
CHAPTER 21

Posttraumatic Stress Disorder

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Despite case reports published in the past 25 years describing serious symptomatology in young, traumatized children, only in the past 15 years has posttraumatic stress disorder (PTSD) been studied systematically. In this chapter I begin by reviewing developmental issues relevant for the study of trauma, including the development of memory and the neurobiological substrate of PTSD. Next, I review what is known about the diagnostic validity of PTSD in young children, as well as comorbidity and associated conditions. Then, I consider the relationship context of PTSD in early childhood. Finally, I conclude by reviewing methods of assessment and what is known about the treatment of young children with posttraumatic symptomatology.

DEVELOPMENTAL CONSIDERATIONS

Memory Development

Memory is a critical issue in PTSD. One must have some form of memory of a past event in order to demonstrate key signs of the disorder: distress at reminders of the event, intrusive recollections of the event, avoidance of the event, and/or flashbacks of the event.

Many types of memory have been studied. Here I focus on two major types most useful for our practical and clinical questions: What do infants remember of their past events? How accessible are those memories to evaluators and therapists of young, traumatized children?

The first type of memory, behavioral memory (also called nondeclarative or implicit), is the earliest. It is essentially unconscious to the individual, cannot be verbally recalled, but may be enacted behaviorally. Tests have shown that infants as young as 6 months of age show recall by manipulating toys correctly, which were demonstrated to them 24 hours earlier, and more frequently than toys that were not demonstrated to them (Collie & Hayne, 1999). Nelson (1995) has hypothesized that the brain structures responsible for long-term memory are in place and functional by at least 8 or 9 months (Nelson, 1995). These types of memories may be what are observed when preverbal children repetitively reenact traumatic experiences (Terr, 1981). That is, one can have behavioral memories such as automatic distress reactions to situations that resemble their past events.

The second type of memory, autobiographical memory (also called declarative or

explicit), is verbal recall of discrete personally experienced events. This type of memory appears with the emergence of language around 18 months, increases between 18 to 36 months, and manifests in a coherent narrative form after 36 months. This timeline shows convergence from both normal developmental studies (Fivush, 1999) and from clinical settings (Terr, 1988).

Overall, memory research suggests that children who are traumatized prior to 6 months of age, and perhaps even prior to 18 months of age, will not have retrievable autobiographical narratives of those events. If children describe memories of events before these ages, the odds are that they overheard discussions of the events from adults and have come to believe that these were, in fact, their own memories. For example, Terr reported a striking case of a girl who was 2 years, 1 month old when her 5-year-old sister was seriously injured when eviscerated by the suction of a swimming pool drain (Terr, 1990). The younger sister was at the pool but never saw her sister in any state of injury. Several years later, after the older sister unexpectedly died, the girl insisted for the first time that she had seen the accident happen originally, and gave several detailed descriptions of the traumatic scene. It was concluded that these were the exact family tales she had heard at home.

Memory for Stressful Events

Memory for autobiographical events is an extremely important factor, if not the rate-limiting factor, for determining whether or not children develop PTSD. There is an informative body of literature on children's memory about how much we can expect young children to remember of their personal stressful experiences, which may or may not be different from how much they remember of everyday events. Merritt et al. systematically asked 24 3- to 7-year-old children about 21 component parts of a voiding cystourethrogram procedure (a catheter is inserted in the urethra, the bladder is filled with contrast fluid, and then the child urinates while being X-rayed) (Merritt, Ornstein, & Spicker, 1994). Six weeks later, children remembered, on average, 83% of the components. Videotaped observational ratings of the degree of children's distress

during the procedures negatively correlated with the amount of recall. They concluded that young children remember quite accurately, but children for whom the procedure was more distressing actually seemed to remember significantly less.

Other studies have parsed out the age effects more systematically. Researchers asked 140 3- to 7-year-old children to remember, on average 18.6, components of a well-child visit to a pediatrician (Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993). There was a predictable gradient of memory accuracy increasing with age: the 3-year-olds remembered 75% immediately after the event, the 5-year-olds remembered 82%, and the 7-year-olds remembered 92%. Furthermore, the 7-year-olds showed essentially no forgetting weeks later, but the 3-year-olds' accuracy had dipped significantly to 70%.

A study by Chen et al. of 3- to 18-year-old children also empirically quantified the age gradient for the amount of accurate recall. These children were interviewed for their recall of a lumbar puncture procedure (spinal tap) as part of their cancer treatment protocols (Chen, Zeltzer, Craske, & Katz, 2000). Based on systematic interviews for 20 component parts of the procedure, the 3- to 4-year-olds remembered significantly less (42%) compared to the older age groups; 5- to 7-year-olds, 69%; 8- to 10-year-olds, 78%; and 11- to 18-year-olds, 87%. The 3- to 4-year-olds also endorsed purposefully misleading questions significantly more often (61%) compared to the older age groups (18%, 16%, and 0%, respectively). Children's self-report of more anxiety during the procedure was associated with poorer recall, replicating the relationship between distress and recall shown by Merritt et al. (1994).

Terr's pioneering qualitative studies of traumatized clinically referred children concluded that generally only those children who were 3 years of age or older at the time of the experiences were capable of producing coherent autobiographical narrative recall of the events years later (Terr, 1988). This timeline concurs generally with nonclinical research conducted by Peterson and colleagues on children who received emergency room treatments. In one study the researchers interviewed 25 children who ranged from 17 to 66 months of age (Howe, Courage, & Peterson, 1994). They concluded that

children under 24 months of age, in general, failed to provide a coherent narrative of the traumatic event. In another emergency room study, children who were 1 and 2 years old at the time of emergency room treatment did not produce accurate recall later, but children who were 2.5 years or older at the time produced accurate recall, with little forgetting, even 5 years later (Peterson & Whalen, 2001).

Lastly, Fivush et al. reinterviewed 42 9- to 10-year-old children who had been 3- to 4-years old at the time that they experienced Hurricane Andrew (Fivush, McDermott-Sales, Goldberg, Bahrick, & Parker, 2004). Their first aim was to determine how much children could recall of a life-threatening experience 6 years later? Using the same interview techniques at both time points, they found that children recalled almost twice as much detail 6 years later as they did 2–6 months after the hurricane. There was no effect of high or low stress on recall, in contrast to Merritt's and Chen's work.

Overall, these data suggest that children as young as 2.5–3 years of age clearly recall stressful experiences years later, and these recollections are at least as detailed as normative experiences (Fivush, 1999). There is some evidence that those who experienced more stress at the time of the events recalled less, but this finding is less clear. The implications for infancy (i.e., 12 months and younger) are that children may show behavioral evidence of recalling previously learned experiences but generally are not able to express memories of these events in verbal narrative form even when older (Fivush, 1999).

The Salience of Memory for Psychopathology

Despite the obvious importance of memory for the development of PTSD, only a few attempts have been made to explore how assessments of memory correlate with actual psychological outcome. The only known prospective study with children was a 6-year follow-up of 35 children who were 3–4 years old at the time of experiencing Hurricane Andrew at the first assessment (McDermott-Sales, Fivush, Parker, & Bahrick, 2005). At Time 1, children who recalled more information about the hurricane events showed less severe PTSD symptomatology. In contrast, amount of recall was not correlated

to severity of PTSD at Time 2, consistent with an adult study (Kangas, Henry, & Bryant, 2005). However, children who simply talked more (but not recalled more amounts of different content) and used more positive emotion words at Time 1 showed less severe PTSD scores at Time 2, with post hoc evidence suggesting that it was primarily the positive emotion words rather than total amount of talking that was associated with better Time 2 PTSD outcome. This finding suggests that the valence of memories, as opposed to the number of memories, may be related to the development of PTSD. One limitation shared with the Kangas et al. (2005) study is that this study did not assess the accuracy of the children's memories.

These findings are important because of the commonly encountered clinical scenario in which caregivers do not want to discuss traumatic events with children because they want children to forget. First, once an event is remembered (after approximately 2.5 years of age), children do not forget it. As time passes beyond the events, children may forget details, and younger children forget more details, but they do not forget generally what happened. Second, although remembering more details does not appear to protect the child from developing PTSD, neither does remembering less. Thus, the advice for caregivers of children 2.5 years old and older would be to encourage conversation about past traumatic events.

However, for children younger than 2.5 years, the advice for caregivers may be not to talk about the events. Discussions may create memories in children who lack memories of their own. But if children ask about the past events and seem to recall them, then the advice for older children would apply.

The Moment of Panic

PTSD is defined as beginning with an initial moment of panic or sense of being suddenly overwhelmed by a temporarily uncontrollable sense of desperation. Consistent with this definition, epidemiological research on risk factors for PTSD has shown that perceived threat to life and fear at the time of the traumatic events are two of the most consistent predictors of PTSD (Ehlers, Mayou, & Bryant, 1998). The capacity to show fear emerges around 9 months of age

(Lewis, 2000) but may be present earlier in precocious individuals.

The challenge is to ascertain what is and is not frightening for infants and young children. The clearer our understanding of this area, the more effective will be our efforts to help adult caregivers understand how symptoms start and how best to soothe traumatized young children. For physical abuse, sexual abuse, auto accidents, accidental injuries, and animal bites, it is usually straightforward to precisely identify the past events that caused the present triggered fear responses. However, in cases involving the witnessing of domestic violence, determining cause-and-effect links can be more confusing. For example, children may be more frightened when the mother fights back or when they flee the house, or, if they are in the next room, when they hear yelling without being able to see what's going on. For invasive medical procedures, oxygen masks or being left alone on a gurney in a hallway may be more frightening than any actual procedure.

For more complicated types of events, such as natural or human-made disasters, there are often secondary events connected that may have been equally or more frightening, and it's not obvious which events were the scariest to children. In a study of 70 young children victimized by Hurricane Katrina, the prevalence of PTSD was 50%. Twenty-four of these children stayed in the city through the storm and the subsequent flood, and their rate of PTSD was 62.5%. The remaining 46 children were evacuated prior to the storm and therefore were never clearly in harm's way, yet their rate of PTSD was unexpectedly high at 43.5% (Scheeringa & Zeanah, 2008). For most evacuated children, the moment of panic occurred when they returned for the first time to see their flooded homes; this experience was repeatedly and clearly described to us in standardized interviews. All of their toys and clothes were ruined, and all the houses around them had suffered the same fates. It's likely that children realized at this moment that they had nearly been in harm's way, more than they had ever imagined, or perhaps they believed that *now* they were in harm's way. Most parents of evacuated children that we interviewed were able to clearly pinpoint the onset of their children's symptoms to the day they returned to see their damaged homes.

The moment of panic for one of these evacuated children was when she and her mother evacuated late at night when it was dark, they were tired, and traffic was heavy. The father was out of the country on business, and the child feared the father wouldn't be able to find them. A moment of panic for another evacuated child occurred when the mother was pulling out of their driveway and the father refused to go with them. The father finally relented and got in the car, but not until after a standoff that was frightening for the child.

All of these examples took place with preschool children rather than infants, but the main point is that a careful history must be taken to track when events in the present trigger distress and then thoughtfully connect back to past events to empirically derive what caused the fear, rather than rely solely on caregiver intuition.

Neurobiology

Research with adults has converged to show a number of neurobiological differences associated with PTSD (Kaufman & Charney, 2001; Vermetten & Bremner, 2002); however, few studies have been conducted with young children to confirm whether findings from adults apply to children. For example, morphometric brain imaging of adults has shown consistently a reduced size of the hippocampal structures in subjects with PTSD, but studies with school-age children have failed to replicate this finding, instead suggesting that global brain volume may be reduced (DeBellis et al., 2002).

The first year of life is a very active time of emergence and consolidation of capacities. In addition to the more well-known developments in visual acuity, increasing ability to discriminate facial expressions in others, crawling and walking, babbling, and the emergence of discrete emotions, two major advances in socioemotional capacities occur over the 2- to 9-month span (Zeanah, Stafford, Boris, & Scheeringa, 2003). Neurobiological studies in infancy are beginning to map the underlying neural mechanisms of these emerging developmental capacities (Bell & Fox, 1992; Marshall, Bar-Haim, & Fox, 2002). Clearly, the cognitive capacities and the underlying neural networks that are needed for the appreciation of external events are evolving relatively rapidly in

infancy, making extrapolation from adult studies risky.

Nevertheless, to summarize and simplify research on traumatized adults, mapping of the main neural network has shown increased activity of the amygdala and diminished activity of the prefrontal cortex (Shin et al., 2004). Trauma-related stimuli are associated with increased heart rate and decreased autonomic flexibility of heart rate control (diminished heart rate variability) (Cohen et al., 2000). Findings on baseline levels and reactivity of cortisol regulation have been conflicting (Kaufman & Charney, 2001).

The few studies in young children have included a demonstration that autonomic control of heart rate reactivity is diminished in association with PTSD in preschool children only in an interaction with rearing quality that involves harsher and less responsive discipline (Scheeringa, Zeanah, Myers, & Putnam, 2004). There have been substantial studies on cortisol in stressed and maltreated children, but the absence of concurrent measures of PTSD has limited the ability to generalize that research to clinical-level disturbed children (Cicchetti & Rogosch, 2006; Gunnar & Vazquez, 2001).

Despite the paucity of data for young children, the potential implications of trauma-induced neurobiological disruptions are ominous. Perry invoked the concept of use-dependent consolidation of neural networks to suggest that the repetitive triggering of fear networks in the context of PTSD will selectively retain maladaptive neural circuits at the expense of more adaptive circuits during the normal course of pruning synapses and networks in the early years of life (Perry, Pollard, Blakley, Baker, & Vigilante, 1995). This retention of maladaptive circuits would theoretically lead to more permanent alterations in the developing brain structure and perhaps maladaptive personality traits and greater chronicity of symptomatology. The only prospective longitudinal study of PTSD in preschool children, to date, does suggest a more chronic course of PTSD compared to the course reported in typical adult studies (Scheeringa et al., 2005).

In addition, Schore (2002) has speculated at length that abuse or neglect in infancy (between an infant and caregiver) causes damage to the developing orbitofrontal cortex and is implicated in the development of

PTSD. However, none of the extensive research cited has been conducted with children with PTSD, and the theory remains speculative.

DIAGNOSTIC VALIDITY OF PTSD

Nine studies have systematically examined the diagnostic criteria for PTSD in preschool children (Bogat, DeJonghe, Levendosky, Davidson, & von Eye, 2006; Ghosh Ippen, Briscoe-Smith, & Lieberman, 2004; Levendosky, Huth-Bocks, Semel, & Shapiro, 2002; Ohmi et al., 2002; Scheeringa, Peebles, Cook, & Zeanah, 2001; Scheeringa & Zeanah, 2008; Scheeringa, Zeanah, Drell, & Larrieu, 1995; Scheeringa, Zeanah, Myers, & Putnam, 2003; Stoddard et al., 2006). The consistent findings are that (1) PTSD can be reliably detected in young children; (2) they manifest most (but not all) of the items; and (3) most importantly, an alternative criteria algorithm appears more developmentally sensitive and valid than the DSM-IV algorithm. However, none of these studies analyzed children less than 12 months of age separately from older children.

The alternative algorithm for PTSD in young children (Scheeringa et al., 2003) includes modifications in wording for several items to make them more developmentally sensitive to this population. For example, the DSM-IV item for irritability and outbursts of anger was modified to include extreme temper tantrums. The major change, though, is a modification to lower the requirement for the C criterion (numbing and avoidance items) from three out of seven items to just one out of seven items. While this modification was empirically driven, replicated in multiple studies, the rationale behind it was that many of the C-criterion items reflect highly internalized phenomena that appear to be either developmentally impossible in young children (e.g., sense of a foreshortened future) or extremely difficult to detect even when present (e.g., avoidance of thoughts or feelings related to the traumatic event, and inability to recall an important aspect of the event).

When this alternative algorithm was applied to samples and compared head-to-head to the DSM-IV algorithm, significantly higher rates of PTSD were consistently found. The rate of PTSD in nonclinical (i.e., non-

help-seeking) samples from a gas explosion in Japan was 25% (Ohmi et al., 2002) and from a variety of traumatic events (mainly auto accidents and witnessing domestic violence) was 26% (Scheeringa et al., 2003), whereas the rates of PTSD using the DSM-IV criteria in both of those studies were 0%. The rate of PTSD in clinic-referred children who witnessed domestic violence was over 40% (Ghosh Ippen et al., 2004) and from a variety of traumas in two small clinic studies was 69% (Scheeringa et al., 1995) and 60% (Scheeringa et al., 2001), but the rates by the DSM-IV criteria were approximately 2%, 13%, and 20%, respectively. Rates of PTSD in young children are consistent with rates found in older populations when developmentally sensitive measures and criteria are used.

What Is the Youngest Age Possible to Develop PTSD?

Gaensbauer (1982) evaluated a 3-month-old girl who had been physically abused; she was treated for a broken arm at 2 weeks of age, a bruise on her back was discovered at a well-baby visit at 7 weeks, and a nondepressed skull fracture and another broken arm were reported at 3 months. Gaensbauer did not put forth a diagnosis, as his purpose was to describe emotion development, but there were enough details to ascertain much of the PTSD symptomatology. Her symptomatology was apparent immediately in the hospital, but whether the enduring symptoms were all due to the traumas or confounded by the new stressors and attachment-related difficulties is difficult to parse apart. Her fear of men and her affect improved naturalistically approximately 2 weeks after the last injury, during which time she had been in a foster home, suggesting that these were not enduring PTSD symptoms. The girl's father was implicated in all of these injuries. She was described as differentially distressed by the approach of men but not women, tried to avoid interactions with men, lost interest in usual activities, had reduced positive affect, and was excessively irritable and hypervigilant. This case was complicated by the pain of her physical injuries, being hospitalized, undergoing medical procedures, and then separation from her parents and placement in a foster home. Therefore, it's not clear that

her symptomatology can rightly be called PTSD symptomatology. It may have been more akin to adjustment disorder problems that existed as long as the noxious events were still ongoing (abuse, pain, procedures, separations), but disappeared soon after the noxious events ceased.

Solter (2007) described a 5-month-old boy who underwent cranial surgery to correct a congenital defect. He showed three PTSD items, including distress at being placed in the supine position (a possible reminder of his surgery and/or hospitalization experience), new night waking, and irritability. He also showed new night terrors, regression in motor skills, and fear of strangers, but these are not used in the PTSD criteria. The presence or absence of the items that constitute the avoidance and numbing criterion of PTSD were not specifically described as either present or absent. This infant also had extreme emotional distress and newly impaired routine functioning (sleep, feeding, and socializing). Treatment was conducted using a flooding technique within the first month, which consisted of placing the infant in the supine position for successively longer periods until the crying and distress abated. It's problematic to conclude that this was a case of PTSD because there were "no remaining symptoms" at the 2-month follow-up. The literature on the course of PTSD has been clear that most, if not all, individuals show some symptomatology consistent with PTSD in the first month following life-threatening events (Davidson, Hughes, Blazer, & George, 1991), but only approximately 30% show symptomatology after the first month and are eligible for the diagnosis for PTSD (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The symptomatology of this infant may have disappeared due to the flooding treatment in the first month, or it may have remitted spontaneously after he adapted to the helmet or the residual irritants (movement restriction, incision pain, and sore throat) were removed.

A more convincing possibility of the youngest child with PTSD is a girl who had been in a terrifying car accident at 9 months of age (Gaensbauer, 1995) and was evaluated at 22 months of age. She showed distinct trauma-related symptomatology, as she was frightened of being in cars in ways that represented both distress at, and avoidance

of, reminders. She also showed new sleep difficulty, irritability, and restricted range of affect. It may not be a coincidence that this earliest known published case of PTSD (diagnosed by the alternative algorithm) is around 9 months of age, which is also the time when behavioral memory capacities are known to emerge (described earlier). In contrast, the youngest known case to qualify for full DSM-IV criteria of PTSD was 34 months old (Gaensbauer, 1997), highlighting the problematic issue of including highly internalized items in a diagnostic nosology for young children.

Other noteworthy published cases include a girl who was sexually abused from 0 to 6 months of age and evaluated at 35 months (Terr, 1988); a boy who was likely sexually and physically abused at 7 months of age and had a dissociative flashback at 7 years of age (Gaensbauer, 1995); a girl who witnessed the violent death of her mother at 12 months of age and was first treated at 4 years of age (Gaensbauer, Chatoor, Drell, Siegel, & Zeanah, 1995); a boy who took an accidental overdose of pills and required hospitalization at 13 months of age and was assessed at 25 months of age (Gaensbauer, 1995); a girl who broke her leg under somewhat mysterious circumstances at 15 months and was treated at 19 months (Gaensbauer, 1995); a child who suffered complications of an intravenous needle insertion in a hospital at 16 months of age (Gaensbauer, 1997); a girl who witnessed domestic violence throughout her first year of life and probable physical abuse at 17 months of age and was evaluated at 18 months of age (Zeanah & Scheeringa, 1997); and a girl who was sexually abused from 15 through 17 months of age and assessed at 5 years of age (Terr, 1988). In addition, Coates and Schechter (2004) published two cases from the World Trade Center disaster: a 3-year-old girl and a 2-year-4-month-old girl. For clinical guidance about individual cases, readers may wish to consult the cases noted above for more detail if they are close in type of trauma and age to the case of interest. Nearly all of these reports are problematic for a lack of comprehensiveness in assessing PTSD symptomatology. It would be helpful for future published case reports to systematically describe the presence and absence of all PTSD items, and to make more comprehensive efforts to try to

establish whether distress and avoidance behaviors are truly trauma specific as opposed to generalized negative reactivity to current pain.

In summary, there have been no cases of infants (under 12 months) published in the literature that clearly meet criteria for PTSD, even by the alternative algorithm. That doesn't mean the diagnosis is impossible. The conservative conclusion at this point is that cases have not been described completely enough with this goal in mind. It still appears plausible that infants (particularly those in the 9- to 12-month range) can develop PTSD, but such a case has yet to be published. The evidence has not been overwhelmingly convincing yet that children under 9 months of age can manifest the critical items of PTSD symptomatology, even if cases were to be assessed and described more systematically. Below 9 months of age children can certainly show distress from painful circumstances, but it's not clear that there are the cognitive meta-associations of connections between various stimuli and threat reminders. Symptoms in this age may be more akin to conditioning, which disappears relatively quickly with the removal of the painful stimulus.

PARENT-CHILD RELATIONAL ISSUES

Over 17 studies are nearly unanimous in showing that children with more severe psychopathology following traumas have parents with more severe psychopathology and/or family problems (reviewed in Scheeringa & Zeanah, 2001). None of these studies involved infants, and only a few involved preschool children, but the implications for the importance of the caregiving context are so relevant that they deserve our attention in this chapter on infancy. There are several plausible explanations for these data that are not mutually exclusive:

1. *Parenting models* explain these data by saying that children have severer reactions because their caregivers are disabled in their rearing skills by their own psychopathology.

2. *Bidirectional models* explain these data by saying that when children are emotionally

disturbed, the (normal?) empathic response of many parents is to also be distressed. The key difference in these models from parenting models is that children are seen as becoming disturbed first, and parenting does not influence their psychopathology.

3. *Shared genetic vulnerability models* contend that parents who are vulnerable to developing emotional disorders pass on those vulnerability genes to their children. These models don't depend on who became disturbed first or on parenting.

In clinical practice it is tempting to rely most heavily on parenting models because we are used to believing in the importance of rearing. Within parenting models, there are additional potential sets of assumptions to consider: (1) Parenting completely causes children's PTSD, and children only get PTSD because their parents aren't doing well (full mediation model); (2) children develop PTSD on their own, but it is intensified by parents' less than optimal functioning (partial mediation or moderation model); and (3) less than optimal parenting doesn't cause PTSD or make it worse, but it can prevent it from getting better when it is an additive burden on the children (partial moderation model). However, the studies that could prove or disprove these models have yet to be conducted. In fact, the early studies described next, which analyze parenting models with cross-sectional data, do not consistently support a parenting model.

A study involving 95 7- to 12-year-old children—the first to use an observational rating of parenting in relation to domestic violence (DV)—showed no simple association between severity of domestic violence and parental warmth. But after statistically “controlling” for observed child behaviors, negative life events, social support, maternal depression, and maternal trauma symptoms, then exposure to DV accounted for 17% of the variance in maternal warmth (Levendosky & Graham-Bermann, 2000). However, severity of DV did not predict observed authority control, as it should have if DV effects operate through parenting. The authors acknowledged that the chicken-or-the-egg question could not be answered by this study design, and it was plausible that children were not reacting to their parents' rearing style, but that the parents' rearing

style was a reaction to their children's symptoms. Furthermore, severity of DV was not directly related to observed child's behavior either prosocial or antisocial, contrary to expectations. This study was limited in that it did not assess children's psychiatric symptomatology as an outcome.

However, children's outcome was assessed in a later study (Levendosky, Huth-Bocks, Shapiro, & Semel, 2003) that tested an ecological model of the parent-child relationship as a mediator. These researchers studied 103 3- to 5-year-old children, 70% of whose mothers reported physically abusive DV during their children's lifetime. PTSD was not measured, but the design and analysis are useful for shedding light on how violence is related to quality of parenting and how that, in turn, may be related to child outcome in more general terms. Severity of DV was associated with self-reported higher parenting effectiveness, contrary to expectations. However, severity of maternal psychological problems appeared to mediate parenting quality; that is, mothers with severer psychological problems had lower self-reported parenting effectiveness, suggesting, somewhat obviously, that mothers with psychological problems, not those who experience DV, per se, exhibit diminished parenting effectiveness. The model suggested that mothers with severe psychological problems and lower parenting effectiveness had children with higher scores of externalizing behavior—but overall this group of children did not show severe externalizing problems: The group mean on the Child Behavior Checklist (CBCL) Externalizing scale was only 55.78, with a standard deviation of 10.74, and the “clinically significant” accepted cutoff is 63.

This group of researchers also used the Working Model of the Child Interview (Zeanah & Benoit, 1995) and found that mothers who experienced DV had more negative representations of their infants and themselves as mothers compared to mothers who had not experienced DV (Huth-Bocks, Levendosky, Theran, & Bogat, 2004). This finding suggests that trauma to a mother impacts the quality of her rearing skills, and by extension, has an impact on her children. However, this study did not measure actual rearing quality or any child outcomes. Furthermore, this study is limited by the fact

that DV does not happen at random in the population, and mothers who suffer violence also may possess different working models prior to their involvement in abusive relationships.

A clue that infants are influenced by violent rearing environments was provided by DeJonghe and colleagues, who studied 30 DV-exposed and 59 non-exposed 12-month-old infants. The exposed group showed more facial distress in response to a staged angry phone call by a female experimenter (DeJonghe, Bogat, Levendosky, von Eye, & Davidson, 2005). Although not surprising that these findings were consistent with research that has shown that infants can be affected by violence at this age, and there was no concurrent measure to indicate if facial distress co-occurred with increased symptomatology or impairment, this study does provide a more standardized and observational laboratory confirmation that 12-month-old infants have the capacities to scan, process, and react to their environments for these types of salient events, and these capacities were generalized because they were shown in the absence of cues from their mothers.

In another study by this group, 48 twelve-month-old infants were assessed for the impact of witnessing DV (Bogat et al., 2006). A strict assessment of PTSD was not conducted, but infants showed a mean of 1.04 posttraumatic symptoms (range 0–7). In addition, the time frame was within 2 weeks of the traumatic events, so it's problematic to consider these true PTSD symptoms, which must be present for a minimum of 1 month. Nevertheless, a moderating relationship was shown for level of maternal posttraumatic distress. That is, those infants who had witnessed relatively more violence showed more trauma symptoms only if their mothers had higher levels of trauma symptoms, and this relationship was not present for those who had witnessed relatively less violence. The author's interpretation was that the severer violence led to severer maternal symptoms which led to changes in parenting, consistent with a relational PTSD model in which maternal symptoms may worsen children's symptoms (Scheeringa & Zeanah, 2001).

Stoddard and colleagues (2006) collected data from 52 children with burns, ages 12–48 months, and their caregivers (Stoddard et al., 2006). They found that 29% met

criteria for PTSD by the alternative criteria (Scheeringa et al., 2003). Parents' symptomatology partially mediated the relationship between children's levels of pain and acute stress symptoms.

ASSESSMENT

Children with PTSD may not appear symptomatic to most observers. This leads to a public health challenge because professionals and caregivers do not recognize PTSD or provide appropriate treatment. For example, the 3-month-old girl described earlier, "was described by observers in the hospital as a 'lovable baby'—happy, cute, and highly sociable"—despite her multiple injuries and list of problems (Gaensbauer, 1982, p. 35). In one study of preschool children, only 12% of their actual PTSD symptomatology was observed and/or elicited by a clinician in the office (Scheeringa et al., 2001). Therefore, the most efficient assessment method is to interview the caregiver. An additional problem, however, is that parents may endorse many items reflecting symptomatology but then reject a referral to treatment because they think their child doesn't need it. Contrast this situation to that involving children with severe externalizing disorders, whose annoying and disruptive behaviors can be spotted across a room, and who, as a group, are disproportionately represented in preschool clinic populations (Peebles, 1997).

Complicating this issue is that PTSD is not in the normal lexicon describing observable phenomenon for most people. We all know what depression and hyperactivity look like. But most people, in their ordinary experiences, do not know what it's like to have overgeneralized fear responses to non-threatening stimuli or a constant state of hyperarousal in the absence of a present stressor. Once a pediatrician asked me how to recognize PTSD in children in the pediatric clinic. Before I could answer, he described an anecdote of a child who had been struck by a car. The child's mother told the pediatrician that the child was now afraid to cross the street with her. The pediatrician had told her that that was normal and to basically ignore it. Unfortunately, PTSD may be missed even by motivated professionals—and this oversight constitutes one source of false

negatives in assessment. Another source of false negatives arises from caregivers who minimize, deny, or are simply unaware of their children's symptoms, perhaps because of their own symptomatology.

False positives, also a challenge, may arise when clinicians equate the young child's experience of a traumatic event or sub-threshold symptomatology with a diagnosis of PTSD. In fact, most traumatized young children do not develop PTSD. In addition, caregivers may overreport signs of PTSD in their children, perhaps projecting their own symptoms onto the children.

Although the accuracy of parental reports of young children's posttraumatic symptoms has not been studied carefully, there are relevant data to consider. Many studies have been conducted with simultaneous assessments of both caregivers and children, and they generally report moderate to strong convergence of symptomatology (Scheeringa & Zeanah, 2001). These data are most compatible with the false-positive problem, though a reasonable rival hypothesis is that parents and young children are both traumatized, and the parent reports are accurate.

Interviewing

To minimize false positives and false negatives and to assess for PTSD in young children, one must conduct a comprehensive, standardized, and rigorous interview of the caregiver. Such an interview involves systematically inquiring about all 17 signs of PTSD, as well as the associated signs in young children. Specifically, one must ask, from a menu of probes, about possible signs and symptoms until the caregiver answers "yes," or the interviewer runs out of probes. Further, in our interviewing technique, before we endorse an item as being present, we typically require an example, a date of onset, duration, and frequency.

For example, for an infant who was physically abused by the father, the initial probe question for the item "psychological distress at reminders to the traumatic experience" would be to ask, "Does your child show distress when exposed to things that could remind him/her about the (traumatic event)?" If the caregiver replies "No," then the interviewer is obligated to ask more specific probes. "What about if something hap-

pens that might be close to what happened, like you tell her to stop doing something?" If the answer is no, continue. "What about if somebody raises their voice and yells at him/her or around him/her?" If the answer is no, continue. "What about being spanked?" If the answer is no, continue. "What about being in certain positions, or being handled roughly?" If the answer is no, continue. "What about being around the man who abused him/her, or being around any man that might remind him/her of that man?" If the answer is no, continue. Continue until the interviewer has exhausted all possible triggers applicable to that particular situation.

Clinicians may have reservations about this technique because they were trained not to "lead the witness." This is not leading the witness, however. Instead, this is being clear about the meaning of probes. Most caregivers have no frame of reference for the internalized and abstract items comprising signs of PTSD, so they need education about how these signs appear in young children. These signs are in contrast to other types of symptomatology, as already noted, such as hyperactivity or depression, which are readily observable and intuitively obvious to most people. If clinicians follow up every endorsement by asking for specific examples, frequency, duration, and onset, there is very little chance that caregivers will overreport symptomatology.

PTSD if the Trauma Is Unknown

If it is suspected that infants or older preverbal children have been traumatized but no adult witness is available who can describe what happened, this presents a challenge to diagnosing PTSD. In one common scenario, it may be known that something happened, but the details are unclear. For example, the caregiver is a grandparent or foster parent who knows that some type of maltreatment is alleged as a reason to remove a child from the parents' care. In another common scenario, it is unknown if a trauma has occurred, but the child's behaviors are abnormal. For example, new onset of sexualized behavior following a visitation with another parent or after a babysitting episode, but no adult has confirmed that anything traumatic happened, and there is no physical evidence.

In both of these cases, it is useful to remember that 5 of the 17 PTSD items represent triggered phenomenon (the other 12 items are more nonspecific). These five items are psychological distress at reminders, physiological distress at reminders, intrusive recollections of the event (or play reenactments), avoidance of external reminders, and avoidance of internal reminders. If the infant or young child has PTSD, the caregiver ought to be able to report that there are certain situations that trigger distress or avoidance in him or her. From our example earlier, if a caregiver notices that a child shows wide-eyed terror and cries when her husband raises his voice, this reaction is not normative childhood behavior and is an indicator that the child is being triggered by a reminder of something similar to past maltreatment. Short of verbal confirmation from an adult who witnessed the child's original trauma, these types of clues are the best for which we can hope. These are reasonably reliable, since they involve both non-normative behavior and triggered fear responses.

Specific Measures

As noted earlier, the only proper assessment of PTSD in young children is to conduct a comprehensive, standardized, and rigorous interview of the caregiver. Two standardized diagnostic interviews are available that have been developmentally adapted for caregivers of young children.

The Posttraumatic Stress Disorder Semi-Structured Interview and Observational Record for Infants and Young Children (PTSD-SSI) has been the most widely used in multiple studies of very young children (Scheeringa et al., 2001; Scheeringa et al., 2003; Stoddard et al., 2006). A traumatic events screen at the beginning includes a menu of 11 different types of traumatic events. The interview inquires about the 17 items of PTSD from the DSM-IV, and alternative developmentally sensitive wordings are provided for 5 of the items. In addition, the interview includes questions about four associated symptoms that are not part of the DSM-IV criteria but empirically have been found to be common in young children. There are five questions at the end to establish whether functional impairment or significant distress is associated with the symptomatology. Interrater

reliability in which a second rater coded the measure from a videotape of an interviewer using this interview for 11 cases from a psychiatric clinic was good (mean Cohen's kappa 0.75 for all 17 items) and was excellent for agreement on the full diagnosis by the alternative algorithm (Cohen's kappa 0.79). This measure has been translated into Dutch, German, Spanish, and Hebrew.

The Preschool Age Psychiatric Assessment (PAPA) is a structured diagnostic interview of 2- to 5-year-old children that includes detailed probes about PTSD symptomatology plus a traumatic events screen for 21 different events and a functional impairment section. The symptomatology section includes 15 of the 17 DSM-IV items; sense of a foreshortened future and loss of interest in usual activities have to be extracted from the depression module. It also includes five associated symptoms that are not part of the DSM-IV criteria but are common in young children. In one study, the 1-week test-retest reliability of a large number of preschool children ($N = 307$) was good to excellent (Egger et al., 2006). Retest agreement was not reported for individual items.

It was noted earlier that a study of observational assessments of infant and preschool children in the office detected only about 12% of their actual PTSD symptomatology (Scheeringa et al., 2001). Since nearly all of this 12% of symptomatology also was reported in caregiver interviews, it is neither time efficient nor useful to try to elicit diagnostic information directly from young children. Clinical interaction and observational assessments may, of course, be valuable for other purposes, but not for making diagnoses of PTSD.

Self-administered checklists (completed by caregivers about their children) for PTSD symptomatology should not be used in routine clinical practice. Because of the issues noted earlier—most persons have no frame of reference for these types of internalized and abstract items—self-administered checklists are almost certain to be less accurate than responses elicited by a well-trained interviewer. This will be true particularly for the critical items regarding triggered events involving reexperiencing and avoidance. Checklists can be useful for screening large numbers of children in schools or for very large surveys where time-consuming in-

interviews are not used, but they always carry the limitations noted above.

COMORBIDITY AND ASSOCIATED SYMPTOMATOLOGY

Young children with PTSD are often first noticed by adults as having something wrong with them due to associated problem behaviors (usually of the externalizing sort) rather than due to the internalized and/or triggered symptomatology of PTSD. The first study of comorbid disorders in very young children with PTSD studied 62 1- to 6-year-old children who had all experienced one or more traumatic events. Of the 16 children who met criteria for a diagnosis of PTSD, 75% also met criteria for oppositional defiant disorder (ODD), 63% had separation anxiety disorder (SAD), 38% had attention-deficit/hyperactivity disorder (ADHD), and 6% had major depressive disorder (MDD) (Scheeringa et al., 2003). This high rate of ODD was replicated in a recent study of 70 three- to six-year-old children who experienced Hurricane Katrina. Of the 35 children diagnosed with PTSD, 61% also had ODD, 21% had SAD, 33% had ADHD, and 43% had MDD (Scheeringa & Zeanah, 2008). Over half (57%) of the ODD disorders started immediately after the hurricane experiences.

Thus, in both of these studies over three-fourths of children with PTSD also had at least one other comorbid disorder, and we can surmise that over half of these comorbid disorders started after their traumatic experiences. Furthermore, and perhaps most importantly, the latter study also found that none of the new-onset comorbid disorders existed in the absence of PTSD symptoms. In other words, non-PTSD disorders that arose following traumatic events were always accompanied by PTSD symptomatology. This finding is consistent with findings from the only other known study to track onsets of disorders in this fashion, a study of adult flood survivors, and also found that no non-PTSD disorders developed in the absence of PTSD symptomatology (McMillen, North, Mosley, & Smith, 2002).

The take-home lessons from this type of research: Assessments of young children who are brought in for new problems (of whatever type) that begin following trau-

matic events need to include assessments of PTSD. The most parsimonious and efficient treatment approach is to be to treat the post-traumatic symptomatology first, as that is likely to have a ripple effect for improving the comorbid disorders.

COURSE

Studies of adult trauma survivors have shown consistently that although there is usually a statistically significant decrease in the group mean for the number of PTSD items over long follow-ups, PTSD fails to remit in more than one-third of cases (Norris & Slone, 2007). Furthermore, the disorder can persist for decades (Lee, Vaillant, Torrey, & Elder, 1995). This prospect of chronic and unrelenting PTSD takes on new salience in early childhood during a time of uniquely rapid brain development. Given the speculation noted earlier about potentially permanent alterations in the developing brain, maladaptive personality traits, and greater chronicity of symptomatology (Perry et al., 1995; Schore, 2002), it seems reasonable to ask, What is known about the course and prognosis of PTSD in young children?

Preliminary data are sparse but worrisome. Only one study has prospectively followed PTSD in young children. We followed 35 children for 2 years who were 1–6 years old at the first assessment (Scheeringa et al., 2005). There was no statistically significant decrease in the number of PTSD items over these 2 years. This finding contrasts with the findings from adult studies of improvement for most patients over time (Norris & Slone, 2007).

Other studies have also shown lack of remittance in samples of older children. Thirty months after preschool Israeli children experienced Scud missile attacks Laor, Wolmer, Mayes, and Gershon (1997) reassessed their posttraumatic symptoms. The subset of children who were not displaced (as opposed to the subset that was displaced by home damage) did not show significant improvement over this time. The children in the displaced group may have shown statistical improvement because they were so symptomatic at the first assessment that the follow-up assessment found them somewhat improved but still highly symptomatic. McFarlane's study of 808 school-age children exposed

to an Australian bush fire showed no significant improvement in posttraumatic phenomena after 18 months (McFarlane, 1987). In a study of children exposed to Hurricane Andrew, 53% showed no change and 17% had actually worsened in PTSD symptoms after 21 months (Shaw, Applegate, & Schorr, 1995).

TREATMENT

There are no controlled psychotherapy studies of infants with PTSD. The few controlled studies that have included older preschool children have used cognitive-behavioral therapy (CBT; Cohen & Mannarino, 1996a, 1996b; Deblinger, Steer, & Lipmann, 1999; Scheeringa et al., 2007) or child–parent psychotherapy (CPP; Lieberman, Van Horn, & Ghosh Ippen, 2005). CBT cannot be used with infants and younger toddlers because they lack the cognitive and verbal capacities to engage in the therapy, but other treatments are available.

Acute (Less Than 1-Month) Reactions

Research on the course of PTSD has been clear that, following life-threatening events, most individuals show some PTSD-like symptomatology in the first month (Davidson et al., 1991), but only approximately 30% show enduring symptomatology after the first month (Kessler et al., 1995). Recognition of these findings has been codified in a National Institute for Clinical Excellence report, which recommends watchful waiting for mild symptoms within the first month (National Institute for Clinical Excellence [NICE], 2005). However, if symptomatology is severe and impairing within the first month, treatment probably ought to start immediately.

Work with Caregivers

The first approach probably ought to focus on teaching caregivers to (1) recognize what situations trigger the overgeneralized fear reactions of PTSD in their infants, (2) protect their infants from those triggers, and (3) rapidly and effectively soothe them when they become distressed.

Situational triggers stem directly from children's traumatic experiences but are not

always intuitively obvious. A preschool child was in an automobile accident in which the car was rear-ended by a speeding truck. The gas tank ruptured, and the smell of gas was strong. The child's cognitive distortion of the event produced a narrative in which the accident had occurred because his family had run out of gas, and his PTSD reaction was triggered whenever the car came to a stop (Scheeringa et al., 2007). Another young child was trapped in his home through the Hurricane Katrina disaster and experienced a series of stressful events over days. Initially, his mother believed that his most terrifying moment had been when he had to evacuate in a boat without her. However, during the course of therapy it became clear that he was triggered by the dark, and his most salient fear actually stemmed from spending 2 nights in their dark, suffocatingly hot attic waiting to be rescued (Scheeringa et al., 2007).

If sensitive responding by parents does not lead to improvement within a month, then more systematic approaches in office-based therapy ought to be tried.

CPP may be useful for younger children because of the focus on enhancing emotional communication during parent–child interaction. Lieberman et al. (2005) assessed 75 three- to five-year-old children who had witnessed marital violence and randomly assigned them to either a 50-week CPP protocol or to case management plus standard community treatment. CPP was significantly more effective than community treatment for reducing posttraumatic stress symptomatology. Interestingly, CPP also showed significant reductions in total maternal PTSD severity scores, driven mostly by reductions in the avoidance cluster. CPP, with its heavy emphasis on joint mother–child free play interspersed with individual sessions for the mothers, emphasizes the value of including caregivers in the treatment. Limitations include the practical problem of retaining families in treatment for 50 weeks.

In a novel study (Schechter et al., 2006), a sample of 32 mothers with 8- to 50-month-old children were videotaped in a structured laboratory interaction that included free play, separation, and reunion. The clinician then chose four 30-second excerpts to show to the mothers at their next visit. The excerpts were chosen to show both positive and negative moments. As the video excerpts were

shown to the mothers, the clinician probed with a series of scripted questions to lead the mothers to think about what both they and their children were feeling at those moments, and also commented on the positive qualities the parents showed while interacting with their children. Serial measurements of how negatively mothers described their children (maternal attributions) showed that mothers described their children more positively following the clinician-led video-feedback session. This type of emerging research suggests the potential value of working with caregivers to alter their parenting amid issues of violence and trauma.

Parent-child interaction therapy (PCIT) was developed as a treatment for oppositional behavior but has been proposed as a potential treatment for maltreated toddlers because of the focus on the parent-child relationship in the first phase (Timmer, Urquiza, & Zebell, 2005; Urquiza & McNeil, 1996). An adaptation of PCIT, called parent-child attunement therapy, was described as improving behavioral problems of a 23-month-old child (Dombrowski, Timmer, Blacker, & Urquiza, 2005). There have been no controlled studies of this approach with PTSD and no known case reports with traumatized infants. Theoretically, PCIT could be effective for relational issues, particularly in cases of maltreatment, but it does not include techniques for addressing past traumatic events or triggered fear reactions.

If efforts with caregivers are still not effective in eliminating children's symptoms or impairment, consideration should then be given to a procedure to help extinguish the children's overgeneralized fear reactions.

Play Therapy

There are no controlled trials and no known published case reports of using play therapy for PTSD with 12-month-old or younger infants. Due to their cognitive developmental limitations it is difficult, if not impossible, for infants to abstractly connect current office maneuvers to past events. Play therapy becomes more feasible as children turn 2, or more generally 3, years old. Excellent case-centered descriptions of how to conduct play therapy with these older toddlers are available (Gaensbauer, 1995, 1997; Gaensbauer et al., 1995).

Prolonged Exposure

Prolonged exposure therapy teaches patients to implement positive coping skills while maintaining exposure to the feared stimulus. Since infants cannot implement self-soothing skills on command, using prolonged exposure with infants would appear as more of an involuntary flooding experience. Solter's (2007) case of treating a 5-month-old boy with flooding was described earlier. Caution must be urged, given the involuntary nature of the procedure and potential for extreme distress, and, of course, any procedure that could exacerbate a child's symptoms urges considerable caution.

Eye Movement Desensitization and Reprocessing

Including a review of at least 10 well-conducted randomized clinical trials, eye movement desensitization and reprocessing (EMDR) has been found to be as effective as other less controversial treatments for PTSD, (Bradley, Greene, Russ, Dutra, & Westen, 2005), but none of these studies included young children. There have been several individual case reports of successful use of EMDR with 4- and 5-year-old children (Cocco & Sharpe, 1993; Greenwald, 1994; Tufnell, 2005), and less rigorous anecdotal reports of treatment of younger children (Lovett, 1999; Tinker & Wilson, 1999).

The potential advantages of using EMDR with young children are enormous. EMDR does not require patients to verbalize their thoughts. The bilateral processing does not have to involve eye movements and can be effective with bilateral auditory or tactile stimuli. Treatment effects are often seen relatively quickly compared to other treatment modalities. Preliminary work needs to be conducted with controlled trials in young children.

CONCLUSIONS

The first few years of life are important because the brain is developing and refining circuitry that may be lasting. It is not yet clear if this period provides protective plasticity or greater vulnerability to extreme stress. The case studies of disturbed infants and the

controlled investigations of preschool children suggest that older infants are at least equally vulnerable as other age groups and leave open the possibility that they are at greater vulnerability. The gaps of knowledge identified possess pressing salience. These gaps include identifying earliest possible ages for PTSD, earliest memory capacities, the bidirectional influences of parent-child relationships, and the lack of controlled treatment studies. A major issue is underdetection, and hence, undertreatment of young children. Only by ensuring that health and mental health professionals understand the subtleties of PTSD in young children will we be able to meet the challenge that confronts us.

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