the door).

- | | | |
|------------------|-----------------------------|--|
| 1. | (yes) | Were there any windows in that room? |
| 2. | (no) | Was there a telephone in that room? |
| 3. ^a | (there was no TV) | Was the TV set in the room on or off? |
| 4. ^a | (no) | The walls of the room were painted blue, weren't they? |
| 5. ^a | (there were none) | What color were the curtains on the windows? |
| 6. ^a | (yes, there was) | There wasn't a mirror in the room, was there? |
| 7. ^a | (none) | When you were in there, about how many dolls were on the floor in that room? |
| 8. | (yes) | Were there any posters on the walls of the room? |
| 9. | (no) | Was there a bed in the room? |
| 10. | (beige/brown) | What color was the couch in the room? |
| 11. ^a | (there was no refrigerator) | What was inside the refrigerator that was in the room? |
| 12. | (three) | How many chairs were there in the room? |

Time questions

- | | | |
|-----------------|------------------|--|
| 1. | (once) | How many times did you go in the room? |
| 2. | (about 20 mins.) | About how long were you in the room with the man/woman? |
| 3. ^b | (not scored) | What time of day was it when you were in the room; morning, afternoon, or nighttime? |
| 4. ^a | (no) | Wasn't it Christmas day when you went into the room? |
| 5. ^a | (none) | How many nights did you sleep in the room? |
| 6. ^a | (no) | You went into that room 3 months ago, didn't you? |
| 7. ^a | (yes, I was) | You weren't in the room for about 20 minutes, were you? |
| 8. ^a | (yes, it was) | That wasn't the first time you'd been in the room, was it? |

Affect questions

- Did anything happen in the room that day that made you feel uncomfortable?
- Did you like the person who played games with you in the room?
- Was the person in the room nice or mean?
- How do you think the man in the room felt while you were playing games together?

Photo lineup question

I am going to show you pictures of six men. Please look at each one of them. The man who was in the room may or may not be one of these men. You don't have to choose one. Point to the picture only if you are very sure it is the same man who was in the room. Do you understand?

Note: Correct answers are noted parenthetically.

^aMisleading question.

^bDropped question.

^cAbuse relevant question.

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