

# Trauma and Long-Term Memory for Childhood Events: Impact Matters

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**ABSTRACT**—*In recent years, society has been stunned by high-profile cases in which adults allege they were sexually victimized in childhood. A crucial issue in these cases is how accurately adults remember the traumatic childhood experiences. In this article, we examine the predictors of the accuracy of adults' long-term memory for maltreatment and events related to the maltreatment experienced in childhood. First, we discuss memory for negative or threatening information and how child maltreatment may affect memory. Second, we highlight methodological challenges inherent in this scientific inquiry. Third, we describe the findings from our longitudinal research on the accuracy of adults' memory for child abuse and for subsequent involvement in the legal system. We conclude that, overall, the greater the traumatic impact experienced, the more accurate the later memory, although factors related to development, individual differences, and interviews moderate the effects of childhood trauma on the accuracy of adults' memory.*

**KEYWORDS**—*child abuse and neglect; memory; trauma*

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Developmental psychologists have long been interested in adults' memory for childhood experiences. But research on the accuracy of adults' memory for traumatic childhood events is now vital as society struggles with the aftermath of shocking cases of past sexual abuse of children. Alleged perpetrators in these cases involve such prominent figures as Michigan State athletic physician Larry Nassar, Speaker of the U.S. House of Representatives Dennis Hastert, and Penn State University football coach Jerry Sandusky, as well as disparate Catholic priests. Such cases feature prosecutions that commence years after the alleged sexual assaults occurred. In light of widespread recognition that children infrequently disclose sexual abuse before adulthood (London, Bruck, Ceci, & Shuman, 2005), the statutes of limitation for sex crimes against children have been extended, paused, or abolished in many countries and U.S. jurisdictions, permitting accusations of decades-old abuse to be brought to criminal and civil courts despite long delays that can erode memory.

The accuracy of adults' memory for sexual abuse in childhood is particularly important because the victim's word is typically pitted against that of the accused. In cases brought to trial decades after the events are alleged to have occurred, forgetting is to be expected. Nevertheless, long-term memory is affected by many factors. In this review, we seek to identify these factors in individuals with documented histories of maltreatment as children. We are particularly interested in such questions as: How well do adults with histories of trauma remember significant childhood experiences? Does the traumatic impact of the event matter for subsequent memory? Does trauma-related psychopathology predict accuracy of memory, memory error, or both? Do individual differences shape long-term memory for childhood trauma?

In this article, first, we briefly describe the research on memory of negative emotional experiences and theoretical models of consequences of maltreatment. Second, we highlight the methodological challenges inherent in this scientific inquiry. Finally, we review the findings from our longitudinal studies that address the aforementioned questions.

## MEMORY OF NEGATIVE EMOTIONAL INFORMATION

A useful starting point for understanding memory of childhood traumas is research on how negative emotional information is remembered in general (McGaugh, 2013). In contrast to our longitudinal studies, this larger body of research has generally not focused on memory of events that threaten (or potentially threaten) physical or psychological safety (e.g., child sexual abuse) or stressful experiences related directly to such events (e.g., forensic medical exams, courtroom testimony). Nonetheless, the findings are important to understand how distress may affect memory. Although not entirely uniform, this work largely suggests that memory is stronger for highly negative emotional events than for neutral or less emotional events (Bowen, Kark, & Kensinger, 2017), and more recently, that survival relevance (i.e., the need to escape or prevent threats to survival) also aids memory (Nairne & Panderirada, 2016).

Stronger memory for negative emotional than nonemotional information results, in part, from activation of the prefrontal-hippocampal-amygdala complex, which enhances attention and encoding, and hence improves later memory (e.g., Canli, Zhao, Brewer, Gabrieli, & Cahill, 2000). This activation also contributes to tunneling attention toward the most important components of the stressful event, leading to enhanced memory for those components but weaker memory for peripheral details (Christianson, 1992). Forgetting and errors still occur, but they typically do so to a lesser extent than for memory of less negative events, even in children (Chae et al., 2013).

However, these findings may not generalize completely to adults' memories of negative, personally threatening experiences—particularly from childhood. Childhood trauma itself can have a host of sequelae (e.g., depression) that, as we show, have implications for memory. Other characteristics related to individual differences, some also linked to childhood, may shape accuracy, and possibly errors, when recounting negative experiences.

## EFFECTS OF CHILDHOOD MALTREATMENT ON MEMORY

Given that most of our work has focused on maltreatment as the source of childhood trauma, models of the effects of maltreatment on children's development need to be considered. The most prominent view has been an *impairment model*, in which maltreatment causes deficits or distortions in cognitive and socioemotional processes, as well as impairments or alterations in neurobiology (Loman & Gunnar, 2010) and brain development (Teicher et al., 2003), which might affect memory. An alternative view is the *conditional adaptation model*, which emphasizes that maltreatment in childhood results in specialized mental functions that are adapted to threatening and stressful environments (e.g., Ayoub & Fischer, 2006; Frankenhuis & de Weerth, 2013). This specialization does not necessarily alter

basic associative processes that can affect memory, which appear comparable for children with and without histories of maltreatment (Howe, Cicchetti, Toth, & Cerrito, 2004). Instead, the specialization may lead to heightened attention and hence memory for specific types of information. Notably, children raised in hostile and violent homes are particularly attuned to detecting threat: Children with histories of maltreatment (compared to children without such histories) identify angry faces sooner, label fearful faces faster, and orient longer to anger cues (e.g., Masten et al., 2008; Pollak & Sinha, 2002), suggesting hypervigilance to threat-related stimuli (Dannlowski et al., 2013) beyond normative preferential processing of negative and threatening information (Windmann & Krüger, 1998). Hypervigilance, in turn, can contribute to amplified encoding and memory for such information (Goodman, Quas, & Ogle, 2010). In our longitudinal research, we found some support for that possibility, although individual differences, most notably in attachment-related coping (Bowlby, 1969), moderated these relations.

In contrast to positive associations between child maltreatment and accuracy of memory for negative and threat-related information, inaccuracies in memory also emerge, but at times in relation to psychopathology likely resulting from childhood trauma, and surprisingly, for positive information. Specifically, when memory is compared in individuals with and without histories of child maltreatment, memory deficits (e.g., commission errors) for positive stimuli are associated with trauma-related psychopathology. This pattern was seen in a study comparing accuracy of and errors in memory in 9- to 15-year-olds with or without histories of maltreatment (McWilliams, Harris, & Goodman, 2014). The youth watched a film clip about a positive or a negative family interaction, and then answered questions testing their memory. Younger age and higher levels of trauma-related psychopathology (a composite measure of symptoms of anxiety, depression, posttraumatic stress, anger, and dissociation) predicted commission errors to direct questions after the youth viewed the positive family interaction but not after they saw the negative family interaction. These effects were significant even when IQ was controlled statistically (cf. Young & Widom, 2014). Arguably, this pattern fits with the conditional adaptation model.

## METHODOLOGICAL CHALLENGES OF RESEARCH ON CHILDHOOD MALTREATMENT

Numerous methodological challenges arise when studying memories of child maltreatment. One challenge concerns causal inference. We cannot randomly assign children to maltreatment versus nonmaltreatment groups, and correlational findings are plagued by potentially confounding variables, such as family dysfunction, preexisting child effects, socioeconomic and cultural factors, community influences, and interventions. All these can affect memory performance. Quasi-experimental designs help control for some but not all possible confounds.

Other challenges include misclassification. Misclassifications can occur when attempting to compare samples of maltreated and nonmaltreated children. Some studies classify children or adults into designated groups according to self-reports (e.g., regarding history of maltreatment or diagnosis of psychopathology; Bremner, 2006), which typically involves memory. Classifications become even more challenging when relying on memories of severity, chronicity, and age at first occurrence, which likely influence long-term memory of the abuse. Other studies rely on official reports, but for many child victims, what happened to them is never reported to authorities, so official reports capture just the tip of the iceberg. Furthermore, children who have arguably suffered the most severe maltreatment, resulting in permanent removal from home, may not be included in child maltreatment samples (but see Eisen, Goodman, Qin, Davis, & Crayton, 2007; Masten et al., 2008; Melinder, Baugeerud, Ovenstad, & Goodman, 2013), likely limiting the upper range of psychopathology symptoms studied. Finally, especially for longitudinal research, attrition can affect representativeness of samples of adults. Findings would likely be less murky if these unavoidable sampling problems did not exist.

Another set of challenges concerns disentangling the effects of victimization. The common occurrence of polyvictimization (i.e., experiencing many forms of child maltreatment; Finkelhor, Shattuck, Turner, Ormrod, & Hamby, 2011) and the risk that victims of maltreatment will be revictimized (e.g., West, Williams, & Siegel, 2000) make it important to separate effects of different subtypes of maltreatment or cumulative trauma on memory (Barnett, Manly, & Cicchetti, 1993). A dimensional approach that consider both the level of risk and level of deprivation offers a promising alternative (McLaughlin & Sheridan, 2016). Moreover, for many types of maltreatment, such as child sexual abuse, acts vary considerably (e.g., having someone expose himself compared to being sexually assaulted at gunpoint) in their likely effects on memory. Defining the severity of the acts is also challenging (e.g., is long-term incest that results in pregnancy more or less severe than stranger kidnapping with violent rape?).

#### METHODOLOGICAL CHALLENGES IN THE STUDY OF LONG-TERM MEMORY OF TRAUMATIC CHILDHOOD EVENTS

Many challenges arise in relation to a focus on long-term memory. First, to determine accuracy, an objective record of what actually occurred is crucial. However, the original documentation of the events may be incorrect or incomplete. Second, psychopathology and child trauma, such as abuse, are typically entwined, so the supposed effects of child maltreatment on memory may actually be the effects of psychopathology, with some psychopathologies contributing to false reports and inaccuracies in memory, but others supporting accuracy of memory and resistance to false suggestion (Goodman et al., 2010). Adding to the complexity, child maltreatment is associated with

different types and degrees of later adult psychopathology, including heightened symptoms of posttraumatic stress disorder (PTSD) and depression (Browne & Finkelhor, 1986). Thus, effects of child maltreatment and psychopathology should be distinguished, including the specific forms of psychopathology, as should whether subclinical symptoms or diagnoses are being studied.

Third, largely for ethical reasons, we do not study the effects of highly suggestive tactics, such as those used in studies of false memory, on individuals who have been maltreated in childhood (Loftus & Pickrell, 1995; Shaw & Porter, 2015). Fourth, because our work has focused on memory for child abuse and abuse-related experiences, when we refer to childhood trauma, we primarily mean exposure to child maltreatment or related medical and legal events. Researchers should test whether our findings and models extend to accuracy of (and errors in) memory for other kinds of childhood traumas (e.g., injury, exposure to domestic violence).

#### PREDICTORS OF MEMORY FOR THREATENING EVENTS

With these complexities in mind, we turn to possible predictors of long-term memory of child maltreatment: Age at maltreatment, type of abuse, traumatic impact (e.g., was the maltreatment the worst thing that happened in the child's life?), attachment, and psychopathology.

Regarding age, being older at encoding (i.e., when the event took place) typically predicts more complete and accurate memory (e.g., Eisen et al., 2007). However, when children experience negative or threatening events, age differences in accuracy vary more, appearing and disappearing, presumably because starting in the early preschool years, some individuals remember stressful events that are personally significant or have had a traumatic effect, whereas other individuals do not (Chae et al., 2018; Peterson, 2012; Williams, 1994).

With respect to type of abuse and traumatic impact, negative stories, pictures, or films, although possibly distinctive and emotional, do not generally lead to high levels of arousal (sometimes they lead to none at all; Quas & Lench, 2007), or the type of encoding and mnemonic processing evoked by exposure to threatening and traumatic events that put children in survival mode. The latter likely occurs when children are maltreated. Such events, if identified via self-reports or observation as highly consequential—for instance, as affecting children's lives significantly or threatening children's well-being—likely are retained in memory (Alexander, Goodman, Schaaf, Shaver, & Quas, 2002; Greenhoot & McCloskey, 2005), barring successful attempts to avoid the memories.

Avoidance of memory is central to attachment theory (Bowlby, 1969). The expectations children develop about close others and themselves shape how children react to and remember negative events that activate the attachment system. Regarding negative,

threatening conditions, more secure children are later more accurate and complete in their memory of the emotional or distressing events than avoidant or insecure children (Chae et al., 2018; Edelstein et al., 2005). Parents' attachment orientations also have implications for children's memories of stressful experiences. Children of more secure parents have more accurate memory of stressful experiences, whereas children of parents who are more avoidant tend to have less accurate memories of these experiences (e.g., Alexander et al., 2002). These effects are less common in studies that tested memory for stories or photographs than those that tested memory for salient personal experiences (e.g., invasive medical procedures), probably because the former fail to activate the attachment system and hence do not evoke the same levels of arousal and memory processing or avoidance that the latter experiences do.

Although some psychopathologies (e.g., schizophrenia), measured as diagnoses or heightened symptoms, predict less accurate memory for certain types of information (Ragland et al., 2015), other psychopathologies may be associated with more accurate memory for negative experiences. For instance, symptoms of PTSD include flashbacks and hypervigilance to trauma-related cues, both of which might maintain or reinstate memory (Alexander et al., 2005). Rumination is a characteristic of depression (Nolen-Hoeksema, 2000) and may involve rehearsal for negative experiences.

#### LONGITUDINAL STUDIES OF CHILD MALTREATMENT AND MEMORY

We conducted two longitudinal studies to examine long-term memory for maltreatment in childhood and events related to that maltreatment. Study 1 started as research on 4- to 17-year-olds involved (as alleged victims) in prosecutions for child sexual abuse (Goodman et al., 1992). Documentation gathered at the start of the study included information from police and prosecutors' records, interviews with nonoffending parents, questionnaires completed by nonoffending parents and child victims, and courtroom observations of the children. About 14 years after the legal involvement ended (up to 21 years after the sexual assaults), we interviewed more than 80% of the child victims, now older adolescents or adults (ages 16–30 years; Quas et al., 2005). The extensive original documentation allowed us to examine the victims' memories of the abuse and the legal case.

Most individuals remembered their victimization (Goodman et al., 2003). However, lost memory (or at least failure to disclose) was also evident, with as many as 30% in some subgroups failing to report the former abuse. Being older when the abuse ended, experiencing more severe abuse, and having maternal support predicted later memory. In addition, among individuals who remembered (or disclosed) the abuse, unexpectedly, age did not significantly predict accuracy. Rather, severity of PTSD symptoms and naming the sexual abuse as the most traumatic

life event (regardless of indicators of PTSD) predicted greater accuracy of memory for the abuse (Alexander et al., 2005). These results show that understanding an event's traumatic impact is important for predicting accuracy of long-term memory for child sexual abuse. When we examined long-term memory for other negative (and possibly traumatic) experiences that resulted from the sexual abuse, namely the legal case, similar trends emerged: Greater severity of abuse, closer relationship to the perpetrator, and more frequent testimony predicted more accurate memory (Quas et al., 2010). These findings suggest that greater distress, like traumatic impact, is associated with more accurate long-term memory.

In Study 2, we examined memory in victims of child maltreatment, including sexual abuse, physical abuse, or neglect, as well as in individuals in a control group with no known history of child maltreatment. The study initially involved assessments of 3- to 17-year-olds (Eisen, Qin, Goodman, & Davis, 2002; Eisen et al., 2007) who had been removed from their homes because of suspected maltreatment and were placed briefly in a forensic hospital unit, where evaluations included anogenital swabbing during a medical examination. Three days after the medical exam, we tested children's memory for the procedure. Both being older and having experienced sexual abuse, physical abuse, or sexual and physical abuse predicted greater accuracy of memory for the details of the exam, indicating both the standard effect of age and possible sensitization to threats and emotions associated with past abusive experiences.

Nearly 20 years later, we contacted a subset of the child victims to examine their long-term memory for the medical exam (Goldfarb, Goodman, Larson, Eisen, & Qin, *in press*). Lost memory of (or failure to disclose) being in the hospital was evident overall in 17% of the sample. Almost half (43%) of the participants (now adults) reported they had experienced genital contact during the medical procedure that took place when they were children. Adults whose child sexual abuse was substantiated and adults with higher self-reported symptoms of depression remembered the exam more accurately than the other adults tested. No participant falsely reported chargeable offenses that did not occur, even though for half of the sample, researchers had falsely suggested such offenses when they interviewed them as children.

In contrast to the positive associations between accuracy of long-term memory for child abuse and childhood distress—indicated by, for example, repeatedly testifying, or having experienced more severe abuse and traumatic impact—inaccuracies in memory were also evident in our longitudinal studies. Consistent with our findings regarding attachment, less maternal support predicted memory errors for the former victims of child sexual abuse: In Study 1, adults who as children lacked maternal support were less likely to remember (or disclose) the sexual abuse and remembered the abuse less accurately (Alexander et al., 2005; Goodman et al., 2003; see Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1997, for similar findings

regarding children's memory of stressful medical procedures). These children may have learned not to talk about the abuse, leading to suppression or forgetting over time, including into adulthood.

Suggestibility (i.e., agreeing with an interviewer's false suggestions) can be a source of memory error in the short and long term. In Study 2, some of the most traumatized, dissociative children, especially those who were quite young when the abuse occurred, showed response bias, agreeing with misleading questions (Eisen et al., 2002, 2007). Furthermore, as adults, some participants erred in response to interviewers' false suggestions about events that would be expected based on general knowledge to have occurred but that had not happened; for example, when interviewers suggested falsely to the adults that during the childhood medical exam, they received a shot, some of the adults agreed, even though they did not make commission errors to false suggestions about taboo acts that had not occurred, such as being hit or kissed by the doctor.

### IMPLICATIONS

Our work has psychological, legal, and social policy implications. First, our findings indicate that the core of childhood events of psychological significance can be retained accurately over many years into adulthood, but that individual differences and interview techniques can affect the accuracy of adults' reports. Second, our findings argue for extending statutes of limitations that permit sexual crimes experienced in childhood, as recounted in adulthood, to move into the court system. Third, scientists and clinicians who advise the fact finders (e.g., juries) or evaluate or treat adults who recount traumatic childhood experiences should be aware of the predictors of accuracy and inaccuracy we have set forth here. And fourth, forensic interviewers, courts, and legislators may want to consider our findings in revising their interview practices, relevant laws, and social policies when recommending how to evaluate victims' claims and move forward once allegations have been made.

Given these implications and the scientific challenges of conducting research on children's maltreatment, we encourage replication of our work. However, that will not be easy: Longitudinal studies are time-consuming, and access to samples of children who have been maltreated is limited. Yet replication is vital because of the importance of the findings for psychology, law, and society.

### CONCLUSION

Simplistic beliefs that maltreatment in childhood harms accuracy of memory do not conform to the data, nor do beliefs that maltreatment in childhood uniformly enhances memory for childhood events. Instead, the links between emotional events and memory are complex. Our studies imply that factors related to children's development, individual differences, and how

adults are interviewed help shape the long-term reports of memory, but that impact also matters considerably. For many adults, the more traumatic the event (e.g., it was the worst thing that ever happened) and the more traumatic its impact (e.g., more symptoms of PTSD, more depression), the more accurate is their later memory of distressing to threatening childhood experiences.

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