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Trauma in Early Childhood: A Neglected Population

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Abstract Infants, toddlers and preschoolers are a high risk group for exposure to trauma. Young children are also vulnerable to experiencing adverse outcomes as they are undergoing a rapid developmental period, have limited coping skills and are strongly dependent on their primary caregiver to protect them physically and emotionally. However, although millions of young children experience trauma each year, this population has been largely neglected. Fortunately, over the last 2 decades there has been a growing appreciation of the magnitude of the problem with a small but expanding number of dedicated researchers and clinicians working with this population. This review examines the empirical literature on trauma in young children with regards to the following factors: (1) how trauma reactions typically manifest in young children; (2) history and diagnostic validity of posttraumatic stress disorder (PTSD) in preschoolers; (3) prevalence, comorbidity and course of trauma reactions; (4) developmental considerations; (5) risk and protective factors; and (6) treatment. The review highlights that there are unique developmental differences in the rate and manifestation of trauma symptomatology, the current *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., DSM-IV-TR) PTSD criteria is not developmentally sensitive and the impact of trauma must be considered within the context of the parent–child relationship. Recommendations for future research with this population are also discussed.

Keywords Trauma · Infant, toddler and preschooler · Posttraumatic stress · Parent–child relationship · Treatment

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Our understanding of infant and preschool mental health lags significantly behind our knowledge of child and adolescent mental health. Various reasons for the discrepancy in our understanding include the following: (1) resistance to the notion of early childhood mental health, (2) stigma associated with giving a young child a diagnosis, (3) challenges of diagnosis in this age group, (4) lack of developmental sensitivity of the current diagnostic classification system, and (5) limited availability of psychometrically sound assessment measures (Carter et al. 2004; Egger and Angold 2006). Fortunately, the importance of early childhood mental health has now been recognised with research, clinical and policy efforts in this area growing over the last 3 decades. Research is consistently showing that young children do develop psychiatric disorders, such as anxiety, depression and oppositional defiant disorder; prevalence rates are comparable to rates reported for older children; and problems often persist over time (Egger and Angold 2006).

Trauma during early childhood is one of the many areas that has been largely neglected and represents a significant gap in our understanding of trauma across the lifespan. This is a significant issue as infants, toddlers and preschoolers are at particularly high risk of being exposed to potentially traumatic events (Lieberman and Van Horn 2009). The most recent Australian statistics on child maltreatment documented 54,621 substantiated cases of child abuse and neglect during 2008–2009 (Australian Institute

of Health and Welfare 2010). Children aged 0–4 years had the highest rates of substantiated reports. This is consistent with American statistics that have documented that approximately 56% of maltreatment victims were younger than 7 years of age (U.S. Department of Health and Services 2009). Young children are also in the highest risk group for accidental trauma, with the majority of burns, falls, driveway runovers, dog attacks and drownings occurring in children under the age of 5 years (Australian Institute of Health and Welfare 2009; Kidsafe QLD 2006). Finally, Mongillo et al. (2009) found 23% of toddlers in a community sample had experienced at least one potentially traumatic event between the ages of 6–36 months.

For a person of any age, the above events threaten life, serious injury or physical integrity and can elicit intense feelings of fear, helplessness or horror (American Psychiatric Association 2000). However, traumatic events can be uniquely distressing for young children and place them at even greater risk of adverse psychological outcomes as they are undergoing a rapid period of emotional and physiological development, have limited coping skills and are strongly dependent on their primary caregiver to protect them physically and emotionally (Carpenter and Stacks 2009; Lieberman 2004; Lieberman and Knorr 2007). Cohen et al. (2006) have reported that trauma during early childhood may have even greater ramifications for developmental trajectories than traumas that occur in later adolescence. Additionally, research has shown that up to 50% of preschool children suffering from posttraumatic stress disorder (PTSD) following a trauma do not experience natural recovery and retain the diagnosis for at least 2 years (Scheeringa et al. 2005). Finally, studies have consistently demonstrated a significant association between childhood adversities and the onset of DSM-IV disorders (e.g. mood, anxiety, substance use and disruptive behaviour; Green et al. 2010), health risk behaviours (e.g. smoking, physical inactivity and suicide attempts) and a range of physical health conditions (e.g. diabetes, cancer, heart disease and stroke) in adulthood (Felitti et al. 1998). Together these findings indicate that young traumatised children may be particularly vulnerable to long-term adverse outcomes.

Over the last 20 years, a small but expanding number of dedicated researchers and clinicians have started working with children who are exposed to trauma before the age of 6 years of age. However, although the field has made progress, profound gaps in our scientific and clinical knowledge base exist regarding the epidemiology, aetiology, neurobiology, course, assessment and treatment of traumatic stress reactions in young children. Additionally, the existing body of research has largely been by the same research group and therefore requires replication. It is therefore no longer debatable that this is a population that deserves much needed attention. With the aim of increasing understanding and encouraging future research in this area, this review presents an examination of the extant empirical literature on trauma in young children with regards to the following factors: (1) how trauma reactions typically manifest in young children, (2) history and diagnostic validity of PTSD in preschoolers, (3) prevalence, comorbidity and course of trauma reactions, (4) developmental considerations, (5) risk and protective factors, (6) treatment, (7) methodological limitations and conceptual gaps, and (8) directions for future research.

Clinical Manifestation of Trauma in Young Children

Posttraumatic stress disorder is commonly experienced following exposure to trauma (Kessler et al. 1995). Based on the existing research, it appears that infants, toddlers and preschoolers also typically manifest with the traditional three PTSD symptom clusters of reexperiencing, avoidance/numbing and hyperarousal that are seen in older children, adolescents and adults (Scheeringa et al. 2003). This suggests that young children may also experience similar underlying biopsychosocial changes following a trauma (Coates and Gaensbauer 2009). However, there are several important unique developmental differences in the rate and manifestation of symptoms in children under the age of 5 years. The following section outlines how researchers in the area have described how PTSD symptoms typically present in young children.

Reexperiencing

Young children often reexperience trauma through posttraumatic play (Gaensbauer 1995). The distinctive characteristics of posttraumatic play include a rigid, repetitive and anxious quality whereby the child continuously reenacts themes from the trauma over and over again (Lieberman and Knorr 2007). For example, a child who has sustained a burn injury may repeatedly wrap bandages around a dolls head similar to what happened to them. Children may also express intrusive recollections about the trauma through drawing or repeatedly talking about the event. However, in comparison with adults, recurrent recollections of the trauma may not necessarily be distressing (Scheeringa et al. 2003). Young children also often experience an increase in distressing nightmares; however, the content may not always be recognisable (Scheeringa et al. 2003). Additionally, as do older children and adolescents, young children may react with intense emotional or physical reactions when exposed to internal or external trauma reminders (Scheeringa et al. 2003). Less commonly, behavioural manifestations of a flashback (e.g. suddenly enacting rescue

action plans) or dissociative episodes where the child appears frozen or stilled and unresponsive (Pynoos et al. 2009; Scheeringa et al. 2003) may also be observed.

Avoidance

In young children, avoidance can be observed as efforts to avoid exposure to conversations, people, objects, situations or places that serve as reminders to the trauma. This may be subtle (e.g. a child averting their gaze or turning their head away from reminder), or more obvious, such as marked distress and engagement in active attempts to be away from stimuli associated with the trauma (e.g. crying and refusal to get in car following a MVA; Coates and Gaensbauer 2009). Emotional numbing symptoms in young children may manifest as social withdrawal from family members and friends (e.g. a child displaying less affection with their primary caregiver). Additionally, in young children the symptom, markedly diminished interest or participation, is mainly observed as a constriction in play or other activities or restricted exploratory behaviour (Pynoos et al. 2009; Scheeringa et al. 2003).

Hyperarousal

Hyperarousal symptoms in young traumatised children typically present as disturbed sleep, increased irritability, extreme fussiness and temper tantrums, a constant state of alertness to danger, exaggerated startle response, difficulties with concentration and increased activity levels (Lieberman and Knorr 2007; Pynoos et al. 2009; Scheeringa et al. 2003).

Associated Features

In addition to the core symptoms of PTSD, young children also commonly present with increased separation anxiety or excessive clinginess and new fears without obvious links to the trauma (e.g. fear of toileting alone, fear of the dark; Scheeringa et al. 2003). Additionally, new onset of physical aggression towards family, peers and animals (Zero to Three 2005) or oppositional defiance may be observed. Further, loss of previously acquired developmental skills, for example enuresis and encopresis or talking like a baby again, may appear (Scheeringa et al. 2003). Finally, children may present with sexualised behaviours that are inappropriate for the child's age (Zero to Three 2005).

Symptom Presentations

It has also been suggested that trauma symptomatology may present differently depending on the nature and frequency of exposure to trauma. Terr (1991) has proposed that childhood traumas can be categorised into Type I, Type II or Crossover-type traumas. Type I traumas refer to acute single-incident events (e.g. MVA where there is physical recovery). Type II traumas involve multiple and repeated traumas (e.g. sexual or physical abuse). Crossover-type traumas describe single-incident events where there are ongoing consequences (e.g. burns that require ongoing treatment and result in permanent scarring). Reactions to Type I traumas are more likely to fit the classic triad of PTSD symptoms whereas Type II traumas more often lead to a constellation of difficulties that have been conceptualised as 'complex PTSD' or 'developmental trauma disorder' (van der Kolk 2005). The symptom clusters that have been proposed for developmental trauma disorder include repeated dysregulation (e.g. affective, behavioural, cognitive and relational) in the presence of trauma cues and persistently altered attributions and expectancies (e.g. negative self-attribution, loss of expectancy and trust of protection; van der Kolk 2005). Children who have experienced Crossover-Type traumas may manifest with symptom patterns seen following both Type I and II traumas.

Other Consequences

Posttraumatic stress disorder is not the only consequence of trauma. Traumatised young children are also at greater risk of developing other emotional and behavioural difficulties, including anxiety, depression, attention-deficit/hyperactivity disorder and oppositional defiant disorder (Scheeringa and Zeanah 2008; Scheeringa et al. 2003). In addition, trauma not only has a direct impact on a young child's emotional and behavioural functioning but it has been suspected in clinical cases to lead to disturbances in a child's attachment with their primary caregiver as well as with their interactions with other family members and friends. Interpersonal difficulties may stem from the child having less trust in their caregiver to keep them safe, from withdrawal of their affection or as a result of the child's behavioural changes (e.g. unpredictable outbursts, aggressive and demanding behaviour and excessive clinginess) and emotional dysregulation (e.g. increased irritability and difficulties calming down). However, there have been no empirical studies on trauma and clinical disorders of attachment. Finally, trauma may also interfere with a child's ability to accomplish key developmental tasks (e.g. development of emotion regulation, secure attachments, separateness and autonomy and socialisation skills; Gaensbauer and Siegel 1995) but there have been no prospective studies of trauma on children's development.

In summary, consistent with older children, adolescents and adults, young children also present with a similar pattern of PTSD symptoms, emotional and behavioural

disturbances and experience functional impairment with relationships and achievement of developmental tasks. However, there are several developmental differences in the manifestation of trauma symptoms in young children that need to be taken into consideration when making a diagnosis. The next section presents the history and current conceptualisation of PTSD for infants, toddlers and preschoolers.

Diagnosis of PTSD in Young Children

The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV-TR; American Psychiatric Association 2000) is the most widely used diagnostic classification system for mental health disorders. However, concerns have been raised regarding the suitability and validity of this classification system for young children as the diagnostic criteria have been mostly developed, researched and refined in adult populations (Postert et al. 2009). When the DSM-IV nosology for PTSD was first published (American Psychiatric Association 1994), only minimal modifications were made to accommodate the unique developmental differences in symptom manifestation in children and no children under the age of 15 were included in DSM-IV field trials (Kilpatrick et al. 1998).

Pioneering research by Scheeringa and colleagues has since shown that the DSM-IV-TR PTSD criteria does not adequately capture the symptom manifestation experienced by infants and preschoolers and underestimates the number of children experiencing posttraumatic distress and impairment (Scheeringa et al. 1995). These researchers have highlighted that 8 out of the 19 criteria require individuals to give verbal descriptions of their experiences and internal states. This is almost impossible for preverbal or barely verbal children. This therefore led to the development of an alternative PTSD algorithm (PTSD-AA; Scheeringa et al. 1995) which involved modifying DSM-IV PTSD symptom wording to make them more objective, behaviourally anchored and developmentally sensitive to young children. Other changes included omitting Criterion A2 as it is difficult to determine a young child's subjective experience of an event, especially if there are no witnesses to their reaction. Additionally, symptoms that were deemed inappropriate for the developmental capacities of young children (i.e. sense of foreshortened future and inability to recall aspects of the trauma) were excluded. Furthermore, a new symptom, 'loss of previously acquired developmental skills' was included in the avoidance cluster as well as the addition of an entirely new cluster describing symptoms of new separation anxiety, new aggression and new fears. Finally, the cluster thresholds were modified so that only one symptom each was required for avoidance (instead of three) and hyperarousal (instead of two). Following further validation of the PTSD-AA, the algorithm was refined to reflect findings that showed that the hyperarousal threshold should be kept at two or more symptoms and loss of developmental skills and the new cluster of symptoms should not be included as they did not demonstrate any utility (Scheeringa et al. 2003). However, given that these additional symptoms are very common in young traumatised children, the authors suggested that they be retained as associated symptoms. Refer to Table 1 to see the PTSD-AA and how it was modified from the DSM-IV-TR PTSD criteria.

To address the crucial need for developmentally appropriate nosology, the clinically based *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood* (DC: 0–3; Zero to Three 1994) was the first systematic effort to establish a categorical classification system for disorders of infancy to assist research and clinical practice. An early version of the Scheeringa and colleagues alternative algorithm formed the basis of the 'Traumatic Stress Disorder' criteria published in the DC: 0–3 (Stafford et al. 2003). The DC: 0–3 has since been revised to reflect the growing body of scientific research (DC: 0–3R: Zero to Three 2005). Additionally, during 2000–2002, a task force of independent investigators developed the *Research Diagnostic Criteria-Preschool Age* (RDC-PA; Task Force on Research Diagnostic Criteria: Infancy and Preschool 2003) to promote systematic research on psychiatric disorders in young children. The development of the RDC-PA PTSD criteria was largely informed by the research investigating the validity of the PTSD-AA (Ohmi et al. 2002; Scheeringa et al. 1995, 2001, 2003).

Most recently, the DSM-V Task Force published proposed draft revisions to the PTSD criteria. Importantly, the task force proposed the addition of an age-related subtype of PTSD, PTSD in preschool children, to be included in the Disorders Usually First Diagnosed in Infancy, Childhood and Adolescence section (American Psychiatric Association 2010). The proposed algorithm is based on the empirical validation of the PTSD-AA but has been revised to be consistent with the proposed changes for the DSM-V PTSD adult criteria (American Psychiatric Association 2010). Refer to Table 2 for the newly proposed PTSD in preschool children criteria for the DSM-V.

To date, research using the PTSD-AA has shown that the algorithm possesses adequate reliability (Scheeringa et al. 1995, 2001, 2003), convergent validity (Meiser-Stedman et al. 2008; Ohmi et al. 2002; Scheeringa et al. 2003), discriminant validity (Levendosky et al. 2002; Scheeringa et al. 2001, 2003), predictive validity (Meiser-Stedman et al. 2008; Scheeringa et al. 2005) and criterion validity (Scheeringa et al. 2001, 2003). These studies have consistently shown that the DSM-IV PTSD criteria, in

Table 1 Alternative PTSD algorithm (PTSD-AA) reflecting changes made to the DSM-IV-TR PTSD criteria

Alternative algorithm for PTSD in preschool children
A. The *child* has been exposed to a traumatic event
1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
2. ~~The person's response involved intense fear, helplessness or horror. Note: In children, this may be expressed instead by disorganised or agitated behaviour~~. This criterion is not required because preverbal children cannot report on their reaction at the time of the event and an adult may not have been present to witness the child's reaction
B. The traumatic event is persistently reexperienced in one (or more) of the following ways
1. Recurrent and intrusive recollections of the event (*but not necessarily distressing)*, including images, thoughts, or perceptions. *Note*: In young children, repetitive play *or behaviours* may occur in which themes or aspects of the trauma are expressed
2. Recurrent distressing dreams of the event. *Note*: In children, these may be frightening dreams without recognisable content
3. Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations and dissociative flashback episodes, including those that occur on awakening or when intoxicated). *Note*: In young children, trauma-specific re-enactment may occur
4. Intense psychological distress at exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event
5. Physiological reactivity on exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event
C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by ~~three~~ *one* (or more) of the following
1. Efforts to avoid thoughts, feelings or conversations associated with the trauma
2. Efforts to avoid activities, places or people that arouse recollections of the trauma
3. ~~Inability to recall an important aspect of the trauma~~
4. Markedly diminished interest or participation in significant activities. *Note*: *In young children, this is mainly observed as constriction of play*
5. Feeling of detachment or estrangement from others (e.g. unable to have loving feelings). *Note*: *In young children, this is mainly observed as social withdrawal*
6. Restricted range of affect
7. ~~Sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)~~
D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following
1. Difficulty falling or staying asleep
2. Irritability or outbursts of anger *or extreme temper tantrums in young children*
3. Difficulty concentrating
4. Hypervigilance
5. Exaggerated startle response
E. Duration of the disturbance (symptoms in Criteria B, C and D) is more than 1 month
F. The disturbance causes clinically significant distress or impairment in social, occupational or other important areas of functioning

Adapted from Scheeringa et al. (2003). Modifications in wording to DSM-IV-TR criteria are noted in italics and items deleted from DSM-IV-TR are crossed out

comparison with the PTSD-AA, does not adequately capture trauma manifestations in young children and under identifies highly symptomatic children who would require treatment.

Of note, the diagnostic validity of the DSM-IV acute stress disorder (ASD) diagnostic criteria for young children has not been thoroughly investigated. To date, only two research groups have used the PTSD-AA to assess for acute stress reactions within the first month of trauma (Meiser-Stedman et al. 2008; Stoddard et al. 2006). Meiser-Stedman and colleagues (2008) also used the DSM-IV ASD criteria and found that in comparison, the PTSD-AA diagnosed more children and was a more sensitive predictor of PTSD at 6 months post-MVA.

In summary, the establishment of empirically supported, developmentally sensitive diagnostic criteria for preschoolers is one of the key tasks remaining for the DSM classification system. The existing empirical data provide promising preliminary support for the inclusion of an age-related subtype of PTSD in the DSM-V. However, although there is growing support for the PTSD-AA, it should be noted that the validity has largely been tested by the same research group, in populations of American children largely involved in interpersonal or mass trauma. The following section will present the prevalence rates that have been documented for both the DSM-IV PTSD criteria and PTSD-AA as well for other emotional and behavioural reactions posttrauma.

Table 2 Proposed DSM-V revisions: posttraumatic stress disorder in preschool children

Posttraumatic stress disorder in preschool children
A. The child (less than 6 years old) was exposed to the following event(s): death or threatened death, actual or threatened serious injury, or actual or threatened sexual violation, in one or more of the following ways
1. Experiencing the event(s) him/herself
2. Witnessing the event(s) as it (they) occurred to others, especially primary caregivers
3. Learning that the event(s) occurred to a close relative or close friend*
Note: Witnessing does not include events that are witnessed only in electronic media, television, movies or pictures
B. Intrusion symptoms that are associated with the traumatic event (that began after the traumatic event), as evidenced by one or more of the following
1. Spontaneous or cued recurrent, involuntary, and intrusive distressing memories of the traumatic event. *Note*: spontaneous and intrusive memories may not necessarily appear distressing and may be expressed as play reenactment
2. Recurrent distressing dreams related to the traumatic event (*Note*: it may not be possible to ascertain that the content is related to the traumatic event)
3. Dissociative reactions in which the individual feels or acts as if the traumatic event(s) were recurring (such reactions may occur on a continuum with the most extreme expression being a complete loss of awareness of present surroundings)
4. Intense or prolonged psychological distress at exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event(s)
5. Marked physiological reactions to reminders of the traumatic event(s)
One item from C or D Below
C. Persistent avoidance of stimuli associated with the traumatic event (that began after the traumatic event), as evidenced by efforts to avoid
1. Activities, places or physical reminders that arouse recollections of the traumatic event
2. People, conversations or interpersonal situations that arouse recollections of the traumatic event
D. Negative alterations in cognitions and mood that are associated with the traumatic event (that began or worsened after the traumatic event), as evidenced by one or more of the following
1. Substantially increased frequency of negative emotional states—for example, fear, guilt, sadness, shame or confusion*
2. Markedly diminished interest or participation in significant activities, including constriction of play
3. Socially withdrawn behaviour
4. Persistent reduction in expression of positive emotions
E. Alterations in arousal and reactivity that are associated with the traumatic event (that began or worsened after the traumatic event), as evidenced by two or more of the following
1. Irritable, angry or aggressive behaviour, including extreme temper tantrums
2. Reckless or self-destructive behaviour*
3. Hypervigilance
4. Exaggerated startle response
5. Problems with concentration
6. Sleep disturbance—for example, difficulty falling or staying asleep, or restless sleep
F. Duration of the disturbance (symptoms in Criteria B, C, D and E) is more than 1 month
G. The disturbance causes clinically significant distress or impairment in relationships with parents, siblings peers or other caregivers or school behaviour

This is the criteria published on the American Psychiatric Association DSM-5 Development website (American Psychiatric Association 2010). At present, there is not a consensus about including the items marked with *. Data relevant to their inclusion or exclusion are being sought

Prevalence of Trauma Reactions

One of the many areas where there is a significant gap in our knowledge in comparison with older children, adolescents and adults is an accurate empirical data base on the prevalence of PTSD and other emotional and behavioural reactions in traumatised young children. In addition to the general paucity of research with this population, there is a restricted selection of studies that can be used to determine prevalence rates. Many of the earlier research studies with young children are unable to inform prevalence rates as they include either single case studies or studies that have relied solely on questionnaires and thus limited in the ability to accurately diagnose PTSD or other disorders. Fortunately, since the publication of developmentally sensitive classification systems (Scheeringa et al. 1995, 2003; Task Force on Research Diagnostic Criteria: Infancy and Preschool 2003; Zero to Three 1994) and the

emergence of diagnostic interviews (Egger et al. 2006; Scheeringa and Haslett 2010; Scheeringa and Zeanah 1994), research with this population is growing.

Prevalence of Acute Stress Reactions and PTSD

Table 3 summarises the studies that have adopted developmentally sensitive PTSD algorithms and specific measures of PTSD and comorbid disorders. Prevalence rates for PTSD in young children vary greatly depending on the type of trauma, diagnostic algorithm used, time of assessment and cohort sampled (Table 3). Specifically, studies that have used the PTSD-AA with samples of children exposed to single-event traumas have reported prevalence rates of 6.5–29% for acute stress reactions (Meiser-Stedman et al. 2008; Stoddard et al. 2006), and PTSD rates that vary from 14.3% within 2 months following admission to hospital for injury (Meiser-Stedman et al. 2008; Scheeringa et al. 2006), 10% 6 months post-MVA (Meiser-Stedman et al. 2008) and 25% 6 months after a gas explosion in Japan (Ohmi et al. 2002). Studies investigating the impact of mass trauma have documented PTSD-AA prevalence rates ranging from 17% 9–12 months post-9/11 (DeVoe et al. 2006), and up to 50% 6 months to 2.5 years following Hurricane Katrina (Scheeringa and Zeanah 2008). The rates of PTSD-AA diagnosis following a variety of traumatic events (mostly witnessing or being subject to interpersonal violence [IPV]) range from 26% in nonhelp-seeking community samples (Levendosky et al. 2002; Scheeringa et al. 2003) to 60–69% in clinic samples (Scheeringa et al. 1995, 2001). If the DSM-IV criteria alone had been adopted in these studies, the PTSD prevalence rates would have been substantially lower (Table 3).

Prevalence of PTSD Symptoms

Reexperiencing is the most commonly endorsed symptom cluster, with rates ranging from 35 to 80%, followed by hyperarousal, with rates ranging from 32 to 45% (Meiser-Stedman et al. 2008; Scheeringa et al. 2003, 2006). Very few young children (0–5%) meet the avoidance/numbing cluster if three or more symptoms are required (Scheeringa et al. 2003, 2006). If the avoidance threshold is reduced to one symptom, rates increase dramatically to between 18 and 62% (Meiser-Stedman et al. 2008; Scheeringa et al. 2003, 2006; Stoddard et al. 2006). It is possible that due to developmental reasons, young children simply do not experience avoidance symptoms at similar rates to older children and adolescents. However, this may also be due to young children having limited verbal and cognitive skills to report or explain avoidance symptoms thus increasing the difficulty in accurately detecting avoidance behaviourally or via parent report (Scheeringa 2006). The relative scarcity of avoidance/numbing symptoms provides further support for the need to modify the DSM-IV PTSD criteria to place greater emphasis on behavioural manifestations rather than cognitive manifestations of reactions to trauma.

The most common symptoms that are reported across studies, including either interview or questionnaire data, are talking about the event, distress upon reminders, nightmares, new separation anxiety or clinginess, new fears, crying, sleep disturbance, increased motor activity and increased irritability or tantrums (Graham-Bermann et al. 2008; Klein et al. 2009; Levendosky et al. 2002; Saylor et al. 1992; Scheeringa et al. 2001, 2003; Zerk et al. 2009).

Emotional and Behavioural Difficulties

Young children who are exposed to trauma are also at increased risk of developing emotional and behavioural difficulties (Chemtob et al. 2008; Laor et al. 1996; Lieberman et al. 2005b; Mongillo et al. 2009; Zerk et al. 2009). However, to date, only two studies have used diagnostic interviews to determine the prevalence of other psychological disorders, besides PTSD, following trauma in young children (Scheeringa and Zeanah 2008; Scheeringa et al. 2003). These studies found high rates of oppositional defiant disorder (ODD), separation anxiety disorder (SAD), attention-deficit/hyperactivity disorder (ADHD) and major depressive disorder (MDD, Table 3).

Comorbidity

Only two studies have investigated comorbidity with PTSD in children under the age of 6 years (Scheeringa and Zeanah 2008; Scheeringa et al. 2003). Consistent with research with older children and adults, these studies have also shown that comorbidity with PTSD is common in young children (Table 3). In particular, Scheeringa et al. (2003) found children diagnosed with PTSD-AA had significantly higher rates of ODD (75% vs. 13% and 8%, $p < .001$) and SAD (63% vs. 13% and 5% $p < .001$) in comparison with children in the traumatised group with no PTSD or healthy control group. Additionally, children with PTSD scored significantly higher on the Child Behaviour Checklist (CBCL) internalising and total scales than the traumatised group with no PTSD and scored significantly higher on these scales and the externalising scale in comparison with the healthy control group (Scheeringa et al. 2003).

The high rate of comorbidity found with PTSD has raised concerns about the lack of specificity in adults and the lack of sensitivity with children (Cohen and Scheeringa 2009). No known studies have specifically investigated comorbidity models in children or adolescents; however, a

Table 3 Prevalence of psychological disorders and comorbidity in young traumatised children

Author and year	Trauma	*N*	Age	Assessment time and measure	Findings
Interpersonal					
Scheeringa et al. (1995)	Witnessed IPV, sexual and physical abuse	12	18–48 months	Ax: 0–14 months Semi-structured interview	PTSD-AA: 69%[a] vs. DSM-IV: 13%
Scheeringa et al. (2001)	Witnessed IPV, sexual and physical abuse	15	13–47 months	Ax: 0–22 months (M = 6.6 months) PTSDSSI	PTSD-AA: 60%[a] vs. DSM-IV: 20%
Scheeringa et al. (2003)	MVA, accidental injury, abuse, witnessed IPV, cancer	62	20 months to 6 years	Ax: 2–52 months (M = 11.3 months) PTSDSSI, DISC-IV	PTSD-AA: 26% vs. DSM-IV: 0% MDD = 6%; ADHD = 26%; ODD = 40%; SAD = 26%. Comorbidity: SAD = 63%; MDD = 6%; ADHD = 38%; ODD = 75%
Scheeringa et al. (2005)	Same sample as above	T2: 47 T3: 35	20 months to 6 years	Ax: 1 and 2 years post-T1 Ax DISC-V	T2: PTSD-AA: 23.4% vs. DSM-IV: 2.1% T3: PTSD-AA: 22.9% vs. DSM-IV: 11.4%
Levendosky et al. (2002)	DV	39	3–5 years	Most recent event of DV occurred within 1 year of Ax PTSD-PAC checklist	PTSD-AA: 26%[a] vs. DSM-IV: 3%
Terrorism					
DeVoe et al. (2006)	September 11 terrorist attack	180	0–5 years	Ax: 9–12 months PTSDSSI	PTSD-AA: 17%.
Natural disaster					
Scheeringa and Zeanah (2008)	Hurricane Katrina	70	3–6 years	Ax: 6 months to 2.5 years PAPA	PTSD-AA: 50% vs. DSM-IV: 15.7%. MDD = 21%, ADHD = 25%, ODD = 34% SAD = 15%. Comorbidity: ODD = 61%; MDD = 43%; ADHD = 33%; SAD = 21%.
Single-event					
Ohmi et al. (2002)	Gas explosion	32	32–73 months	Ax: 6 months CPTSD-RI modified	PTSD-AA: 25%[a] vs. DSM-IV: 0%.
Scheeringa et al. (2006)	Injury (e.g. from MVA, gun shots, sporting, burns)	21	0–6 years	Ax: 2 months PTSDSSI	PTSD-AA: 14.3% vs. DSM-IV: 4.8%.
Meiser-Stedman et al. (2008)	MVA	62	2–6 years	Ax: 2–4 weeks and 6 months PTSDSSI, ADIS-P	2–4 weeks: PTSD-AA[b]: 6.5% vs. ASD: 1.7% 6 months: PTSD-AA: 10% vs. DSM-IV: 1.7%
Stoddard et al. (2006)	Accidental burns	52	12–48 months	Ax: within 1 month PTSDSSI	PTSD-AA[b] = 29%

ADHD attention-deficit/hyperactivity disorder, *ADIS-P* anxiety disorder interview schedule-parent version, *Ax* assessment time points post-trauma, *CPTSD-RI* child posttraumatic stress disorder reaction index, modified based on PTSD-AA, *DISC-IV* diagnostic interview schedule for children, version 4, *DV* domestic violence; *DSM-IV* diagnostic and statistical manual of mental disorders, 5th ed, *IPV* interpersonal violence, *MDD* major depressive disorder, *MVA* motor vehicle accident, *ODD* oppositional defiant disorder, *PAPA* preschool age psychiatric assessment, *PTSD* posttraumatic stress disorder, *PTSD-AA* alternative posttraumatic stress disorder algorithm, *PTSD-PAC* measure of PTSD symptoms in preschool children developed specifically for study and not inclusive of all symptoms, *PTSDSSI* PTSD semi-structured interview and observational record for infants and young children, *SAD* separation anxiety disorder, *T2* time 2, *T3* time 3

[a] Original PTSD-AA that only required one symptom from each cluster

[b] Used PTSD-AA to assess for acute stress reactions within the first month

study with adult flood survivors tested four possible models in an attempt the untangle the reasons for PTSD psychiatric comorbidity (McMillen et al. 2002). These models were as follows: (A) PTSD leads to other psychiatric disorders, (B) trauma leads to multiple disorders, (C) symptom overlap, and (D) prior disorder creates PTSD vulnerability. The study found that PTSD was associated with an increased likelihood of developing a new non-PTSD disorder and PTSD symptoms were still common ($M = 6.38 \pm 2.62$ symptoms) in adults who had a new diagnosis but not PTSD following the flood. No support was found for new non-PTSD disorders developing independent of PTSD symptoms, symptom overlap amongst diagnoses or prior vulnerability (McMillen et al. 2002). The researchers therefore argued that their findings provided support for the proposed Model A. Scheeringa and Zeanah (2008) have found preliminary support for this model as their research also showed that all children who had a new-onset non-PTSD disorder following Hurricane Katrina also had PTSD symptomatology (Scheeringa and Zeanah 2008). The authors speculated that the presence of SAD may be explained by a young child's unique dependence on their caregiver for protection following trauma. Additionally, they suggested that ODD possibly overlaps with PTSD due to strong hyperarousal (e.g. irritability or outbursts of anger) and identified this as an area for future research. Most recently, Milot et al. (2010) also found some support for the proposal that PTSD symptoms contributes to the development of other psychiatric disorders (Model A), as their research indicated that trauma symptoms fully mediated the relationship between maltreatment and internalising and externalising behaviours in preschool aged children. Comorbidity during early childhood is a complex issue, especially given that this is a time when ODD and SAD often first present. More research is clearly warranted to further understand PTSD psychiatric comorbidity in young children.

The high rates found for comorbid ODD and ADHD provide further support for growing concerns that children who exhibit high emotionality and deregulated behaviour may receive a number of erroneous diagnoses such as ADHD and ODD instead of PTSD (Scheeringa and Zeanah 2008). Many of the observable PTSD symptoms such as inattention, hyperactivity, temper tantrums, decreased interest, defiance, aggression and impulsivity often resemble or mimic normative behavioural changes (e.g. "Terrible Twos"), more serious disruptive behaviour patterns such as ODD or ADHD (Glod and Teicher 1996; Thomas 1995) or emotional difficulties such as anxiety or depression (Perry et al. 1995). Given that it is even more difficult to accurately identify internalised PTSD symptoms in young children (e.g. avoidance of thoughts), there is a high risk that the more easily observable symptoms are mistakenly targeted for treatment without understanding the concurrent underlying PTSD symptomatology (Scheeringa and Zeanah 2008). These findings have important implications for assessment and treatment and clearly highlight the importance of screening for trauma and traumatic stress symptoms in children who present with disruptive behavioural problems.

Course

There are only three prospective longitudinal studies that have specifically examined the course of PTSD symptoms in early childhood. The first study by Scheeringa et al. (2005) investigated the course of PTSD symptomatology in a sample of traumatised young children at three time points over a 2-year period. There was a lack of PTSD-AA diagnostic continuity between baseline and 1-year follow-up. However, initial PTSD-AA diagnosis was predictive of PTSD diagnosis 2 years later. Additionally, analyses demonstrated the PTSD symptoms did not remit over time or from community treatment. In regards to the symptom clusters, a decrease in reexperiencing symptoms and an increase in avoidance/numbing symptoms were observed over the duration of 2 years. There was no significant change in hyperarousal symptoms. Additionally, 49% of children who did not meet full PTSD criteria still suffered from functional impairment in at least one domain at the 1-year assessment and 74% at 2 years.

Meiser-Stedman et al. (2008) further investigated the stability of PTSD diagnosis over the first 6 months following a MVA in children aged 2–10 years. Their data provided further support for the stability of PTSD-AA diagnosis, with 75% of the subsample of 2–6-year-olds retaining a PTSD-AA diagnosis at 6 months.

Finally, Laor and colleagues (Laor et al. 1996, 1997, 2001) investigated the course of traumatic stress symptoms in preschool children at 6, 30 months and 5 years following exposure to missile attacks in the gulf war. The researchers did not use measures that could provide a diagnosis of PTSD (DSM-IV or PTSD-AA); however, they demonstrated that by 5 years after the event, children had shown a significant decrease in externalising symptoms and posttraumatic arousal symptoms. However, they found a significant increase in avoidance symptoms.

Contrary to widely held beliefs, these findings show that PTSD in young children is not a normative reaction that children simply "grow out of" (Cohen and Scheeringa 2009). Rather, it appears that if left untreated, trauma during early childhood may follow a chronic and unremitting course. These results are particularly concerning given the potential for trauma to derail children from their normal developmental trajectories at such a young age.

Developmental Considerations

In addition to variations in trauma symptom presentation and frequency, there are several important developmental considerations to be aware of when working with young children (Zeanah et al. 1997). These include cognitive, emotional, social and behavioural capacities, neurobiological vulnerability and the uniquely powerful salience of the parent–child relationship.

Developmental Capacities

There has been a widely held misconception that infants lack the cognitive, perceptive, affective, behavioural and social maturity needed to remember, understand or be affected by trauma. However, infancy represents a period of dramatic development across cognitive, emotional, social and physical domains. Over the course of 36 months, infants transform from newborns that are completely dependent on their caregivers for survival to individuals who have the capacity to remember; physically move around; communicate; and the ability to understand and express emotions (Zeanah and Zeanah 2009). Therefore, it is important to consider at what age the developmental capacities needed to develop psychiatric disorders, such as PTSD, emerge. This section outlines the six key developmental capacities that Scheeringa and Gaensbauer (2000) have identified that are needed for the development of PTSD and the ages at which children typically develop these capacities.

First, memory is a critical component that is needed for the development of PSTD. That is, one must have a memory of the event in order to experience trauma symptomatology (i.e. intrusive recollections of the event, distress at reminders; Scheeringa 2009). There is a general consensus that there are at least two types of memory systems: implicit or nondeclarative memory and explicit or declarative memory (also referred to as autobiographical memory). Implicit or nondeclarative memory is defined as automatic memories that are outside ones conscious awareness and unable to be verbally recalled but may still be expressed behaviourally (e.g. riding a bike; Howe et al. 2006). Research has shown that implicit memory starts prenatally and early memories can lead to later fears, phobias and anxieties but are not consciously available, are extinguished rapidly and are typically replaced by more recent postnatal experiences (Howe 2010). In comparison, explicit or declarative memory is conscious and able to be expressed verbally and behaviourally (Scheeringa and Gaensbauer 2000). Around the age of 18–24 months, autobiographical memory develops as children acquire a cognitive sense of self (Howe et al. 2006). Memories become organised as events that happened to "me" and are more likely to become stable and durable (Howe et al. 2006). It is unlikely that memories prior to 18 months will be able to be accessed verbally or remembered in later childhood or adulthood due to infantile amnesia (Howe et al. 2006).

Regarding memory for stressful events, Gaensbauer (2002) found some evidence that children traumatised between the ages of 7–13 months spontaneously re-enacted aspects of their traumatic experience up to 7 years later and were able to provide descriptive words or phrases that were not available at the time of trauma. Additionally, based on existing data on the memory of stressful events in early childhood, Scheeringa (2009) concluded that children as young as 30–36 months can retain and accurately recall distressing events up to several years after the event. Finally, in another review of the extant literature on memory in children, Howe et al. (2006) concluded that although children's memory for traumatic events is reconstructive in nature and prone to errors, children over the age of 18 months are able to remember the central or gist information of the event. It also appears that the distinctive and personally significant nature of traumatic events may promote the longevity of traumatic versus nontraumatic memories (Howe et al. 2006).

Second, children require perceptual abilities in order to experience a traumatic event. From birth, tactile and auditory senses are functionally equivalent to adults (Scheeringa and Gaensbauer 2000). By 3 months of age, infants are estimated to have perception of depth, at approximately 5 months are able to differentiate between faces and by 6 months are capable of developing 20/20 vision (Scheeringa and Gaensbauer 2000).

The third capacity, affective expression, is a requirement for many of the symptoms of PTSD (i.e. displayed fear, helplessness or horror at time of event, psychological distress around reminders, increased irritability or anger). The ability to show distress, positive/joy and interest expressions is present from the first few weeks of life (Rosenblum et al. 2009). The primary emotions including sadness, anger and fear have typically emerged by 6–8 months (Lewis 1993). By 18–21 months of age, toddlers develop an awareness of self and others and are able to display more complex self-conscious emotions including feelings of shame, guilt and embarrassment (Lewis 1993).

In addition, many of the motor components needed for the behavioural expression of trauma symptoms (e.g. play re-enactment, avoidance) develop between 7 and 18 months of age (Scheeringa and Gaensbauer 2000). Furthermore, the ability to verbally express subjective experiences and internal reactions to events (i.e. thoughts and feelings) typically emerges around 18–29 months of age (Scheeringa and Gaensbauer 2000).

Finally, trauma can lead to significant impairments in socioemotional relationships (e.g. due to detachment or

estrangement, increased irritability or clinginess); therefore, children need to have formed relationships in order for this interference to occur. Between 7 and 18 months, the onset and establishment of focused attachments with primary caregiver/s occur and separation and stranger anxiety, and secure base behaviour become prominent (Rosenblum et al. 2009). By 18–36 months, children begin to develop the skills needed to engage in meaningful interactions with siblings and peers (Rosenblum et al. 2009).

In summary, the perceptual, affective, behavioural and social capacities needed for the manifestation of trauma symptoms appear to emerge around approximately 7 months of age. The ability to develop autobiographical memories of trauma experiences and the ability to verbally express trauma narratives and describe internalising symptoms appear to emerge after the age of 18 months. Therefore, contrary to commonly held beliefs, very young children can develop and retain memories of traumatic events and are functionally able to present with the emotional and behavioural manifestations of trauma. However, young children are very limited in their verbal abilities. Therefore, assessments must involve caregivers and focus more on behavioural manifestations rather than verbal descriptions of internal states. Additionally, a young child's limited cognitive capacities may make it less likely that their "memories will be coherent or readily understandable either to the parent or to the child" (Coates and Gaensbauer 2009, p. 616).

Neurobiological Vulnerability

Young children's neurophysiological regulation systems, including the stress modulation and emotional regulation systems, are still in the process of rapid development (Carpenter and Stacks 2009), and the rate of development is unprecedented compared to any other period in the lifespan (Zeanah et al. 1997). Environmental factors, such as the quality of the parent–child relationship and life stressors can greatly influence brain development (Carpenter and Stacks 2009; Sheridan and Nelson 2009). Therefore, exposure to trauma during a "critical" or "sensitive" period of brain development can have far-reaching and irreversible consequences (Perry et al. 1995). Whilst not specifically with young children, preliminary research with children aged 7–13 years has found PTSD symptoms and cortisol were associated with hippocampal reduction over a 12–18-month period (Carrion et al. 2007).

Changes in brain development and organisation can place young children at even greater risk of maladaptive responses in the period posttrauma which can lead to derailment of developmental trajectories (e.g. toileting, sleeping and eating patterns, ability to separate from caregivers and emotional regulation) and the emergence of emotional, social, cognitive and behavioural difficulties that may persist into later childhood and adulthood (Lieberman and Van Horn 2009). Perry et al. (1995) has shown that young children's neurobiological, neuroendocrine and neuropsychological response patterns to threat may differ to adults. Specifically, adult males are more likely to respond with hyperarousal (i.e. flight or fight response) whereas young children are more likely to use a dissociative response (i.e. freeze and surrender; Perry et al. 1995). Perry et al. (1995) has argued that the "developing brain organises and internalises new information in a use-dependent fashion" (p. 271); therefore, the longer a child is in a state of hyperarousal or dissociation, the more likely they are to experience a dysregulation of key physiological, cognitive, emotional and behavioural systems. Thus, although these responses may be adaptive in the acute period (e.g. freeze response may allow time to work out how to respond to threat), if they continue they are more likely to become maladaptive "traits" and will determine the posttraumatic symptoms that develop and the chronicity of symptomatology.

Parent–Child Relationship

In addition to developmental and neurobiological factors, the impact of trauma in young children must be considered within the context of the parent–child relationship. Forming an attachment with a primary caregiver is one of the key developmental tasks of infancy (Lieberman 2004) and it is now well established that a secure attachment with a primary caregiver is associated with optimum social, emotional, cognitive and behavioural outcomes (Carpenter and Stacks 2009). However, in comparison with any other age, the parent–child relationship is uniquely salient in young children as they are completely dependent on their caregivers to provide them with a safe, secure and predictable environment and to assist them with the development of emotion regulation skills (Carpenter and Stacks 2009; Lieberman 2004). Emotion regulation is a complex process that involves adapting and managing feeling states, physical arousal, cognitions and behavioural responses. During the first years of life, young children lack the coping capacities to regulate strong emotion and are therefore strongly reliant on their primary caregivers to assist with affect regulation during times of distress.

Research has shown that children who are securely attached are more likely to develop neurobiological systems that enable them to effectively regulate emotional arousal (Carpenter and Stacks 2009). Additionally, in times of trauma, securely attached children are likely to have had a history of responsive and sensitive caregiving and are therefore more likely to seek and be provided with

protection and care and thus be buffered from the negative repercussions of trauma (Carpenter and Stacks 2009). Conversely, children with insecure or disorganised attachments are at even greater risk of negative outcomes following trauma as they are less likely to have or be able to engage in emotionally supportive relationships that can help them process and cope with the overwhelming emotions they experience (Lieberman 2004). Therefore, a child's ability to cope with a traumatic event may be strongly related to the quality of the parent–child attachment and a parent's sensitivity and ability to help their child with affect regulation to minimise physiological and psychological distress (Carpenter and Stacks 2009; Lieberman 2004; Sheridan and Nelson 2009).

However, it is rare that only the child is affected by the traumatic event as parents are also often directly exposed to the event itself (e.g. natural disaster and domestic violence [DV]), witness the child's exposure to the event (e.g. accident) or are responsible for the event in some way (e.g. caused accident, held child down during medical procedures). Not surprisingly, research has documented that parents who have witnessed or experienced the same traumatic event as their child also show increased frequencies of adverse psychological outcomes. Their pathology includes PTSD symptomatology (Bogat et al. 2006; DeVoe et al. 2006; Laor et al. 1996, 1997; Levendosky et al. 2003; Nomura and Chemtob 2009; Scheeringa and Zeanah 2008; Stoddard et al. 2006), depression (Levendosky et al. 2003; Nomura and Chemtob 2009; Zerk et al. 2009) and anxiety (Scheeringa and Zeanah 2008; Zerk et al. 2009). Rates of PTSD diagnosis range from 18 to 49% following exposure to terrorist attacks on the World Trade Centre (DeVoe et al. 2006; Nomura and Chemtob 2009) to 36% following Hurricane Katrina (Scheeringa and Zeanah 2008). Prevalence of depression ranges from 25% (Scheeringa and Zeanah 2008) to 35% (Nomura and Chemtob 2009), and a rate of 17% has been reported for anxiety (Scheeringa and Zeanah 2008).

Research has consistently documented a significant association between caregiver functioning and child functioning following trauma (Scheeringa and Zeanah 2001). Parents suffering from depressive, avoidance or numbing symptomatology may become emotionally withdrawn, unresponsive or unavailable (Scheeringa and Zeanah 2001) and therefore impaired in their ability to detect and respond effectively to their child's emotional needs (Lieberman 2004; Sheridan and Nelson 2009). Further, it has been hypothesised by researchers with older children that distressed, anxious or overprotective parents may directly influence their child's exposure to traumatic reminders, for example through avoidance of reminders or conversation about the event, and thereby impede their child's habituation to the event (Nugent et al. 2007). Additionally, in line with social referencing models, children may use parental distress as a measure for the seriousness of the trauma and may model their parent's fear responses and maladaptive coping responses (e.g. avoidance or distress around reminders; Linares et al. 2001). These responses can have a detrimental impact on a previously secure attachment, can lead to deterioration in family relationships and functioning (Lieberman 2004) and can compromise a parent's ability to help their child to process and cope with distressing trauma symptomatology. This can leave a child's stress and emotional system overstimulated and unregulated (Bogat et al. 2006) and significantly influences the development and maintenance of internalising and externalising behaviours in children.

However, it is also possible that a child's response to a traumatic event contributes to parental distress and subsequent changes in parenting practises. This may be particularly so if the parent is already suffering from guilt or blame for failing to protect their child (Scheeringa and Zeanah 2008). As a consequence, a parent may become overly protective of their children. This may present as allowing their child to avoid experiences and situations that provoke anxiety or distress (e.g. doing burn dressing changes and sleeping in own bed), insisting that they are near their child at all times (e.g. not allowing child to be supervised by other parent or letting the child go to other people's houses), spoiling their child (e.g. giving noncontingent rewards, becoming more lenient with household rules) or giving the child more attention and reassurance (e.g. constant hugs and kisses). These changes in parenting style may further exacerbate behavioural and emotional difficulties or contribute to a child's belief that the world is a dangerous and unsafe place. In addition, it may be very difficult for a caregiver to know how to care for a child who begins to have frequent, intense and unpredictable responses (e.g. hitting, screaming, clinginess; Lieberman 2004) and these sudden changes in the child may impair a parent's ability to maintain family routines (e.g. meal and bed times), family activities (e.g. social events and cleaning) or employment (e.g. child too distressed to be placed in childcare). Finally, trauma may damage a child's trust in their parent's ability to be a safe and secure base and this can have significant ramifications for the quality of attachment and further exacerbate a parent's guilt about not protecting their child.

Scheeringa (2009) has proposed several models, that are not mutually exclusive, to explain the significant association between child and parent distress following trauma. These include:

(1) *Parenting models* which suggest that traumatised parents are impaired in their capacity to act as a "protective shield" as they are too overwhelmed and

symptomatic to provide the emotional support and effective parenting practices needed to help their child recover from the effects of trauma. Within this model, additional mechanisms that have been proposed include:

a. A full mediation model whereby parental distress following trauma mediates the relationship between trauma and children's emotional and behavioural functioning, rather than the trauma having a direct effect on the child;
b. Moderation model whereby the child's symptomatic response to the traumatic event is intensified or buffered by the relationship with their caregiver;
c. Partial moderation model where poor parenting is an additive burden on the child and prevents an improvement in their symptomatology.

(2) *Bidirectional models* whereby the trauma affects not only the child but other family members and each member's symptomatology exacerbates that of the other. Scheeringa and Zeanah (2001) have proposed the construct of "relational PTSD" to describe the co-occurrence of trauma symptomatology in a young child and their parent.
(3) *Shared genetic vulnerability models* which maintain that the co-occurrence of trauma symptoms in a parent and child may be indicative of a shared biological or genetic vulnerability to psychopathology (Scheeringa et al. 2001).

In summary, whilst prospective studies are still needed to specifically test these models, it is clear that trauma during early childhood must be considered within the context of the parent–child relationship. The preliminary cross-sectional research that has examined some aspects of the proposed relational models will be presented in the following section that focuses on risk and protective factors.

Risk and Protective Factors

The findings presented in the above sections demonstrate that young children do develop posttrauma reactions that can follow a chronic course and have a significant impact on their developing neurophysiological regulation systems and parent–child relationship. It is therefore critically important to identify the factors that protect these children as well as the factors that place children at greater risk of long-term adverse outcomes. This information is needed to inform the development of effective screening measures and prevention and intervention programmes. Most research on risk factors has been conducted with older children. The following section will focus on emerging work with infants and young children that has identified certain pretrauma, trauma-related and posttrauma-recovery-environment variables that may account for some of the variation seen in young children's emotional and behavioural outcomes following trauma.

Pretrauma Variables

Premorbid behavioural difficulties may increase a child's vulnerability to poor outcomes following trauma. Specifically, Scheeringa et al. (2006) found that children who had elevated pretrauma externalising difficulties and also witnessed a threat to their caregiver were more likely to develop PTSD symptoms. Additionally, exposure to prior trauma has also been shown to increase a young child's risk of developing clinically significant behavioural difficulties after witnessing high-intensity World Trade Centre attack-related events (Chemtob et al. 2008).

However, existing studies with young children have yielded inconsistent findings on age and gender as a predictor of outcomes following trauma. Some studies have suggested that younger children may be more vulnerable to the effects of trauma. Specifically, Scheeringa et al. (2006) found that younger children (1–3 years) experienced more PTSD, SAD, MDD symptoms and internalising and externalising difficulties than older children (4–6 years) following exposure to a range of traumatic experiences. Additionally, Scheeringa and Zeanah (1995) indentified a potential developmental window, where children between the ages of 18 and 48 months were particularly prone to reexperiencing symptoms. Further, Laor et al. (1997) found the relationship between child and parent distress was strongest for the younger group of children (3–4 years vs. 5 years). In contrast, Thabet et al. (2006) did not find a moderating effect of age on total scores on the Strengths and Difficulties Questionnaire or CBCL in preschool children exposed to war trauma. Finally, analyses by Scheeringa et al. (2005) using a hospital and domestic violence cohort found no relationship between PTSD symptoms and age.

There are also similar inconsistencies for gender as a risk factor with some studies finding no significant differences between boys and girls externalising difficulties (Graham-Bermann and Levendosky 1997; Lieberman et al. 2005b) or trauma symptoms (Graham-Bermann et al. 2008; Scheeringa and Zeanah 1995, 2008; Scheeringa et al. 2005), whilst others have found young girls display higher rates of ADHD (Scheeringa and Zeanah 2008) and PTSD symptoms (Green et al. 1991). In contrast, one study has found boys scored higher on the hyperactivity subscale in comparison with girls (Thabet et al. 2006).

Trauma-Related Variables

The frequency and severity of trauma symptoms have also been shown to vary by the type and degree of exposure to a traumatic event as well as threat of life to self or others. In a sample of preschool children exposed to a variety of potentially traumatic events, Graham-Bermann et al. (2008) found children exposed to family violence were at greatest risk of experiencing fear and intrusive symptoms in comparison with children exposed to other events such as accidental injury. Chemtob et al. (2008) have shown that preschool children exposed to high-intensity traumatic events related to the World Trade Centre attack were at much greater risk of experiencing depressed/anxious symptoms and sleep problems than children exposed to other traumatic events (e.g. accident, natural disaster).

Regarding degree of exposure, preschool children with high exposure to war trauma were found to experience elevated emotional and behavioural difficulties in comparison with children with low exposure (Thabet et al. 2006). Additionally, Scheeringa and Zeanah (2008) found that children who stayed in New Orleans during the storm and flood presented with significantly more PTSD and SAD symptoms compared to children who were evacuated beforehand. Finally, Israeli preschool children who were displaced because their homes were destroyed during Scud missile bombing demonstrated elevated traumatic stress symptoms at 30 months in comparison with undisplaced children whose homes were not destroyed (Laor et al. 1996, 1997).

Perceived threat of life to self or a primary caregiver also represents a significant risk factor. Green et al. (1991) found that threat to life was the most powerful predictor of PTSD symptoms in children (aged 2–15 years) 2 years following a dam collapse. In a review of 41 case studies of traumatised children under the age of 48 months, Scheeringa and Zeanah (1995) found that trauma that involves witnessing a threat to a caregiver was one of the strongest predictors of PTSD in young children. Threat to a caregiver was associated with elevated hyperarousal and aggressive symptoms, more fears, but fewer numbing symptoms (Scheeringa and Zeanah 1995). Consistent with these findings, Scheeringa et al. (2006) also found that witnessing a threat to a caregiver predicted total number of PTSD symptoms in children hospitalised with injuries.

Finally, a relationship has been found between physiological factors and trauma symptomatology in young children. Stoddard et al. (2006) found elevated pulse rate during hospitalisation for burn injury was associated with acute stress symptoms in 12–48-month-old children and mediated the relationship between burn size and acute stress. Pain was not associated with pulse rate, but was indirectly associated with children's acute stress symptoms through its influence on parent distress (Stoddard et al. 2006).

Posttrauma-Recovery-Environment Variables

As mentioned in the previous section, it is hypothesised that the quality of the parent–child attachment, maternal mental health and parenting skills influence a child's adjustment following exposure to trauma. However, very few studies have specifically examined the relationship between attachment quality and psychosocial outcomes in young children exposed to trauma. One study has found that the quality of the parent–child relationship significantly predicted externalising difficulties in preschool children exposed to DV (Johnson and Lieberman 2007). The only other known study found that even though attachment was related to maternal psychological functioning and parenting effectiveness, it did not serve as an independent predictor or mediator to child externalising difficulties following exposure to DV (Levendosky et al. 2003).

Research has consistently documented an association between parent and child psychopathology following exposure to trauma. Specifically, maternal psychopathology (in particular PTSD) has been associated with elevated levels of traumatic stress symptomatology (Bogat et al. 2006; Green et al. 1991; Laor et al. 1996, 1997, 2001; Scheeringa and Zeanah 2008; Stoddard et al. 2006), SAD, ODD, and MDD symptoms (Scheeringa and Zeanah 2008), and internalising (Laor et al. 1996; Zerk et al. 2009) and externalising difficulties (Johnson and Lieberman 2007; Levendosky et al. 2003; Lieberman et al. 2005b; Linares et al. 2001; Nomura and Chemtob 2009; Zerk et al. 2009) in infants and preschool aged children exposed to trauma. The next two paragraphs will explain these studies in more detail.

Several of these studies have tested the potential mediating role of maternal psychopathology in the relationship between exposure to IPV and child functioning. First, maternal distress has been shown to mediate the relationship between exposure to community violence and externalising problems in preschool aged children (Linares et al. 2001). Additionally, Levendosky et al. (2003) tested a proposed ecological model and found that maternal psychological distress was indirectly associated with child externalising behaviour through its influence on parenting effectiveness. Specifically, children exposed to DV experienced more externalising difficulties if they had mothers who reported more depressive and trauma symptoms and lower parenting effectiveness. This model was tested further in a sample of 203 mother–infant dyads and results found maternal functioning (i.e. trauma, depressive and anxiety symptoms) partially mediated the relationship between current DV and infant externalising behaviour

(Levendosky et al. 2006). Adding further support for an ecological-contextual framework, Lieberman et al. (2005b) found maternal PTSD mediated the association between maternal life stress and child behaviour problems. Finally, research investigating the potential moderating role of maternal trauma symptoms found infant trauma symptoms were significantly associated with maternal distress, but only for infants whose mothers had experienced severe IPV (Bogat et al. 2006).

There are many potential confounding factors that complicate the relationships between parent–child functioning in the context of DV backgrounds. However, research investigating other types of trauma has also supported the association between parent–child functioning. Firstly, a longitudinal study of preschool children exposed to SCUD missile attacks during the Gulf War (Laor et al. 1996, 1997, 2001) found that maternal trauma symptomatology predicted child trauma symptomatology and elevated externalising symptoms. Maternal avoidance symptomatology was the most significant predictor of child trauma symptoms 30 months later (Laor et al. 1997). During the 5-year assessment, Laor et al. (2001) found further support for mothers providing a stress-buffering role, with children who had experienced a decline in trauma symptoms more likely to have mothers who were functioning well. Whereas children whose mothers were functioning poorly showed an increase in severity of trauma symptoms. Furthermore, Stoddard et al. (2006) reported that parent distress mediated the relationship between children's pain levels and acute stress symptoms following burn injury. Recently, Scheeringa and Zeanah (2008) demonstrated that preschool children of caregivers who developed new-onset symptomatology (e.g. PTSD, MDD) following Hurricane Katrina were also more likely to develop new-onset trauma symptomatology. It was suggested that parent's immediate and trauma-specific responses were more strongly related to their child's adaption rather than their long-term parenting style (Scheeringa and Zeanah 2008). Finally, Nomura and Chemtob (2009) have found a significant linear relationship between number of maternal psychological disorders diagnosed and child functioning. Specifically, children with mothers suffering from concurrent depression and PTSD were at greater risk of experiencing aggressive behaviour, emotionally reactive behaviour and somatic complaints in comparison with children of mothers with neither a diagnosis of depression or PTSD.

In addition to maternal distress, parenting behaviours (e.g. responsive, consistent and predictable) may also influence child outcomes following trauma exposure. Research with young children exposed to DV has shown that maternal emotional functioning (e.g. anxiety and depression) was associated with parenting stress, and parenting stress was in turn associated with elevated levels of child internalising and externalising difficulties (Zerk et al. 2009). Additionally, a negative association between parenting effectiveness (i.e. authoritative) and externalising behaviours has been found in a sample of preschool children exposed to DV (Levendosky et al. 2003). Finally, another study of preschoolers in a DV cohort has found maternal attunement to their child's experience of sadness and anger accounted for some variance in child externalising behaviours (Johnson and Lieberman 2007).

Finally, child outcomes following trauma have been associated with family functioning. Research has found that irritable and depressed family atmosphere contributed significantly to children's PTSD symptomatology following a dam collapse and subsequent flooding (Green et al. 1991). Furthermore, adequate family cohesion and adaptability have been associated with fewer externalising, internalising and stress symptoms in families displaced from missile attacks whereas children from disengaged or enmeshed families experienced elevated trauma or externalising symptoms (e.g. aggression, acting out and hyperactivity; Laor et al. 2001).

There are several limitations with some of the above-mentioned literature that need to be considered. Firstly, only one longitudinal study looking at predictors has been conducted (Laor et al. 1997, 2001); therefore, inferences about causal relationships are limited by the cross-sectional nature of the existing studies with this population. Additionally, very few studies have specifically examined predictors of PTSD symptoms and only four of these have used diagnostic interviews. Finally, the majority of studies have been conducted with IPV populations which significantly limit the generalisability of the existing findings. This is particularly the case for findings about the association between parent and child distress given that parents are most often directly exposed to DV as well.

In summary, there are now some cross-sectional studies that have investigated aspects of the proposed parenting and relational models mentioned previously. The research to date suggests that a secure attachment, parental psychological functioning, effective parenting skills and cohesive family functioning may protect children from the negative effects of trauma. Whereas the following factors may place young children at greater risk of poor outcomes following trauma: witnessing threat to caregiver, direct exposure to the trauma, interpersonal trauma, parental psychopathology, insecure attachment, poor parenting skills and poor family functioning. However, as noted earlier, the absence of longitudinal studies and other limitations such as the absence of controlled studies that would support these factors and the negative findings of studies such as Levendosky et al. (2003) make it difficult to support such models. It may be more conservative at this point to consider those

as speculative models until support from controlled prospective studies has been provided.

Treatment

This review has illustrated that preschool children exposed to traumatic events are at risk of a range of emotional and behavioural problems that are associated with a myriad of deleterious short and long-term consequences. Given that posttrauma reactions can follow a chronic trajectory into adulthood, it is particularly important that young children receive treatment early on to reduce the potential significant impact on their healthy development and future.

Trauma-focused cognitive behaviour therapy (TF-CBT) has received the strongest empirical support and is the recommended treatment protocol for childhood PTSD (Cohen et al. 2010; Silverman et al. 2008). However, to date, there have been very few controlled treatment studies for PTSD or other anxiety or behavioural disorders in early childhood. The first randomised treatment study published examined the effectiveness of a 12-session CBT programme for sexually abused preschool children (3–6 years) and their parents in comparison with nondirective supportive treatment (Cohen and Mannarino 1996). Unfortunately, PTSD was not assessed; however, children in the CBT group demonstrated significantly greater reductions on the Total Behaviour Problems and Internalising scale of the CBCL than children in the supportive therapy group. One-year follow-up analyses indicated that children in the CBT group demonstrated significantly more improvement over time than the supportive therapy group (Cohen and Mannarino 1997).

A second study with sexually abused young children (2–8 years), randomised children and parents to 11 group sessions of CBT or supportive education group treatment (Deblinger et al. 2001). All children showed an improvement in PTSD symptoms, but no significant differences were found between the two groups. Children in the CBT group did however demonstrate greater knowledge and retention of body safety skills. Parents in the CBT group reported significantly greater reductions in intrusive thoughts and emotional distress than parents in the supportive therapy group.

Recently, support has been found for the feasibility and effectiveness of a manualised 12-session TF-CBT protocol conducted with 3–6-year-old children exposed to a variety of traumatic events (Scheeringa et al. 2010). Caregivers were in the room with the children for three of the sessions. The protocol in this study was adapted from the manual used by Cohen and Mannarino (1996). Scheeringa et al. (2010) found that children in the intervention group experienced a significantly greater decline in PTSD symptoms than the control group. Significant time effects were observed for depression, separation anxiety and oppositional defiant disorders; however, there were no significant group differences. A large effect size was found for PTSD depression, separation anxiety and oppositional defiant disorders. Overall, 83.5% of children were determined to understand the tasks that were rated.

Finally, preliminary support has been found for child–parent psychotherapy (CPP) for preschoolers exposed to marital violence (Lieberman et al. 2005a). Lieberman et al. (2005a) randomly assigned 75 preschool (3–5 years) mother dyads to 50 sessions of CPP or case management plus community treatment. Analyses indicated that CPP was significantly more effective at reducing children's traumatic stress symptoms, total behaviour problems and mother's avoidance symptoms. CPP may be particularly useful for very young children or when there are problems with the parent–child attachment; however, a limitation is the time required to complete treatment.

Limitations of Existing Research

Whilst the field has made progress in helping to understand the impact of trauma in young children, as can be seen in this review, a considerable gap exists between the amount of systematic research conducted with young children in comparison with older children, adolescents and adults. Additionally, there are several limitations with the existing studies that need to be taken into consideration.

To begin with, the majority of studies have relied solely on questionnaires, rather than diagnostic interviews, to either assess more general areas of functioning (e.g. CBCL) or assessed specifically for PTSD symptoms using the CBCL PTSD scale or checklists developed specifically for the study and not subjected to psychometric testing. Given the difficulties with accurately identifying symptoms in this age group, checklists create an added disadvantage as they do not enable explanation or clarification to check parent understanding or accurate endorsement of symptoms (Scheeringa and Zeanah 2008). Additionally, concerns have been raised regarding the validity of the CBCL PTSD scale as the items are administered within the context of assessing behavioural change rather than traumatic stress responses specifically and may therefore be providing an assessment of generic, rather than trauma-related, distress (Levendosky et al. 2002).

Furthermore, to date, there are only eleven studies that have used developmentally sensitive diagnostic interviews or specific PTSD checklists. Of these studies, six are by the same research group and although their research has contributed significantly to our understanding of young traumatised children, the samples are skewed towards a disproportionate number of black participants from single-

parent families and low socioeconomic groups that have been exposed to a heterogeneous range of chronic traumas (Scheeringa et al. 2006). Additionally, the majority of existing studies have small sample sizes, are cross-sectional or retrospective in design; there is a great variation in assessment time frames within and across studies, and the majority of studies have been with repeated interpersonal traumas or mass trauma. This limits the generalisability of findings as the number and expression of trauma symptoms in both the child and the parent may vary greatly depending on the type of trauma (e.g. repeated interpersonal vs. accidental single incident) and interval of time between exposure to the event and assessment (e.g. 1 month vs. 12 months).

Finally, the majority of studies have had to rely on parent report of their child's emotional and behavioural functioning. Whilst this is difficult to avoid due to the limited communication abilities of preschool children, parent report has the tendency to underestimate internalising symptoms in children (Meiser-Stedman et al. 2008; Scheeringa et al. 2006) and can also be biased by the parents' own traumatic experiences (Johnson and Lieberman 2007), level of guilt or misconceptions that their child is 'too young' to be affected.

Future Research Needed

Considerable research is therefore needed to address the gap that exists between our scientific knowledge base on trauma in young children in comparison with the older populations. It is therefore essential that prospective longitudinal studies utilising developmentally sensitive and valid diagnostic assessment instruments are conducted with children under the age of 6 years who are exposed to a wide range of traumas and across different socioeconomic and cultural groups. Specific areas for future research directions include the following:

- Examine the diagnostic validity of the proposed DSM-V PTSD criteria to determine the most suitable approach for conceptualising posttrauma reactions in children under the age of 6 years.
- Identify the symptoms which best reflect posttraumatic distress specifically versus more global emotional and behavioural distress (Mongillo et al. 2009).
- Develop an improved understanding of the relationship between PTSD and comorbid disorders.
- Investigate the nature and frequency of symptom presentation following different types of trauma exposure (e.g. acute vs. chronic trauma, accidental vs. interpersonal, witnessed vs. experienced).
- Conduct epidemiological research to document prevalence, onset and longitudinal course of posttrauma psychological reactions in young children and the impact this has on other areas of functioning.
- Further examine the association between parent–child relationship factors and psychopathology following trauma and determine the direction of effects.
- Identify the key psychological, physiological and environmental variables that function as risk and protective factors.
- Incorporate psychophysiological and brain imaging measures to assess the impact of trauma on cardiac patterns, hormonal and neurotransmitter activity, and brain structures (Scheeringa et al. 2001) to determine the effects of stress on the developing nervous system.
- Develop and test conceptual models to help understand the relationship between trauma, biopsychosocial factors and emotional and behavioural functioning in traumatised young children.
- Validate existing measures of psychopathology in young children and develop and evaluate new measures where needed (e.g. screening measures, PTSD questionnaires).
- Develop and evaluate the feasibility and effectiveness of prevention and treatment programmes for posttrauma reactions in young children exposed to a variety of trauma types.

Summary and Conclusion

Infants, toddlers and preschoolers are a high-risk group for exposure to trauma. Young children may also be particularly vulnerable to experiencing adverse outcomes due to their limited coping skills, unique dependence on their primary caregiver to act as a protective shield and the rapid period of emotional, physical, neurological, social, behavioural and cognitive development that occurs during early childhood. However, as a result of resistance to the notion that young children can experience clinically significant psychopathology and the challenges of diagnosis and assessment in this age group, this population has been largely neglected. Fortunately, the importance of infant and preschool mental health is now recognised and advances in developmentally sensitive classification systems and diagnostic assessment measures have led to an increase in systematic research over the last 3 decades.

The clinical and research literature base that was presented in this review indicates the following: (a) young children do have the developmental capacities and do experience psychopathology following trauma, (b) there are important unique developmental differences in the rate and manifestation of trauma symptomatology, (c) the DSM-IV-TR PTSD criteria is not developmentally appropriate for young children, (d) there is a high rate of

comorbidity with PTSD, and this may increase the rate of erroneous diagnoses (e.g. ODD or ADHD), (e) if left untreated trauma symptomatology may follow a chronic and unremitting course and have a significant impact on developmental trajectories, and (f) the impact of trauma must be considered within the context of the parent–child relationship.

However, whilst the field has made progress, especially with the recent proposal to include a specific PTSD algorithm for preschool children in the DSM-V, the literature lags significantly behind that of older children and adolescents. This is now an opportune time for scientific research to be conducted to inform the establishment of empirically supported developmentally sensitive diagnostic criteria for PTSD in young children. This will in turn facilitate the development of gold standard assessment instruments, promote epidemiological research and the development and evaluation of evidence-based treatments as well as lead to enhanced research and mental health policy.

In conclusion, this review has highlighted that traumatised infants, toddlers and preschoolers are an important group that deserve much needed attention. Although there are increased challenges with working with this population, there is the potential to dramatically improve the mental health and well-being of young children and minimise the long-lasting impact trauma can have on children's emotional, behavioural, social and neurophysiological development.

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