Stress and autobiographical memory functioning

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To appear in R. Fivush & J. Quas (Eds.), Stress and Memory in Development: Biological, Social, and Emotional Considerations.
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In the last two decades, controversy surrounding memory and testimony for traumatic childhood events like abuse has stimulated a profusion of research on the relation between stress and memory in children. Most of this work has investigated how the stress associated with a particular event influences memory for that event, focusing on children without histories of child abuse or trauma. Recently, however, memory researchers have begun to ask whether chronic exposure to stressful events like abuse might actually alter the course of autobiographical memory development or memory functioning. This issue is of considerable relevance to the debate over memory for abuse and other traumas and is also clinically significant, as autobiographical memory contributes to many aspects of human functioning and well-being including self concept, social problem solving, and emotion regulation processes (e.g., Nelson & Fivush, 2004; John & Gross, 2004).

In this chapter, we investigate the possibility that chronic or traumatic stress may influence autobiographical memory development or memory functioning. We begin by reviewing the empirical literature regarding memory disturbances in children and adults with trauma histories. Next, we turn to a discussion of the possible explanations for trauma-related memory patterns, focusing in particular on the hypothesis that they are linked to emotion regulation processes. We then present our own research on these issues, carried out as part of a longitudinal study of family violence. Finally, we will revisit existing explanatory frameworks, and attempt to recast them from a developmental standpoint.

Trauma and Memory Functioning

Much of the interest in the relation between stress and general autobiographical memory functioning has been generated by reports in the clinical literature that adults with childhood
trauma histories seem to have difficulty remembering their childhoods. Herman and Schatzow (1987), for example, found that many members of their therapy group for women survivors of child sexual abuse were unable to remember large portions of their childhoods. Edwards and her colleagues (Edwards, Fivush, Anda, Felluti, & Nordenberg, 2001) have confirmed this association between abuse and self-reported memory loss in a large, non-clinical sample of adults with and without histories of childhood abuse. Both women and men who reported a history of child sexual or physical abuse were more than twice as likely as other individuals to report large gaps in their memories of childhood (after age 4).

Research using more objective memory assessments also shows that trauma history is associated with disturbances in autobiographical memory (Brittlebank, Scott, Williams, & Ferrier, 1993; Kuyken & Brewin, 1995; Park, Goodyer, & Teasdale, 2002). For instance, adults who report childhood abuse histories have been shown to have more difficulty than non-abused controls remembering autobiographical facts from childhood, such as the names of significant people from their childhoods (Hunter & Andrews, 2002). A number of the investigations of trauma-related memory problems have evaluated autobiographical memory with an Autobiographical Memory Test (AMT) in which participants are given a limited amount of time (e.g., one minute) to generate a specific memory (i.e., a personal memory that refers to a single event) in response to each of several cue words. The most robust finding in this literature is that compared to non-traumatized controls, adults who report childhood trauma histories tend to generate “overgeneral” memories that summarize a category of events (e.g., ”My parents were always fighting.”) instead of specific memories that describe individual episodes (e.g., ”On my 9th birthday, my parents got into a bad fight.”). There is also considerable evidence that difficulty retrieving or reporting specific personal memories is also associated with depression (see
Williams et al., 2007 for a comprehensive review). Nevertheless, there is widespread agreement that trauma-related autobiographical memory disturbance is not a simple epiphenomenon of depression, as childhood trauma is related to poor memory specificity even when controlling for depression (de Decker et al., 2003; Henderson, Hargreaves, Gregory, & Williams, 2002; Kuyken & Brewin, 1995; Kuyken, Howell, & Dalgleish, 2006).

The vast majority of these studies have revealed trauma-related memory problems on the AMT, but it should be noted that this pattern has not been uniformly supported. A few investigations have found no association between childhood trauma and performance on the AMT (e.g., Arntz, Meeren & Wessel, 2002; Wessel, Meeren, Peeters, Arntz & Merckelbach, 2001), and a study by Peeters et al. (Peeters, Wessel, Merckelbach & Vermeeren, 2002) found that reports of childhood trauma actually predicted greater specificity in response to cue words. These discrepant findings may reflect variations in the levels of abuse experienced by participants in different studies, as there is evidence that the duration and severity of trauma is negatively related to memory specificity among trauma survivors (Burnside, Startup, Byatt, Rollinson, & Hill, 2004). Consistent with this argument, Wessel et al. (2001) reported that the childhood trauma reported in their sample tended to fall in the minimal to moderate range.

Although autobiographical memory problems are frequently observed in adults who retrospectively report histories of childhood trauma, whether such trauma-related memory disturbances actually appear during childhood or adolescence is less clear. Eisen et al (2001) found no differences between maltreated and non-maltreated children’s memory and suggestibility for a medical examination. Similarly, in their longitudinal study of domestic violence, Orbach and colleagues (Orbach, Lamb, Sternberg, Williams & Dawud Noursi, 2001) reported that the specificity of children’s memories for family disagreements was unrelated to
their exposure to family violence. On the other hand, Orbach et al. noted that children who had been exposed to family violence rarely discussed past family conflict in the memory interviews at all, and this pattern could reflect memory disturbances. Moreover, a study of adolescent psychiatric inpatients found that teens who reported a trauma history, like adults, produced more overgeneral memories on an AMT than teens without such histories (de Decker, Hermans, Raes, & Eelen, 2003). Potential explanations for the trauma-related memory disturbances that have been observed in adolescents and adults are considered in the section that follows.

**Explanations for Trauma-Related Memory Patterns**

One explanation for trauma-related autobiographical memory disturbances that has received relatively little attention in the autobiographical memory literature is that they are attributable to stress-induced damage to the hippocampus and general memory impairments. According to this argument, conditions of high stress lead to elevated production of the stress hormone cortisol (Stansbury & Gunnar, 1994; Wilk & Gunnar, this volume), which impairs the functioning of the hippocampus (Anderson & Teicher, 2004; Bremner, 1999; Nelson & Carver, 1998; Sapolsky, 1996; Squire, 1992; Fillipini, Gijsbers, Birmingham, & Dubrovsky, 1991; Gould, Tanapat, McEwen, Flugge, & Fuchs, 1998). Prolonged exposure to high stress and elevated cortisol may lead to hippocampal atrophy and more permanent memory problems (Bremner, 2005; Bremner & Narayan, 1998; Kitayama, Vaccarino, Kutner, Weiss, & Bremner, 2005). The hippocampus is believed to be involved in a wide range of memory processes, including the consolidation and retrieval of verbal declarative memory representations, as well as implicit memory and spatial memory (Bremner et al., 2003; Bremner, Vythilingam, Vermetten, Vaccarino, & Charney, 2004; Elzinga, Bakker, & Bremner, 2005; Squire, 1992; de Quervain, Roozendaal, & McGaugh, 1998; Chun & Phelph, 1999; Maguire, Frackowiak, & Frith, 1997).
Thus, this explanation predicts broad memory deficits in non-autobiographical declarative memory, as well as autobiographical memory, among individuals with trauma histories.

Most of the evidence for stress-induced hippocampal impairment comes from research with nonhuman animals, in which experimental inductions of high cortisol levels or high stress cause hippocampal deterioration and/or memory impairments (Gould et al., 1998; Sapolsky & McEwen, 1986). In humans, the neuroanatomical evidence in support of these mechanisms is less clear. Some studies have shown that adults with histories of child physical or sexual abuse have decreased hippocampal volume relative to adults without trauma histories (Bremner et al., 1997; Stein, Koverola, Hanna, Torchia, & et al., 1997; Vythilingam et al., 2002), but these differences in brain structure seem to be linked to trauma-related psychological disorders such as PTSD (Bremner, 2001; Bremner et al., 1997; Bremner et al., 2003; Kitayama et al., 2005) and depression (Bremner et al., 2000; Sheline, Sanghani, Mintun, & Gado, 1999), not the trauma per se. Indeed, in a recent meta-analysis Kitayama et al. (2005) found that across nine MRI studies adults with chronic PTSD had smaller hippocampal volume than healthy controls and traumatized adults without PTSD. It is also not clear whether the pre-adult brain is susceptible to stress-related hippocampal damage, as most of this work has been conducted with adult samples. One pilot study of a child sample, however, found no variations in brain structure between maltreated children with PTSD diagnoses and healthy non-maltreated children (DeBellis, Hall, Boring, Frustaci & Moritz, 2001). Further, in light of the correlational nature of this literature, several researchers have questioned the causal direction of the association between stress and apparent hippocampal atrophy, suggesting that smaller hippocampal volume may actually be a risk factor for the development of psychological disorders in response to trauma (Gilbertson et al., 2002; Sapolsky, 1996; Stein et al., 1997).
To date there is also little behavioral evidence to support the argument that trauma-related memory problems reflect broader memory deficits associated with stress-induced hippocampal damage. Although PTSD has been associated with short-term memory deficits (Bremner, Scott, Delaney, & Southwick, 1993; Uddo, Vasterling, Brailey, & Sutker, 1993; Vasterling, Brailey, Constans, & Sutker, 1998), only a few studies have examined the relations between trauma exposure per se and non-autobiographical declarative memory measures. A recent study by Raes et al. (2006) showed that depression-related overgeneral memory on the AMT was related to poorer source memory for non-autobiographical information, but was unrelated to several other measures of semantic and episodic memory. Similarly, measures of immediate and delayed story recall were unrelated to autobiographical memory specificity in de Decker et al.’s (2003) study of adolescent psychiatric inpatients. Finally, Howe, Cicchetti and Toth (2006) examined performance on the Deese Roediger McDermott false memory paradigm in maltreated and non-maltreated children and found no differences according to maltreatment status. In sum, although more extensive investigation seems warranted, the existing literature suggests that trauma-related autobiographical memory problems cannot be entirely explained by broader memory deficits.

Another explanation for trauma-related memory problems focuses on current memory retrieval conditions and constraints on information processing. Kuyken and Brewin (1995) suggested that intrusive ruminative thoughts about traumatic experiences, and efforts to avoid these thoughts, deplete cognitive resources and lead to the truncation of the memory search process before a specific episode has been retrieved. In line with this view, PTSD, which is characterized by intrusive traumatic memories, is also associated with poor memory specificity (McNally, Lasko, Macklin, & Pitman, 1995). Moreover, measures of intrusive memories and
efforts to avoid them (i.e., the intrusion and avoidance subscales of the Impact of Events Scale, or IES) predict overgeneral memory in both trauma victims (Wessel et al., 2002) and depressed adults (Brewin, Reynolds, & Tata, 1999; Kuyken & Brewin, 1995). Experimental manipulations of rumination have also been shown to affect the specificity of memory retrieval (Park, Goodyer, & Teasdale, 2004; Watkins & Teasdale, 2004; Watkins, Teasdale & Williams, 2000). On the other hand, the depletion of cognitive resources does not seem to completely account for the autobiographical memory patterns seen in trauma survivors. Although studies of non-traumatized adults suggest that the reduction of cognitive resources does increase the likelihood of overgeneral memories (e.g., Williams, Chan, Crane, & Barnhofer, 2006), individual differences in cognitive resources (e.g., working memory measures) have not been shown to mediate the differences in memory performance between adults with trauma histories and controls (de Decker et al., 2003; Raes et al., 2006).

For years, the most commonly cited explanation for trauma-related memory specificity problems has been J.M.G. Williams’ (1996) affect regulation hypothesis. This model suggests that aversive experiences during childhood lead to the development of an enduring cognitive style that involves avoiding thinking and talking about the details of past experiences so as to blunt potentially negative affect. In support of this hypothesis, individuals who retrieve fewer specific memories on the AMT report lower mood disturbance following a lab induced stressor (Raes, Hermans, & Eelen, 2003; Raes et al., 2006). Although such functional avoidance of negative details may reduce distress in the short term, this cognitive style is thought to increase vulnerability to depression in the long-term because it impairs problem solving ability (Pollock & Williams, 2001; Raes et al., 2006; Van Minnen, Wessel, Verhaak & Smeenk, 2005; Williams, Barnhofer, Crane, & Duggan, 2006). Consistent with the argument that trauma-related memory
patterns reflect a cognitive style, individual differences in memory specificity appear to be relatively stable in adults (e.g., Brittlebank et al., 1993; Williams & Dritschel, 1988). Researchers have yet to demonstrate that avoidant emotion regulation processes actually account for trauma-related memory patterns, but there is evidence that poor memory specificity is related to measures of cognitive avoidance, such as the White Bear Suppression Inventory (Wegner & Zanakis, 1994), and “repressive” coping style among non-traumatized, non-depressed adults (Hermans Defranc, Raes, Williams, & Eelen, 2005; Raes et al., 2006). One problem with the affect regulation explanation, however, is that it emphasizes early adverse experiences at the expense of attention to current retrieval conditions. Yet manipulations of current retrieval conditions, such as rumination inductions, do affect the specificity of autobiographical memory. Thus, it seems possible that a tendency to avoid remembering details to blunt affect when presented certain cues could also represent a more transient or flexible strategy adopted in response to current conditions or recent events (see Johnson, Greenhoot, Glisky, & McCloskey, 2005, for elaboration of this argument).

A recent reformulation of the affect regulation hypothesis by Williams and his colleagues (2007) places greater emphasis on the role of current conditions in trauma- and depression-related autobiographical memory problems. The model further specifies the information processing mechanisms that might underlie poor memory specificity and suggests that cognitive resources, intrusive memories and ruminative thoughts all may moderate the application of functional avoidance in autobiographical memory retrieval. The framework draws heavily on Conway and Pleydell-Pearce’s self-memory model (2000), which proposes that autobiographical memories are dynamic patterns of activation constructed from an autobiographical knowledge base that is organized hierarchically into three levels of representation: lifetime periods (e.g.,
“When I was young...”), intermediate or general event representations (“My parents used to argue about money.”), and event-specific knowledge (e.g., “The time my mom walked out because my dad lost his job.”). A voluntary or top-down memory search is viewed as a staged process that begins at the level of the lifetime period or the general event representation and is followed by activation of event-specific details.

According to Williams et al. (2007), when the retrieval process begins to elicit event-specific details related to past traumatic experiences, the search may be prematurely aborted in order to limit exposure to aversive details and reduce negative affect. As a result, the search produces a memory at the intermediate, rather than specific event, level. This strategy of avoiding event-specific details is reinforced over time and, as emphasized by the original affect regulation explanation, can become an enduring cognitive style. But the new model posits that this pattern of functional avoidance can be intensified by several other conditions that are typical in adults with trauma histories and/or depression, such as rumination, elaborate repertoires of negative self-representations, intrusive memories and executive resource deficits. For example, rumination tends to activate abstract negative self-representations, and when these representations are elaborate, the individual can become “captured” at this intermediate, conceptual level of representation and attention will be diverted from the retrieval of specific memories. Executive resource deficits (e.g., Zacks & Hasher, 1994) may also contribute to poor autobiographical memory specificity because of the cognitive effort involved in the staged search process. Such deficits may also disrupt the inhibition of ruminative thoughts, further increasing the likelihood of overgeneral memories. Similarly, the efforts of traumatized individuals to suppress intrusive, involuntarily activated memories may place excessive demands on executive
resources, thus further exacerbating the tendency to remain at the general level when engaging in a deliberate memory search.

This reformulation of the affect regulation model accommodates much of the existing data on memory disturbances that are associated with trauma and trauma-related psychopathology. Nevertheless, one limitation of the extant literature is that virtually all of the work documenting trauma-related autobiographical memory problems has focused on participants’ own global judgments of autobiographical memory loss or measures of memory specificity on the AMT. Assessments of other dimensions of autobiographical or episodic memory would provide more information about the scope of trauma-induced memory problems and the implications of these problems for human functioning outside of the laboratory. Research on the breadth of trauma-related memory problems might also elucidate the underlying mechanisms. In this regard, such work would permit a more effective assessment of the contribution of general memory impairments to autobiographical memory problems, and could also enrich the prevailing affect regulation framework. For instance, the retrieval of emotional details figures centrally in this model, but little is actually known about the way that emotional details are represented in the memories of individuals with trauma histories.

Another limitation of the existing research base is that it is not clear when and how trauma-related memory problems develop. In spite of the theoretical interest in early trauma, most investigations have sampled adult populations. Indeed, almost all of the data on early trauma exposure in this literature comes from adult retrospective reports of child abuse. Therefore the effects of early exposure to trauma are confounded with adults’ current willingness or ability to report it. In other words, it is not clear whether the autobiographical memory disturbances that are associated with childhood trauma stem from the trauma itself or from an
adult response to current retrieval conditions or frame of mind. Furthermore, although much work has focused on the cognitive processes that underlie trauma-related memory patterns, less attention has been paid to the developmental processes that give rise to them.

**Our Research Program on Family Violence and Memory Functioning**

We have been addressing these issues, and others, by examining memory functioning in a subset of adolescents participating in a larger longitudinal study of family violence. The longitudinal project was originally designed to assess the impact of spousal violence and child abuse on women’s and children’s mental health and involved tracking an ethnically diverse sample of battered and non-battered women, and one of their children, over an eight year period (see McCloskey, Figueredo, & Koss, 1995). Over the years, this project has yielded a rich database for examining both memory for exposure to family violence per se (see Greenhoot, McCloskey, & Glisky, 2005) and the impact of such exposure on memory functioning in general.

The analyses presented in this chapter focus on data collected during the initial assessment when the children were 6 to 12 years old ($M = 9$ years) and after a 6-year delay when they were 12 to 18 years old ($M = 15$ years). The initial assessment evaluated 363 mother-child dyads who were recruited through announcements asking for women who had “been abused by a partner in the last year” (for the battered group) or who wanted to participate in “a study of the family” (for the comparison group) (see McCloskey et al., 1995 for a full description of the recruitment procedures). Eighty-two percent of these dyads ($n = 296$) were retained for the 6-year follow-up assessment. Both assessments involved separate two- to three-hour interviews with each member of the dyad to evaluate the children’s and mothers’ social, emotional and cognitive functioning. At both time points, the Conflict Tactics Scale (Straus, 1979) was used to question the children about their exposure in the previous year to mother-directed spousal abuse.
(e.g., mother being beaten or choked) and child-directed physical punishment or abuse (e.g., child being hit with an object or kicked) by the mother’s partner. The mothers’ independent responses to the same questions (and more) were used to corroborate the children’s disclosures. At the initial interview, the participants were also asked, with their mothers’ corroboration, to report whether they had ever been sexually abused. At the 6-year follow-up only girls (and their mothers) were questioned in depth about sexual abuse (see Bailey and McCloskey, 2005 for details regarding the coding of sexual abuse). As summarized in Table 1, participants disclosed a broad range of abuse exposure, from no exposure to moderate exposure to frequent and severe exposure, at the childhood interview. Levels of aggression and abuse were lower at the adolescent assessment, in part because many of the women had ended their relationships with the partners they had at the initial assessment.

The 6-year follow-up (i.e., adolescent) interview also included several measures of the teens’ memories. The teens were questioned specifically about their memories for childhood experiences with family violence, as well as several non-traumatic events documented at the same time, but these data are not the focus of the analyses presented in this chapter. An adaptation of the AMT was administered to provide a broader assessment of memory for childhood. Participants were given 3 minutes to generate as many specific childhood memories (from before the age of 9) as possible in response to each of six cue words varying in valence: two positive cues (playing, present), two negative cues (arguing, punishment) and two neutral cues (car, shopping). Finally, there was also an assessment of non-autobiographical episodic memory consisting of immediate and delayed recall of 10 verbally-presented paired associates.

We have conducted a series of investigations of the relations between abuse and memory functioning in this longitudinal sample, and in the sections that follow we describe three of these
studies. In contrast to most previous research on trauma and memory functioning, the longitudinal design of this project permitted prospective documentation of both early (childhood) and recent (adolescent) exposure to abuse. As a result, we have been able to separate the effects of childhood abuse exposure from those of current frame of mind or recent stressors that may be correlated with childhood abuse histories. Our investigations also extend previous work by looking at a broader range of memory measures than has typically been examined, including non-autobiographical episodic memory and multiple aspects of autobiographical memory such as the affective qualities of recollections. Finally, in our most recent set of analyses we have begun to explore questions about the developmental mechanisms that might contribute to trauma-related memory patterns.

**Abuse and the Specificity of Autobiographical Memories**

In our first investigation of the relations between autobiographical memory and abuse exposure, Johnson, Greenhoot, Glisky, and McCloskey (2005) sought to extend previous research on trauma-related specificity problems to an adolescent sample. The study was designed to examine multiple indices of the accessibility of specific autobiographical memories, and the relations between these measures and childhood exposure to abuse, recent exposure to abuse, and current depressive symptoms. To this end, we examined AMT performance in a subset of 134 participants whose mothers had corroborated their accounts of family violence and whose memory narratives were transcribed and available for this analysis.\(^1\) Spousal violence and child-directed aggression were combined into overall measures of childhood family violence and recent (adolescent) family violence. Like previous research using the AMT, we coded each memory that was produced as specific (i.e., a personal memory that refers to a single event) or

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1. The selection of participants for transcription was random and unrelated to the variables of interest in this study, and this subset was almost identical to the remainder of the sample in demographics and family violence exposure.
overgeneral (i.e., a memory that summarizes a category of events). But we also noted the number of interviewer prompts required to elicit each specific memory and the length of each memory (the number of words) as additional indicators of the participants’ abilities or willingness to generate specific memories. In addition, we coded the valence of each memory as negative or non-negative, as information about the affective quality of teen’s memories might be useful in evaluating the role of affect regulation processes. Finally, to evaluate whether AMT performance was related to broader memory deficits, we also included a paired associates recall test as a measure of non-autobiographical episodic memory.

Preliminary analyses indicated that our measure of non-autobiographical episodic memory (paired associates recall) was unrelated to AMT performance and abuse exposure and this variable was therefore removed from the final models. The major analyses focused on the degree to which multiple measures of AMT performance were predicted by childhood exposure to family violence, adolescent (recent) exposure to family violence, sexual abuse, and depressive symptoms, as measured by the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). As summarized in Table 2, adolescent exposure to family violence was associated with shorter memories for all cue types, fewer negatively-valenced memories in response to neutral cues, and more overgeneral memories in response to neutral cues.² Additionally, higher rates of childhood family violence predicted more interviewer prompting across cues. Finally, consistent with research on the links between depression and autobiographical memory, teens with clinically significant symptoms of depression generated more overgeneral memories across cues than participants without clinically significant symptoms.

² Although the univariate tests indicated that the effect of recent family violence on overgeneral memories for neutral cues fell short of significance, the test of the interaction between recent family violence and cue type in the repeated measures model was statistically significant, $F(2, 119) = 4.15, p = .018$. 
of depression. Sexual abuse was unrelated to memory performance, but it may be that the number of participants with sexual abuse histories was too small to detect an effect, as only 14% of our sample reported sexual abuse at any time point.

The fact that paired associates performance was not associated with trauma or autobiographical memory patterns argues against the hypothesis that trauma-related memory patterns are attributable to impairments in basic memory function. The overall pattern of results seems to be more in line with the reformulated affect regulation framework (Williams et al., 2007). The findings that teens with abuse exposure not only produced shorter and more generic memories, but generated fewer negative memories in response to neutral cues, provide convergent evidence that teens with abuse exposure may have been engaging in functional avoidance of potentially aversive memories or memory content. The association between childhood abuse exposure and interviewer prompting is also consistent with functional avoidance and suggests that although abused teens may have stored specific memories, they were less willing or able to retrieve or report them. But our data also suggest that avoidance is a dynamically applied strategy adopted in response to current stressors (e.g., recent violence or depressive symptoms), rather than an enduring cognitive style that stems from early experience. The argument that current conditions moderate the application of avoidance is further bolstered by the fact that some of the effects of recent violence were specific to neutral cues. One explanation for this pattern is that neutral cues activate weaker associations with episodic details than positive and negative cues, thus the combination of the higher effort involved in the retrieval process and the potential for retrieval of aversive content may increase the likelihood that the search stops short of a specific memory. Nevertheless, ours is the first study to use neutral cues as part of the AMT, and previous findings on cue valence effects have been
inconsistent (e.g., de Decker et al., 2003; Henderson et al., 2002; Kuyken & Brewin, 1995). Therefore, additional research is needed to better evaluate the ways in which semantic and affective characteristics of memory cues might moderate trauma-related memory patterns.

**Abuse and Internal States Language**

Our next analysis of the links between abuse and memory examined affect in the recollections of teens with and without past histories of abuse (Greenhoot, Johnson & McCloskey, 2005). The affect regulation hypothesis motivated our analyses: if individuals with abuse histories avoid remembering and talking about aversive past events, they may also be prone to forgetting or failing to report details within episodic memories that are especially likely to be aversive (e.g., emotional and perceptual details). This analysis was further motivated by theory and research suggesting that the recall of internal states serves important functions in relationships and self-understanding. Recalling how one felt or thought about past events may help people make sense of experiences, especially negative experiences. Research on non-traumatized samples, for example, shows that children increase their internal states language when recalling negative, stressful events (Fivush, Hazzard, Sales, Safarti, & Brown, 2003).

For our study we coded internal states language in the (AMT) autobiographical narratives provided by the adolescents during the six-year follow-up. Using an adaptation of a coding scheme developed by Bauer, Stennes, and Haight (2003), we coded the transcripts for the frequency of words referring to cognitions (e.g., *thought*), perceptions (e.g., *saw*), physiological states (e.g., *tired*) and emotions (e.g., *afraid*). We were especially interested in comparing the emotional content of childhood recollections elicited by the negative and non-negative cues, and whether any differences were moderated by abuse history. To this end, we constructed two groups of participants according to childhood abuse exposure (excluding those with only
occasional exposure to family violence). Participants who reported severe spousal violence, child physical abuse and/or sexual abuse at the childhood assessment (Year 1) were coded as having a childhood abuse history ($n=47$; the Childhood Abuse Exposure group). Those in the No Childhood Exposure group ($n = 24$) reported no aggression or abuse whatsoever. Twenty-one of these 71 participants reported abuse exposure at the adolescent interview; all but five were in the Childhood Abuse Exposure group. It is important to point out that although we used dichotomous abuse variables to simplify these analyses, a comparable set of analyses using continuous abuse variables and including participants with moderate abuse exposure yielded very similar results.

We found that the only category of internal states that differed between youth with and without childhood abuse exposure was emotion, and this difference was found even after we controlled for memory length, age and gender. Of special interest was our discovery of an interaction between cue type and child abuse, as illustrated in Figure 1. As can be seen, controls without childhood abuse exposure showed elevated emotional language in response to negative cues relative to nonnegative cues. Analyses of the content of the memories in response to negative cues confirmed they were almost uniformly negative and related to the cues themselves (arguing and punishment). For the non-abused controls, therefore, the increased emotional language to negative cues converges with prior evidence that children express more emotions and other internal states when recalling negative events than when recalling positive events (Fivush, Hazzard et al., 2003). Surprisingly, teens with child abuse histories showed no such increase in emotional expression when discussing conflict-related childhood memories. Even though their childhood experiences related to arguing and punishment were likely to be more
emotionally arousing, the abused youth generated less emotional language in response to these cues than non-abused adolescents.

These abuse-related patterns of emotional language are consistent with the affect regulation framework; abused youth may be avoiding painful memory content by limiting recall or disclosure of emotion. The affect regulation model is typically applied to the pattern of overly-generic autobiographical memories in people with trauma histories. But it seems possible that when a retrieval search activates a specific memory, individuals who have developed avoidant memory tendencies in response to trauma may extend such strategies in order to “sanitize” aversive memories by screening out emotions and other unpleasant episodic details. Another possibility is that individuals with abuse histories encode very little affective detail in the first place. Conflict-related events may be especially confusing for children from violent homes, making it hard for them to fully appraise and label their own and others’ emotions related to these events. Yet a further explanation for the lower levels of emotion language among abused youth is that they have become somehow desensitized to conflict through repeated exposure, such that conflict-related events were actually less emotionally-arousing to them than to individuals without abuse histories. It should be noted, however, that the psychophysiological evidence regarding desensitization versus hyper-sensitization among abused children is mixed (Carrey, Butter, Persinger & Bialik, 1995; El-Sheikh, 1997; Hennessy, Rabideau, Cicchetti, & Cummings, 1994; Laumakis, Margolin, & John, 1998).

Unlike childhood abuse exposure, exposure to family violence during adolescence (i.e., recent abuse) was unrelated to internal states language. Admittedly, exposure during adolescence was less frequent and severe than exposure during childhood, therefore we may have lacked the statistical power to detect recent abuse effects. But the fact that recent abuse did predict memory
functioning in the Johnson et al. (2005) analyses of memory specificity argues against this interpretation. Moreover, recent abuse exposure was unrelated to emotional language event when the analyses were conducted on the entire sample of adolescents for whom we had transcribed AMTs. Another explanation is that it reflects differences in the types of events being remembered (i.e., how easily events can be appraised): the teens were asked to recall memories from childhood, and those with recent abuse did not necessarily have abusive experiences during childhood. Therefore, if reduced emotional language reflects difficulty appraising experiences related to abuse, effects of recent abuse might be more likely to be observed in recent memories. An additional possibility is that the effects of abuse on autobiographical memory may vary with age, and one limitation of our study is that autobiographical memory was assessed only at the follow-up interviews. Further research on the developmental sequence of abuse-related memory problems would shed new light on these issues.

To summarize, the Johnson et al. (2005) and Greenhoot et al. (2005) findings, and those of others, suggest that many adolescents and adults with abuse histories exhibit memory disturbances. These disturbances appear to be specific to autobiographical memory and to be linked to patterns of emotional processing. Nevertheless, it remains to be seen whether these memory problems are actually part of a broader emotion regulation system in the individual. There is evidence that memory specificity is negatively related to measures of thought suppression and repressive coping style among non-traumatized individuals (Hermans et al., 2005; Raes et al., 2006), but researchers have yet to demonstrate that emotion management strategies account for the poor specificity observed in people with abuse histories.

Another limitation of the existing literature is that it has focused primarily on the cognitive mechanisms that underlie abuse-related memory patterns, and far less is known about
the developmental processes that give rise to these patterns. For example, people whose lives are replete with bad memories may learn to avoid or “suppress” them, but how might such strategies be learned in the first place? Research on autobiographical memory and emotion regulation suggests that more adaptive responses to stress involve cognitively reframing and attempting to find meaning in memories of negative experiences (e.g., Compas & Boyer, 2001; John & Gross, 2004; Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003; Sales, Fivush, & Peterson, 2003). Therefore, we need to explain why individuals with abuse histories respond to negative past experiences with reduced memory specificity rather than attempts at meaning making. Some insights into this issue are offered by the developmental literatures on memory and emotion regulation, which suggest the way children remember and cope with negative experiences is influenced by socialization experiences with their parents and other adults (Fivush, Berlin et al., 2003; Kliewer, Fearnow, & Miller, 1996; Sales et al., 2003). One implication is that atypical socialization experiences in abusive families may contribute to the patterns of autobiographical memory often observed in abuse-victims. In the section that follows, we present the results of some recent exploratory analyses of the longitudinal sample that address this possibility.

**Emotion Management, Socialization, and Abuse-Related Memory Patterns**

In these analyses we sought to identify additional variables that may help explain abuse-related differences in autobiographical memory functioning and individual differences within traumatized groups. One aim was to explore the role of socialization processes in abuse-related memory patterns. These analyses were informed by overlapping literatures on autobiographical memory development and emotional development, which suggest that children’s relationships, particularly with their parents, are a powerful source of information about how to process and remember emotional experiences. For example, the structure and content of parent-child
conversations about past events influence children’s general autobiographical memory and narrative skills, as well as their understanding and memories of specific past experiences (Fivush, Berlin et al., 2003; Fivush, Haden, & Reese, 1996; McCabe & Peterson, 1991). Similarly, parent-guided conversations that focus on emotions are thought to promote the development of children’s skills in understanding and regulating emotion (e.g., Dunn, Brown, & Beardsall, 1991; Denham, Zoller, & Couchaud, 1994; Kliewer et al., 1996). Moreover, much of this emotion socialization is thought to occur in the context of conversations about past experiences (Fivush & Nelson, 2006). There is also evidence that autobiographical memory and emotion socialization experiences vary according to the quality of parent-child relationships. For example, securely attached parent-child dyads have more elaborative and emotional conversations about past events than insecurely attached dyads (Fivush & Vasudeva, 2002; Laible & Thompson, 2000; Reese & Farrant, 2003).

Taken together, these findings suggest that abuse-related patterns of memory specificity and emotional content could be partly attributable to atypical socialization experiences in abusive families. For instance, differences in emotional language associated with abuse exposure could be related to the way that parents talk about emotional events, either as they are happening or after they have occurred. Children may be especially reliant on adults to help them interpret negative events like family conflict, but adults in abusive families may be unlikely to discuss these events with their children, or may even socialize their children not to discuss their feelings about these experiences. Similarly, poor memory specificity could be related to a parental style of talking about past events that “teaches” children to avoid specific episodic details, or to the socialization of more general avoidance strategies for coping with stressful events. To explore these possibilities in this investigation, we looked at whether measures of mother-child
relationship quality and conversation could explain abuse-related autobiographical memory patterns. The relationship quality indices included child report of maternal warmth and rejection at both assessments (Parent Perception Inventory; Hazzard, Christensen, & Margolin, 1983) and mother perception of mother-child closeness at the adolescent assessment (Parent-Adolescent Child Relationship Scale; Stuewig & McCloskey, 2005). Conversation measures included child/adolescent report of problem-focused conversations with the mother (i.e., “How often do you talk with your mother about things that bother you?”) at both assessments, as well as child report (at the initial assessment) of having discussed family conflict with the mother.

The second aim of these analyses was to determine whether abuse-related memory patterns are related to individuals’ broader abilities to understand and manage emotion. We addressed this goal by examining the degree to which measures of adolescent emotional awareness and emotion management skills accounted for abuse-related memory patterns. Lane’s Emotional Awareness Scale (Lane, Quinlan, Schwartz, Walker & Zeitlin, 1990) was used to measure adolescent emotion understanding and the Adult Attachment Scale (Brennan, Clark & Shaver, 1998) served as an indicator of how the teens managed their emotions in their romantic relationships. We were particularly interested in the avoidance subscale, which asks individuals about their comfort with intimacy and emotional openness in relationships (e.g., “I prefer not to show my boyfriend/girlfriend how I feel deep down.”).

Preliminary analyses indicated that three of these measures were related to adolescent autobiographical memory patterns: child reports of mother-child discussion of family conflict collected during the childhood assessment, teens’ scores on the Avoidance subscale of the romantic attachment measure, and adolescent report of maternal warmth. Further analyses focused on whether these three emotion management and relationship variables mediated or
moderated the effects of abuse exposure on autobiographical memory patterns. In other words, we were interested in whether these variables accounted for differences between groups of teens with and without abuse exposure, and whether they accounted for individual differences within these groups.

The analyses revealed that the emotion-management and/or relationship variables helped to explain variation in both the number of overgeneral memories and the frequency of emotion terms. As in the Johnson et al. (2005) analyses, older age, more interviewer prompts and recent family violence exposure (i.e., reported at the adolescent interview) were associated with more overgeneral childhood memories. But the effect of recent abuse was qualified by an interaction with teen attachment avoidance; the effect of recent violence on overgeneral memory depended on avoidance tendencies (regardless of cue type). We illustrate this interaction in Figure 2, which presents estimated regression lines, representing avoidance regressed on overgeneral memories, for teens with and without recent abuse exposure. As shown in Figure 2, recent abuse was associated with more overgeneral memories only among teens who also displayed high avoidance in their romantic relationships. At high levels of avoidance (i.e., at 1 standard deviation above the mean), recent abuse exposure was associated with significantly more overgeneral memories, whereas at low levels of avoidance (i.e., at 1 standard deviation below the mean), there was no effect of recent abuse exposure.

These results demonstrate that the adolescents’ autobiographical memory specificity is related to the way they manage intimacy and emotion in their relationships. Teens who avoided getting close and revealing their feelings to romantic partners produced more generic memories on the AMT than teens who were less avoidant in their relationships, but only if they had been exposed to child abuse or mother-directed violence in the recent past. One interpretation is that
avoidance in relationships has a direct effect on the strength and retrievability of personal memories. Individuals with avoidant attachments are probably less likely to share personal memories with others, thereby reducing opportunities for the rehearsal and reinstatement of episodic details. But this argument cannot easily explain the fact that avoidance was unrelated to memory specificity among individuals without recent abuse exposure. It seems more likely that the increased overgeneral memories associated with avoidant attachment reflect avoidant strategies for regulating the negative affect associated with abuse exposure: teens with avoidant tendencies respond to stressors by avoiding potentially aversive episodic memory details. Our findings provide an important extension to previous work on abuse and memory specificity by showing that it was the combination of broader avoidant tendencies and abuse exposure, rather than abuse alone, that led to overgeneral memories.

The analyses of emotional language indicated that there were interactions between childhood abuse and mother-child discussion of family conflict for positive and negative cues, but not for neutral cues. As illustrated in Figure 3, mother-child discussion of family conflict during the childhood interview was associated with greater emotional language in response to positive and negative memory cues, but only for teens without childhood abuse histories. Furthermore, the differences in emotional language related to childhood abuse status depended on mother-child discussion; teens without childhood abuse histories who did not discuss family conflict with their mothers had levels of emotional language comparable to those of teens with childhood abuse histories. The control group produced more emotional language than the abused group only when the children and their mothers had reported discussion of family conflict during the childhood interview. Therefore, the differences between teens with and without childhood abuse exposure were attributable to the differential effects of mother-child discussion for each
Further analyses indicated that these patterns were limited to negative, as opposed to positive, emotion terms.

One explanation for these patterns is that for children in non-abusive homes, mother-child discussion of family conflict may be associated with more open and affect-laden discussion of emotional events in the family. More open and emotional discussion of events, in turn, may increase children’s tendencies to emotionally evaluate their experiences, increase the salience of affective information, and socialize emotional disclosure in recollections. Indeed, there is considerable evidence that parents who use more emotions when conversing with their children about past events have children who use more emotions as well (Adams, Kuebli, Boyle, & Fivush, 1995; Fivush, et al., 2003a; Sales, Fivush, & Peterson, 2003). The finding that mother-child discussion did not have the same effect on emotional language in children from abusive homes suggests that the content or style of their conversations about conflict and other emotional events differed from those in non-abusive homes. Unfortunately, we have no direct measures of the content or quality of mother-child discussions in this study, but our findings do suggest that an analysis of parent-child conversation about emotional events in abusive families could be one key to understanding the origins of abuse-related memory disturbances.

One unexpected finding was that teen report of maternal warmth (at the adolescent assessment) was negatively related to emotional language in their memories, for all cues, and regardless of violence history. This pattern, moreover, was consistent regardless of the valence or experiencer of the emotion. This finding is quite surprising because both maternal warmth and emotional disclosure are generally viewed as positive qualities, and warm sensitive parenting is thought to promote mother-child closeness and emotional disclosure. These results are clearly in need of replication and there are several potential explanations, but one possibility is that “more
is not always better” with regard to emotional expression, particularly for children and adolescents. In fact, some recent work has suggested that in some contexts, children who express more emotions or other internal states may actually display higher levels of psychological symptoms than children who express fewer internal states (Legerski, Vernberg, & Greenhoot, 2007; Sales & Fivush, 2005). Thus, it is possible that warm, sensitive parents promote moderate levels of emotional content by helping their children modulate their emotions during, or shortly after, emotional events, and/or by discouraging “venting” or inappropriately high levels of emotion expression. These patterns may also be related to typical patterns of adolescent development and autonomy-seeking. Further investigation of the relation between emotional expression and parent-child relationships across development may help clarify these findings.

Conclusions

Our data add to the mounting evidence of autobiographical memory dysfunctions in individuals exposed to abuse. Collectively, these analyses suggest that models of the effect of stress on memory need to account for not only the stress associated with the to-be-remembered event, but each individual’s history of exposure to traumatic stress as well. Our results extend previous work on trauma-related memory problems by illustrating that these deficits appear by at least adolescence and that abuse affects the affective qualities of memories in addition to their specificity and accessibility. Furthermore, our prospective documentation of abuse exposure has enabled us to disentangle the effects of childhood abuse from current frame of mind and recent stressors, revealing that both early and recent experiences with abuse are associated with atypical autobiographical memory function. One of the most important findings of our research program is that atypical memory patterns are not explained by abuse alone, but are also products of the teens’ broader emotion management tendencies and socialization histories.
Some of our findings suggest that abuse-related patterns of memory specificity and emotional language may reflect different underlying processes. The memory patterns associated with recent abuse in our first study (Johnson et al., 2005)—shorter, more overgeneral, and fewer negative memories—are highly consistent with the widely-cited affect regulation hypothesis. This explanation is bolstered by the results of our exploratory analyses, which revealed that recent abuse led to overgeneral memories only among teens who exhibited avoidant tendencies in their relationships. These findings suggest that poor specificity could be only one of many avoidant behaviors in these individuals, with these responses making up a broader emotion management system. When teens with avoidant tendencies are exposed to negative experiences like abuse, they may respond with reduced memory specificity, as opposed to more adaptive responses like cognitive reframing and meaning making. We were not able to determine the origins of avoidant tendencies in our sample, but attachment research and theory suggests that adult attachment is built on early attachment relationships to parents as well as more recent relationships with peers and significant others (e.g., Simpson, Collins, Tran, & Haydon, 2007). Thus, examination of early relationship patterns and socialization history may further explain autobiographical memory patterns in individuals with abuse histories.

The fact that recent abuse was a consistent predictor of specificity problems in childhood memories suggests that these abnormalities are probably best characterized as comprising a flexible response to recent or current stressors as opposed to an enduring style that stems from early adverse experiences. In other words, although some individuals may be more likely to use functional avoidance than others, its application varies with current conditions. Additional support for this hypothesis comes from our own and others’ findings that memory specificity fluctuates according to retrieval conditions such as the type of memory cue (Johnson et al., 2005).
or the presence of intrusive thoughts (e.g., Wessel et al., 2002). These patterns also permit some speculation as to the temporal locus of abuse-related memory problems. Specifically, they suggest that poor memory specificity reflects atypical processes that occur during recollection, rather than during encoding or consolidation, although it is not clear whether they reflect retrieval problems or unwillingness to disclose.

In contrast, the Greenhoot et al. (2005) findings, combined with the results of our exploratory analyses, suggest that abuse-related patterns of emotional language may have to do with the way emotional events were processed during childhood, rather than screening processes that take place at the time of retrieval. Some support for this argument comes the fact that conditions reported at the childhood assessment (i.e., abuse exposure and mother-child discussion of family conflict), rather than the adolescent assessment, predicted patterns of emotional language six years later. The finding that abuse-related differences in emotional language were mediated by mother-child discussion suggests that abuse-related emotional language patterns may reflect differences in the way emotional events are discussed and evaluated in abusive and non-abusive families. In other words, abuse-related emotional language patterns may reflect atypical emotion socialization processes that took place during childhood, possibly preventing affective content from being integrated into the children’s memories in the first place. A logical next step would be to directly examine mother-child discussion of emotional events in dyads with and without exposure to family violence and abuse. The counterintuitive findings related to maternal warmth also highlight the need to look more directly at mother-child interactions during adolescence and how they relate to memory.

Although our findings provide some insight into the developmental processes that may contribute to abuse-related memory problems, it is still unclear how early in development these
problems might emerge. Few studies in this literature have examined memory functioning during childhood, and in our longitudinal study autobiographical memory was not assessed until the adolescent interview. Further investigation to track the developmental sequence of abuse-related memory problems may strengthen the arguments that can be made about the underlying processes. The developmental course of trauma-related specificity problems that reflect strategic avoidance of negative memory content may depend on age-related change in emotion regulation strategies (e.g., Brenner & Salovey, 1997) as well as cognitive resources and executive control. Thus, it is possible that functional avoidance and poor memory specificity appear later in childhood or adolescence, in response to negative thoughts about past experiences. On the other hand, if abuse-related variations in emotional language are attributable to early socialization of emotion regulation and autobiographical memory processes, these patterns may appear in early childhood.

Our research program suggests that abuse exposure is associated with a broader range of autobiographical memory abnormalities than previously known, but more research is needed to examine the scope of these patterns. Although our work suggested that the autobiographical memory abilities of individuals with trauma histories were unrelated to measures of non-autobiographical episodic memory (e.g., paired associates memory or story recall), only a handful of studies have examined broader declarative memory abilities in individuals with abuse histories (de Decker et al., 2003; Wessel et al., 2002). Thus more thorough evaluation of the contribution of general memory impairments to trauma-related autobiographical memory patterns seems warranted. Another limitation of the existing literature is the almost exclusive reliance on the AMT to measure autobiographical memory functioning. On the one hand, reliance on a common assessment facilitates cross-study comparison, but it also limits the
generalizability of the findings. In other words, it is not clear whether abuse-related patterns are specific to a timed cue-word task or would also be evident under conditions that more closely resemble everyday recollection and allow for greater elaboration and reflection. Additional research using a broader range of autobiographical memory assessments will be critical to understanding how these abuse-related memory deficits relate to recollective processes outside of the laboratory.

An additional issue that we are investigating in ongoing work in our laboratory is whether any of these memory problems are related to an involuntary, automatic form of avoidance or disengagement from stress-related information. Indeed, the dual process model of responses to stress developed by Compas and his colleagues (see Compas, this volume) suggests that disengagement from stress-related stimuli may occur at either a strategic, voluntary level or an automatic, involuntary level. Compas’s research program (e.g., Compas & Boyer, 2001) indicates that these two response levels are dissociated and are differentially related to well-being. Although abuse-related avoidance has been assumed to be strategic (e.g., Williams et al., 2007), it seems possible that abuse could affect engagement/disengagement patterns at the automatic level, and these might have implications for memory.

In conclusion, exposure to traumatic events like abuse may alter the course of autobiographical memory development or memory functioning, but the full significance of trauma-related memory patterns for everyday human functioning has yet to be determined. Williams and others (e.g., Williams, 2007) have argued that the memory specificity problems observed in abuse victims may reduce distress in the short term, but can increase vulnerability to depression in the long term because it impairs problem solving abilities. Consistent with this claim, autobiographical memory problems have been linked to deficits in interpersonal problem-
solving and poorer outcomes for individuals in therapy (Brittlebank, Scott, Williams, & Ferrier, 1993; Evans, Williams, O'Loughlin, & Howells, 1992; Pollock & Williams, 2001; Sidley, Whitaker, Calam, & Wells, 1997). Similarly, a considerable amount of research and theory on emotion expression suggests that low levels of emotional expression are maladaptive, and emotional disclosure reflects coping and leads to improved well-being (e.g., Fivush, Berlin et al., 2003; Larson & Chastain, 1990; Pennebaker et al., 1997; Smyth, 1998). Nevertheless, most of this work has focused on adult populations, and it is possible that highly specific or emotional memories are not always adaptive for children or adolescents. We observed in the longitudinal sample that poor memory specificity was associated with higher concurrent rates of depression, but the causal direction of this association is unclear. Reduced emotional language on the AMT was unrelated to measures of depression or other psychopathology, but other studies (e.g., Legerski et al., 2007; Sales & Fivush, 2005) have shown that increased emotional language in children’s memories of specific events is associated with more symptoms of psychopathology. Thus future research should evaluate the consequences of abuse-related autobiographical memory patterns for well-being, and the degree to which these consequences vary across development.
References


Table 1

*Number of Participants who Reported Different Forms of Abuse, and Average Reported Frequency of Each, at Childhood and Adolescent Assessments*

<table>
<thead>
<tr>
<th>Group</th>
<th># of Reports</th>
<th>Mean Frequency in Previous Year</th>
<th>Range of Frequency Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Childhood Interview (N = 363)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother-Directed Aggression</td>
<td>194</td>
<td>18.6</td>
<td>0 - 150</td>
</tr>
<tr>
<td>Child-Directed Aggression</td>
<td>228</td>
<td>9.1</td>
<td>0 - 79</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>46</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Adolescent Interview (N = 299)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother-Directed Aggression</td>
<td>100</td>
<td>1.1</td>
<td>0 - 17</td>
</tr>
<tr>
<td>Child-Directed Aggression</td>
<td>91</td>
<td>4.9</td>
<td>0 - 505</td>
</tr>
<tr>
<td>Sexual Abuse*</td>
<td>21</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* The three abuse categories were not mutually exclusive because participants could report more than one type of aggression or abuse during any given year.

*a In the Adolescent Interview, only girls were interviewed in depth about sexual abuse experiences.*
Table 2

*Standardized Regression Coefficients from General Linear Models Predicting Measures of Adolescent Memory Performance on AMT*

<table>
<thead>
<tr>
<th>Variable</th>
<th># Prompts</th>
<th>Memory Length</th>
<th># Overgeneral Memories</th>
<th>% Negative Memories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexa</td>
<td>-.224*</td>
<td>.078</td>
<td>.094</td>
<td>-.014</td>
</tr>
<tr>
<td>Age</td>
<td>.062</td>
<td>.039</td>
<td>---</td>
<td>.165</td>
</tr>
<tr>
<td>Positive Cues</td>
<td>---</td>
<td>---</td>
<td>.021</td>
<td>---</td>
</tr>
<tr>
<td>Negative Cues</td>
<td>---</td>
<td>---</td>
<td>.180*</td>
<td>---</td>
</tr>
<tr>
<td>Neutral Cues</td>
<td>---</td>
<td>---</td>
<td>.300***</td>
<td>---</td>
</tr>
<tr>
<td>Childhood Family Violence</td>
<td>.253**</td>
<td>.096</td>
<td>-.158</td>
<td>-.037</td>
</tr>
<tr>
<td>Adolescent Family Violence</td>
<td>-.052</td>
<td>-.195*</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Positive Cues</td>
<td>---</td>
<td>---</td>
<td>-.126</td>
<td>.086</td>
</tr>
<tr>
<td>Negative Cues</td>
<td>---</td>
<td>---</td>
<td>.064</td>
<td>.134</td>
</tr>
<tr>
<td>Neutral Cues</td>
<td>---</td>
<td>---</td>
<td>.164†</td>
<td>-.237*</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>-.037</td>
<td>.142</td>
<td>.074</td>
<td>.119</td>
</tr>
<tr>
<td>Depression</td>
<td>-.121</td>
<td>.004</td>
<td>.220*</td>
<td>.119</td>
</tr>
<tr>
<td>Unintelligible Memories</td>
<td>---</td>
<td>-.177†</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Memory Length</td>
<td>---</td>
<td>---</td>
<td>-.111</td>
<td>---</td>
</tr>
<tr>
<td>Prompts</td>
<td>---</td>
<td>---</td>
<td>.328***</td>
<td>---</td>
</tr>
<tr>
<td>Specific Memories</td>
<td>---</td>
<td>---</td>
<td>-.060</td>
<td>---</td>
</tr>
</tbody>
</table>

*Note.* Parameter estimates are presented by cue type only when there was a significant interaction between a predictor and cue type.

*a*Male = 0; female = 1.
\[ \hat{p} < .06 \quad *p < .05 \quad **p < .01 \quad ***p < .001. \]
Figure Caption

*Figure 1.* Mean number of emotion terms produced per memory, as a function of childhood abuse exposure and cue type.

*Figure 2.* Predicted number of overgeneral memories, as a function of recent abuse exposure and attachment avoidance.

*Figure 3.* Mean number of emotion terms produced per memory, as a function of cue type, childhood abuse exposure, and mother-child discussion of family conflict.
The bar chart shows the comparison between individuals with and without childhood abuse exposure in terms of the number of emotion terms per cue. The categories are Positive Cues, Negative Cues, and Neutral Cues. The chart indicates a higher number of emotion terms for Negative Cues in individuals with childhood abuse exposure compared to those without. The figure suggests a potential association between childhood abuse exposure and the emotional response to cues.
No Adolescent Abuse Exposure

Adolescent Abuse Exposure

# Overgeneral Memories/Cue

Attachment Avoidance
Quas Figure 4-3