

Clinical Implications of Traumatic Stress from Birth to Age Five

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Key Words

trauma, early childhood, infant mental health, PTSD, intervention

Abstract

Children aged birth to five years are exposed to a disproportionately increased amount of potentially traumatic events compared to older children. This review examines the prevalence of traumatic exposure in the birth-to-five age range, the indicators and diagnostic criteria of early traumatic stress, and the contextual issues associated with the experience of early trauma. The article also selectively reviews the impact of trauma on the biological, emotional, social, and cognitive functioning of young children's development along with some promising clinical treatment and service interventions that target the parent-child relationship as a vehicle of trauma recovery. Despite extensive documentation of the negative impact of trauma on the normal development of young children, research, clinical, and policy efforts to address the psychological repercussions of early victimization remain remarkably limited. Future directions in research and clinical practice as well as implications for policy are discussed.

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INTRODUCTION

The first five years of life are the most vulnerable to traumatic death and injury as the result of interpersonal violence and accidents, but efforts to address the psychological repercussions of early victimization remain remarkably limited. There is a pervasive assumption among researchers, clinicians, and the general public

that infants, toddlers, and preschoolers do not remember acts of violence or other traumatic stressors, are too young to understand their significance, or recover readily from traumatic exposure due to their inherent resilience. This perception is far from accurate. There is extensive documentation of the impact of trauma on the biological, emotional, social, and cognitive functioning of young children. This review examines the prevalence of traumatic exposure in the birth-to-five age range, the indicators and diagnostic criteria of early traumatic stress, the contextual issues associated with the experience of early trauma, manifestations of experiencing early traumatic stress, and interventions for young children exposed to traumatic events, as well as policy implications and recommended future directions for this area of study.

The scope of trauma exposure in the first five years of life is truly staggering. Recent national statistics show that 75.7% of the children who died as a result of child abuse and neglect were younger than 4 years old, and the year between birth and 12 months is the single most dangerous period in a child's life, with the highest death rate due to abuse and neglect and an overall victimization rate of 21.9 per 1000 children. Of children entering foster care, 36% are in the birth-to-five age range, with 14% under age 1 (U.S. Dep. Health Human Serv. 2007). Other findings indicate that children under age 5 are more likely than older children to be present in homes where domestic violence (DV) occurs (Fantuzzo & Fusco 2007). Accidental death and injury are also disproportionately high in this age group. Children under age 5 are hospitalized and die from drowning and submersion, burning, falls, suffocation, choking, and poisoning more frequently than children in any other age group (Grossman 2000). A randomly selected community sample of parents of 3- to 7-year-old children in upstate New York found that 87% of the children experienced some form of physical aggression, and in 13% of them the aggression was severe enough to meet many definitions of physical abuse (Slep & O'Leary 2005). Some groups are more affected than others. One nationally

DV: domestic violence

representative sample of children aged 2 to 9 years showed that children in single-parent and stepfamily homes, ethnic minorities, and children of lower socioeconomic status had greater lifetime exposure than comparison groups to most forms of intentional victimization, including physical abuse, sexual abuse, and witnessing family violence (Turner et al. 2006).

Victimization has clear-cut psychological repercussions for these young children. In a pediatric clinical sample of 305 children aged 2 to 5, there was a strong association between the number of stressors experienced by a child and the likelihood of emotional or behavior disorders meeting criteria of the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV; Am. Psychiatr. Assoc. 1994), with 17.4% of the children showing such a disorder (Egger & Angold 2004a). Notably, this sample showed the same high levels of victimization as found in other studies. In the sample as a whole, 52.5% of the children had experienced a severe traumatic stressor in their lifetime: 20.9% had experienced the loss of a loved adult, 16% had been hospitalized, 9.9% had been in a motor vehicle accident, 9.5% had a serious fall, and 7.9% had been burned. In the subsample of 2-year-olds, 42% had experienced at least one of these severe stressors. The finding that a psychiatric diagnosis is strongly associated with these traumatic experiences at a very early age is a sobering statement of the vulnerability of young children to emotional disorders. In spite of the evidence, empirical studies on mental health issues and treatment for children tend not to target this youngest age group. National datasets and population-based studies usually include all children under age 18 instead of parsing out children aged 0 to 5. The majority of empirical studies also mostly utilize school-aged children and adolescents.

THE CONTEXT FOR DISORDERS OF TRAUMATIC STRESS

Definition of Traumatic Events

There is considerable debate about what constitutes a traumatic event, particularly in light

of the individual differences in response to a single traumatic episode. Freud (1926) maintained that the three key criteria involved the (a) unpredictability of the event and the person's response of (b) horror and (c) helplessness. In an effort to operationalize the definition, the DSM-IV anchored its diagnosis of post-traumatic stress disorder (PTSD) in the person's experience of an event or events that "involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (American Psychological Association 1994, p. 463). The applicability of this definition for children aged birth to five has been questioned on the grounds that young children may not have the cognitive resources to appraise accurately the objective danger represented by an event, including its potential to cause death or injury to the self or others. For this reason, a definition specifically tailored to young children was adopted by the *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised* (DC:0-3R), which refers to "an event or events that involve actual or threatened death or serious injury to the child or others, or a threat to the *psychological* or physical integrity of the child or others" (Zero to Three 2005; italics added). The addition of a psychological dimension enables diagnosticians to consider the potential traumatic impact of prolonged separation from the attachment figure in very young children even in conditions when the child is objectively safe.

Single Versus Cumulative Trauma

A persistent problem in the study of traumatic stress across the life span is the conceptual and methodological difficulty of measuring chronic and repeated traumatic exposure. As a result, the bulk of studies on traumatic exposure involve a single trauma episode. For example, Finkelhor and colleagues (2007a) point out that the trauma literature tends to focus on individual types of victimization instead of obtaining "complete victimization profiles" (p. 8). This single-event approach greatly limits our

DSM-IV: *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition

PTSD: post-traumatic stress disorder

DC:0-3R: *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised*

understanding by focusing on acute traumas only and failing to place single events within the broader lens of chronic, complex, and/or multiple traumas. This limitation also applies to the study of young children raised in violent environments, who are routinely exposed to multiple and overlapping sources of violence and accidental injury resulting from severe neglect.

A large empirical literature in adults shows that multiple victimizations, also referred to as revictimization, lead to more severe outcomes and symptomatology as compared to no or single victimization (as reviewed in Marx et al. 2005). The revictimization literature typically includes adults who experienced childhood abuse, but Finkelhor and colleagues (2007b) have begun to examine this issue with a national sample of more than 2000 children aged 2 to 17 recruited through random digit dialing. Based on telephone interviews with caretakers and their children using the Juvenile Victimization Questionnaire, 70% of the children interviewed reported experiencing at least one of the victimization categories during the past year. Of those children, 64% experienced at least one additional, different kind of victimization during the same time period, and 18% experienced four or more victimizations. The mean number of victimizations was 2.8, with a maximum number of 16. Exposure to four or more episodes, a condition the authors termed “polyvictimization,” significantly predicted trauma symptoms during telephone interviews conducted one year later using the Trauma Symptoms Checklist for Children (Briere 1996) and the Trauma Symptoms Checklist for Young Children (Briere et al. 2001) and controlling for prior victimization and prior mental health status. Notably, polyvictimization was a stronger predictor of psychological distress than any one particular type of victimization. Similar findings emerged from the prospective Adverse Childhood Experiences study, where adults who at baseline reported four or more adverse childhood experiences were at greatly increased risk for negative physical and mental health outcomes as

the study progressed (Felitti et al. 1998). These findings are consistent with a growing body of literature indicating that developmental outcomes are best predicted by cumulative risk factors rather than by a single pathogenic condition (Rutter & Sroufe 2000).

The psychological impact of joint exposure to child maltreatment and witnessing domestic violence has been examined in numerous studies. A review of 35 published studies concluded that research findings document a substantial co-occurrence, ranging from 30% to 60% of the cases (Edleson 1999). A review of the effects of domestic violence showed that 45% to 70% of children exposed to domestic violence are also victims of physical abuse, and about 40% of physically abused children are also exposed to domestic violence (Margolin 1998). There is scant research on the co-occurrence of these stressors and other types of traumatic events, including medical trauma, community violence, motor vehicle and other accidents, and natural disasters. Typically, the study of each of these types of trauma exists as a subfield within the larger literature, with studies specifically targeting populations that experienced the specific event of interest without screening for their experience of other traumatic events. For example, studies conducted with pediatric medical samples do not tend to consider the child’s exposure to neighborhood violence in spite of findings that young children have a high incidence of exposure to community violence and that exposure is associated with behavioral problems (Linares et al. 2001). Reflecting on the growing evidence of cumulative trauma exposure, Finkelhor and colleagues posited that for a large proportion of victimized children, victimization is “more of a ‘condition’ than an ‘event’” (Finkelhor et al. 2007a, p. 9). However, the field has yet to systematically investigate the “condition” within which these children develop. The few studies that do so tend not to examine the specific experiences of very young children. For example, in spite of statistics showing that the first year of life has the highest trauma incidence, Finkelhor and colleagues did not include in their sample children under age 2, and they

examined children across a wide age range (2 to 17) instead of also focusing on the 2 to 5 age subgroup in their sample.

The Role of Attachment Relationships in Children's Response to Trauma

Young children evolve their feelings of safety in the world around the physical and emotional availability of the attachment figure, monitoring the environment for signs of danger and seeking proximity and contact when faced with threat (Bowlby 1969). Trauma threatens the child's developing ability to maintain trust in the attachment relationships. In the moment of trauma, the child experiences overwhelming sensory stimulation in the form of pain and/or frightening visual, auditory, olfactory, and tactile sensations, leading to a shattering of the developmental expectation that the parent will be reliably available as a protection from danger. When the child grows up in the context of chronic and multiple traumas, traumatic expectations become the norm as the child learns to anticipate repeated and unrelieved pain and fear. These traumatic expectations may generate hypervigilance and constrict children's motivation to play, explore, and learn from the physical and interpersonal environment. As the child develops, reminders of the original trauma can also renew the negative emotions that were part of the first event, further distorting the child's development (Pynoos et al. 1999).

An attachment figure who is available to the child under conditions of risk and stress can buffer the child's response, whereas an unavailable or frightening attachment figure can exacerbate the child's fears. For example, several studies have shown that infants in secure attachment relationships are better able to modulate their physiological stress response as compared to infants in insecure attachment relationships, whereas infants with anxious or disorganized attachment are associated with greater dysregulation of physiological response (Gunnar & Cheatham 2003, Gunnar & Quevedo 2007). Threat to the attachment figure is associated in the child's mind with

threat to the self. Scheeringa & Zeanah (1995) found that in children exposed to a severe trauma prior to 48 months of age, PTSD was diagnosed more often and children had more symptoms of aggression, fear, and hyperarousal when they witnessed threat to the mother as compared to children exposed to other traumas. Replicating this finding in a sample of children ranging in age from birth up to 18 years who were admitted to an inpatient unit in a Level-1 trauma center for physical injuries, the authors found that witnessing a threat to the caregiver was the only predictor of PTSD symptoms out of seven different risk factors that also included younger age, female gender, minority group membership, prior traumatization, pretrauma externalizing behaviors, and pretrauma internalizing behaviors (Scheeringa et al. 2006). Among traumatized children, those with insecure attachments may be more likely to experience traumatic stress reactions, at least partly because of their difficulty in engaging the parent in supportive exchanges that could buffer the impact of the trauma (Lynch & Cicchetti 1998).

Traumatic events that affect the young child also frequently affect the parent(s) because young children are often in the company of the parent and subjected to the effects of the same events. Scheeringa & Zeanah (2001) proposed a relational PTSD model where they outlined several types of effects that may create an association between parent and child post-traumatic stress symptoms. The moderating effect suggests that the caregiver's relationship with the child affects the strength of the association between the actual traumatic event and the child's response. The degree to which the caregiver can accurately read the child's cues and respond effectively to the child's needs may intensify or reduce the adverse effect of the trauma event on the child's symptoms. The vicarious traumatization effect suggests that if a caregiver's responsiveness to the child is affected by a traumatic event that the child did not experience directly, the impact of the trauma on the caregiver-child relationship accounts for the effect of the trauma on the child's symptoms.

The compound effect suggests that when both caregiver and child are exposed to trauma, the post-traumatic symptomatology in one partner exacerbates the symptoms of the other. This condition may be manifested through several mechanisms. Traumatized adults may experience post-traumatic stress symptoms such as avoidance and withdrawal, which limit their availability and responsiveness to the child. Simultaneously, exposure to a traumatic event creates in the child stress symptoms that are exacerbated by the indirect effect of the caregiver's compromised responsiveness. Children's symptomatic behavior may also place stress on the caregiver and exacerbate the adult's post-traumatic responses. Another possibility is that parents may become constrictive and overprotective in their parenting, also exacerbating the child's post-traumatic symptomatology. Finally, the young child may become increasingly symptomatic from observing and being cared for by a parent who shows re-experiencing symptoms and is emotionally dysregulated or preoccupied with the trauma.

Lyons-Ruth and colleagues (1999) emphasized the intergenerational role of parent's unresolved childhood fears, which may be transmitted to the child through frightening or frightened parenting behaviors. They proposed a relationship diathesis model where vulnerability to stress-related dysfunction is determined by at least three factors: the characteristics of the stressor, the individual's genetic vulnerability to stress, and the capacity of the attachment system to modulate the high levels of arousal that accompany stress. In this model, children respond with emotional and behavioral symptoms either when the stressor is too overwhelming or when the attachment relationship is unable to modulate the child's intensely negative affective response. Parents with unresolved fear dating back to their childhood have difficulty helping their children modulate strong emotions such as fear because the parents curtail their conscious attention to the child's fear signals so as not to re-evoked their own early traumatic responses. Fear signals that are not noted and responded to are unmodulated within the

relationship, leaving children alone with their own unresolved internal experience.

There is extensive empirical evidence supporting theoretical pathways linking the child's traumatic stress responses with the quality of the child-parent relationship. In a study of preschoolers residing in high-crime neighborhoods, maternal distress mediated the relationship between child exposure to community violence and child behavior problems (Linares et al. 2001). Maternal psychological functioning was also identified as a predictor of later behavior problems in a longitudinal study of Israeli preschoolers whose homes were damaged by SCUD missiles during the Gulf War (Laor et al. 2001). Gunnar & Cheatham (2003) reviewed several studies conducted with at-risk children who either did not have access to stable secure relationships in the first months of life or had been maltreated. Across studies, results indicated that the longer the child was neglected, the higher the degree of developmental dysfunction to the hypothalamic-pituitary-adrenal (HPA) system and the less the HPA system recovered when conditions improved. The association between maternal response and child outcome has also been demonstrated with clinical samples. Lieberman and colleagues (2005) showed that among preschoolers referred for treatment after witnessing their mothers' battering by their father figure, the mothers who had experienced higher levels of life stress had children with more behavioral problems. This association was mediated by the mothers' response to stress, both in the mothers' individual functioning and in the mother-child relationship.

These findings suggest that the interface between attachment and traumatic experiences needs to become an integral component in the assessment and treatment of infants, toddlers, and preschoolers with mental health and relationship problems. The incidence of traumatic events is pervasive in infancy and early childhood, but it is not consistently investigated as a possible factor in the etiology of psychological and behavioral problems in young children. The quality of attachment is an important

factor in young children's capacity to process and resolve traumatic experiences. At the same time, traumatic events may damage the quality of existing attachments by introducing unmanageable stress in the parent-child relationship, particularly when the parent's functioning is also negatively affected by the trauma. Assessing the etiology of early mental health disturbances should include an evaluation of possible exposure to trauma in the child and the parents. Reciprocally, traumatic stress in the first years of life should be assessed and treated in the contexts of the child's primary attachments.

Other Contextual Considerations

Attachments between children and parents do not unfold in isolation but develop within a larger ecological context characterized by complex transactions between proximal and distal influences, risk and protective factors, and transient versus enduring stresses, all of which influence children's development (Bronfenbrenner 1979, 1986; Cicchetti & Lynch 1993). Some of the relationships between trauma exposure and poverty, community violence, and belonging to a marginalized ethnic/racial group are briefly highlighted below.

Poverty. Scarcity of financial resources increases the likelihood of exposure to traumatic events. Epidemiological studies have also consistently found that high-poverty neighborhoods have a high concentration of community violence. Poor and minority children are more likely to report victimization in the forms of sustaining or witnessing violence in the home (Finkelhor et al. 2005). The incidence of domestic violence is 3% for families with a yearly income of more than \$75,000 and rises to 20% in families with a yearly income of less than \$7500, showing that the likelihood of violence increases as family income decreases (U.S. Dep. Justice 1998). Overall, research studies consistently demonstrate that poverty is one of the most important predictors of negative child outcomes (e.g., Duncan & Brooks-Gunn 2000, Natl. Res. Council. Inst. Med. 2000). For

example, Evans & Schamberg (2009) found in a longitudinal study that the longer the duration of childhood poverty from birth to age 13, measured every six months, the worse one's working memory as a young adult, measured at age 17. This association was mediated by childhood allostatic load, a biological marker of cumulative wear-down of multiple physiological systems over time in response to environmental demands and stressors, which was indexed in this study using the cardiovascular system, hypothalamic-pituitary-adrenocortical axis, sympathetic adrenal medullary system, and metabolic activity. This sample comprised only European-American children, so the interaction between poverty and ethnicity in affecting working memory remains to be elucidated. A large twin study ($N = 2232$) found that young children growing up in more deprived neighborhoods displayed higher levels of antisocial behavior at school entry (age 5) and slower rates of decline in antisocial behavior over the next five years than children living in more affluent neighborhoods (Odgers et al. 2009). The cumulative research findings are consistent in indicating that family socioeconomic status is an important contextual factor that can influence and constrain a young child's development.

Community violence. Young children are frequently exposed to community violence. Interviews with parents of children in a Head Start program in a high-crime neighborhood in Washington, DC showed that 66.5% of parents and 78.1% of children reported that the child had witnessed or been the victim of at least one incident of community violence (Shahinfar et al. 2000). A Boston pediatric medical center recruited a sample of 3- to 5-year-old children because they lived in high-crime neighborhoods and found that 42% of the children had witnessed at least one violent event; 21% experienced three or more violent events, and 12% witnessed eight or more events (Linares et al. 2001). In an earlier study of children under age 6, 47% of the mothers surveyed in a pediatric room of the Boston Medical Center reported that their children had heard gunshots

at least once, 10% reported that their young children had witnessed a knifing or a shooting, and nearly 20% reported that their children had witnessed at least one episode of hitting, kicking, or shoving between adults (Taylor et al. 1994). The continuity over the years of young children's exposure to community violence is a profound cause for indignation and concern about the danger that continues to prevail in so many of the nation's urban neighborhoods, and it should represent an urgent call for action to address the root causes of this community violence as an effective form of public health policy to prevent the sequelae of exposure to violence in young children and their families.

Culture/race/ethnicity. A recent review of studies examining cultural and ethnicity differences in childhood maltreatment, specifically separating sexual abuse, physical abuse, and neglect, concluded that there is no clear evidence for cultural group differences in child sexual abuse, with the exception of Asian cultures, which have lower reported rates of child sexual abuse (Elliott & Urquiza 2006). A similar picture emerged for physical abuse, where findings suggested various group differences, though the patterns were inconsistent and at times contradictory. The authors attributed the inconsistency in physical abuse findings to methodological differences across studies and large within-culture and within-ethnicity variability. Although neglect was the most common form of child maltreatment based on national child welfare reporting data (U.S. Dep. Health Human Serv. 2007), Elliott & Urquiza (2006) found a lack of research studies focusing specifically on cultural differences in neglect and thus were unable to derive any conclusions. They also reviewed cultural differences in potential mechanisms that might explain the differing child abuse rates. For example, researchers have long suggested that how we interpret differences in reports of sexual abuse by cultural groups should be informed by ethnic differences in willingness to disclose abuse as influenced by emphases on family and collectivistic beliefs, filial piety, and restraint in emotional

expression. Differences in parenting also appear to exist between cultural/ethnic groups (for a review, see Natl. Res. Council. Inst. Med. 2000). However, the differences may be influenced by a variety of factors, including acculturation levels, socioeconomic status, and neighborhood variables. Thus, any consideration of cultural identity in maltreatment, and in particular physical abuse, necessarily depends on our understanding of other familial, parental, and environmental factors. Here again, reviews of studies provided no conclusive evidence regarding cultural/ethnic group differences in disclosure rates (Elliott & Urquiza 2006). Cultural attitudes and perceptions toward sexual activities and definitions of sexual abuse remain important areas of study to further investigate cultural patterns in risk for child sexual abuse. These studies also did not focus on specific age groups when examining cultural and ethnicity differences, despite the inverse relationship between maltreatment rates and age.

Although there is inconsistency in cultural/ethnic differences in child maltreatment based on research studies, clear group differences exist in cases reported to child protective services (Hill 2007). In 2007, African American, American Indian or Alaska Native, and multiracial children comprised the group with highest rates of maltreatment, with 19.8, 15.9, and 15.4 per 1000 children of the same race or ethnicity, respectively (U.S. Dep. Health Human Serv. 2007). The next group consisted of white and Hispanic children (10.7 and 10.8 per 1000 children of the same race or ethnicity). Asian children had the lowest victimization rate, 2.5 per 1000 children. African American and Latino young children are more likely to be placed out of home, stay longer in foster care, have more placement changes, and not be reunified with their parents (Hill 2007). Factors such as poverty may lead to heightened attention from state authorities and thereby disproportionately increase the number of cases reported among certain ethnic groups. Although research studies do point to variations in the child protective system's reporting of and response to reported child abuse from different

cultural/ethnic backgrounds (Elliott & Urquiza 2006), societal and familial factors such as exposure to community violence and single-parent homes continue to confound the issue. These reports also typically include all children under the age of 18, not specifically targeting the youngest age group (0 to 5), so that there is relatively less knowledge about the age group with the highest prevalence rate of victimization.

MANIFESTATIONS OF EARLY TRAUMATIC STRESS

Brain Anatomy and Physiology

The general consensus is that trauma and early-life adversities lead to deviations from normal physiological functioning. Research participants with a diagnosis of PTSD consistently show significant alterations in neuroanatomic and psychophysiological variables. Areas of brain functioning that are consistently implicated include the amygdala, medial prefrontal cortex, dopamine system, norepinephrine/epinephrine (adrenergic) system, HPA axis, hippocampus and corpus callosum, serotonin system, and endogenous opiate system. The amygdala is part of the brain's limbic system, which is involved in the modulation and expression of emotions, and serves as a center for screening and giving emotional meaning to incoming sensory stimulation that, when labeled as dangerous, is transmitted to the systems involved in the stress response, triggering a cascade of physiological and psychological responses. These responses include activation of the medial prefrontal cortex, which is involved in planning, working memory, motivation, and differentiation between external reality and internal models, and which releases neurotransmitters such as dopamine, norepinephrine, and serotonin, all of which show dysregulations in patients with PTSD. Although specific findings vary between studies, anatomical differences have been found in brain structure following trauma; differences generally are associated with earlier age of maltreatment, longer duration of maltreatment, and greater severity of

PTSD symptoms (e.g., De Bellis et al. 1999b). In addition to variations in findings across studies, adult patterns of physiological functioning differ from studies with children. For example, adults with PTSD and adult survivors of child maltreatment typically show low levels of basal cortisol activity and elevated adrenocorticotrophic hormone in response to psychological stressors. On the other hand, studies have found that children diagnosed with PTSD subsequent to childhood maltreatment exhibit elevated cortisol levels when compared to control children (see Tarullo & Gunnar 2006 for a review). This difference in the adult and child literature has led researchers to hypothesize that low cortisol levels in adults may reflect a long-term adaptation to trauma because the body cannot sustain the hypersecretion of cortisol that is triggered by childhood trauma (De Bellis et al. 1999a, Gunnar & Vazquez 2001).

Most brain structure studies for maltreated individuals have been done with school-age children rather than with children in the birth-to-five age range. Many of these studies lack appropriate controls or have small samples. Limitations in this area of research are due in part to the fact that the brain continues to develop in the first 25 years of life; peak volumes of various brain structures occur in late childhood or early adolescence (see Giedd 2009 for a review). Researchers have suggested that the adult physiological patterns emerge over time and develop after childhood trauma exposure. Another difficulty is that concurrent psychopathology or adverse events during early childhood years can contribute to more heterogeneous physiological outcomes. Children are still developing their neural systems, so the effects of adverse events versus normal development can be difficult to disentangle (see Gunnar & Quevedo 2007). The nature and timing of the adverse events during normal development can also lead to different patterns of physiological response. Evidence of structural brain differences requires further study with larger sample sizes and longitudinal designs to help explain whether developmental processes or other factors explain the discrepancies between adult and child findings

and whether there are accompanying functional changes that appear with maturation (De Bellis et al. 2005). In addition, quality of parental care may be a strong moderator of psychobiological child measures. Scheeringa et al. (2004) reported that traumatized children ranging in age from 20 months to 6 years, with PTSD and without PTSD, had decreased heart period in response to a trauma stimulus when compared to a control group of nontraumatized children. There were no significant group effects for respiratory sinus arrhythmia (RSA), but a significant interaction effect was found between parental positive discipline with PTSD symptoms and RSA. The children with the most severe PTSD symptoms had decreased RSA during the trauma stimulus (when their caregivers showed less positive discipline during a clean-up task), which is a significant interaction effect.

In summary, knowledge is still in its early stages in this area. The bulk of the evidence, however, strongly indicates that there are marked and persistent psychobiological abnormalities in adults and children with post-traumatic symptoms, including in a variety of brain structures and physiological processes. These findings have important clinical and policy implications because they highlight the urgency of preventing child victimization, providing good screening that allows for earlier identification of children who experienced traumatic life events, and developing effective treatments as well as the public health resources that allow for these treatments to be administered in a timely manner. The findings about the role of parental positive discipline on child physiological variables also underscore the importance of including parent-focused interventions in treatments designed to treat early childhood traumatic stress.

Socioemotional and Behavioral Outcomes

Research studies with older children have documented robust findings in childhood exposure to trauma and later problematic social interactions, additional peer victimization,

and problem behaviors. These studies typically focus on school-aged children who experienced early childhood trauma rather than using preschool samples. A few studies specifically targeting preschool children show similar associations between trauma exposure and maladaptive socioemotional and behavioral outcomes at this age. For instance, preschool children exposed to violence have more difficulty than their nonexposed peers in their relationships outside their families (Graham-Bermann & Levendosky 1998). The authors included observations of group play and assessment of children's relationships with their preschool teachers. Children exposed to domestic violence were more likely to exhibit negative affect, responded less appropriately to situations, were more aggressive with peers, and had more ambivalent relationships with their caregivers. Co-occurrence of different psychiatric diagnoses, a frequent finding for traumatized older children, has also been reported for preschoolers. Scheeringa and colleagues (2003) compared the diagnostic profile of three groups of preschool children: PTSD, trauma/no PTSD, and healthy controls. They found that the PTSD group had significantly higher rates of separation anxiety disorder and oppositional defiance disorder, more symptoms of separation anxiety disorder and oppositional defiance disorder, and higher scores on the Child Behavior Checklist (CBCL; Achenbach & Rescorla 2001) Internalizing and Total subscales as compared to the trauma/no PTSD and healthy control groups.

There is evidence that the effects of traumatic exposure in the first five years continue to be measurable at later ages. Leve et al. (2007) examined peer relations at school entry among maltreated foster children and a comparison sample of low-income, nonmaltreated, nonfoster care children entering kindergarten to second grade ($N = 121$). Controlling for caregiver-reported behavior problems prior to school entry, girls in foster care showed poorer peer relations after school entry than did girls in nonfoster care. Keiley and colleagues (2001) examined data from a community sample of children followed prospectively for nine years

from the time they entered kindergarten. Using growth curve modeling, the authors showed that the children who experienced physical abuse before age 5 were at greater risk for developing behavior problems (both externalizing and internalizing) than were children who experienced physical abuse after age 5. Using the same sample of community children, Lansford et al. (2006) found significant interaction effects between environmental factors and childhood physical abuse before age 5 on developmental trajectories of externalizing and internalizing behaviors. Specifically, lower levels of unilateral parental decision making (based on sixth-grade adolescent report of their parents) were protective of later externalizing outcomes through grade 8 for abused children as compared to nonabused children. Lower levels of family stress (maternal reports from kindergarten through eighth grade) and higher levels of hostile attributions (as measured from kindergarten through third grade based on children's responses to eight cartoon vignettes depicting negative outcomes) were protective of internalizing behaviors at a later age for abused children as compared to nonabused children.

Cognitive Functioning

Cognitive impairments are also starting to be studied in preschool-aged children after an initial focus on older school-aged children. A large twin study of 1116 monozygotic and dizygotic 5-year-old twin pairs in England that controlled for genetic factors found an eight-point IQ loss associated with childhood exposure to domestic violence (Koenen et al. 2003). In a study of domestic-violence-exposed preschoolers and their mothers compared with nonexposed child-mother pairs matched for child's age, gender, and ethnicity; mother's age and education; and annual family income, the exposed children scored significantly lower than the nonexposed ones on a measure of verbal intelligence (Ybarra et al. 2007). The nonexposed children had been exposed to equivalent community violence, indicating that domestic violence exposure has a unique role in explaining negative cognitive

outcomes over and above other stressors. Adult domestic violence during the child's lifetime accounted for 4% of the variation in the child's IQ, independent of latent genetic influences. Eigsti & Cicchetti (2004) found that preschool-aged children who had experienced maltreatment prior to age 2 exhibited language delays, with less advanced knowledge of vocabulary and production of less complex language. Mothers of children who had been maltreated also directed fewer utterances toward their children and produced a smaller number of overall utterances compared to mothers of nonmaltreated children. Findings indicated significant associations between maternal utterances and child language variables.

Longitudinal studies are needed to tease out causality and elucidate the mechanisms at work in the potential associations between cognitive functioning and trauma exposure. Some indications exist in the literature that even these cognitive deficits may have their roots in the quality of children's caregiving relationships. One study found that domestic violence negatively correlated with preschool children's performance on explicit memory tasks, with children exposed to higher levels of violence performing more poorly. However, this relationship was moderated by the children's mothers' positive parenting practices (Jouriles et al. 2008). These findings point to the intricate interconnections linking child emotional, social, and cognitive functioning to the quality of the caregiving they receive.

Resilience and Protective Factors

Jaffee and colleagues (2007) examined data from the Environmental Risk Longitudinal Study, a nationally representative sample of 1116 twin pairs and their families. The data consisted of home visits at ages 5 and 7 as well as teacher reports on child classroom behaviors. The authors found that resilient children were those who engaged in normative levels of antisocial behavior despite experiences of maltreatment. Maltreated boys (but not girls) with above-average intelligence and whose

parents had relatively few symptoms of antisocial personality were more likely to be in the resilient group. Maltreated children whose parents had substance use problems and who lived in high-crime neighborhoods that were also low on social cohesion and informal social control were less likely to be in the resilient group. The authors concluded that these findings together support a cumulative stressors model in which individual strengths distinguished resilient from nonresilient children under conditions of low (but not high) family and neighborhood stress. A more recent analysis of this sample also showed that children growing up in more deprived neighborhoods, as compared to more affluent neighborhoods, exhibited higher levels of antisocial behaviors (Odgers et al. 2009). However, within this group of children living in deprived neighborhoods, higher scores in collective efficacy (the level of social cohesion and willingness to act on behalf of the common good within the community) were related to lower levels of antisocial behaviors at school entry (age 5). These results demonstrate that collective efficacy may be a neighborhood-level protective factor in the context of other risk factors, such as poverty.

Quality of attachment seems to operate in conjunction with other ecological factors (such as personal and contextual risk) to influence child resilience. Keller et al. (2005) conducted a prospective study with a community sample of adolescent mothers first recruited during their first pregnancy and followed through the first 36 months of the child's life. Using latent variable growth mixture modeling, the authors found that the majority of children in this sample exhibited a normative trajectory of declining problem behaviors over the preschool years. Children whose mothers exhibited positive parenting (securely attached children) were significantly less likely to develop the problematic behavior trajectory as compared to their insecurely attached peers. However, a small proportion of children showed high initial levels of disruptive behaviors that continued to escalate over time. Specifically, Keller et al. (2005) found that insecurely

attached children with high levels of infant negativity had a significantly greater likelihood of belonging to the high-problem-behavior trajectory group as compared to securely attached children with similarly high levels of infant negativity. Avoidant attachment was also associated with significantly higher risk for the problem trajectory group in comparison with children with any other attachment classification (notably, a threefold increase from secure to avoidant attachment).

These findings highlight the importance of contextual and relationship factors in promoting or undermining young children's resilience.

DIAGNOSING TRAUMATIC STRESS DISORDER IN INFANCY AND EARLY CHILDHOOD

Diagnostic Criteria

The DSM-IV-R states that the essential feature of PTSD is the development of characteristic symptoms following exposure to an extreme traumatic stressor (criterion A; Am. Psychiatr. Assoc. 2000). The characteristic symptoms include persistent re-experiencing of the traumatic event (criterion B), persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (criterion C), and persistent symptoms of increased arousal (criterion D). Within criteria B, C, and D, specific symptoms are described, and a logarithm is provided to determine whether the person meets the following criteria for diagnosis: at least one symptom from criterion B (re-experiencing), at least three symptoms from criterion C (avoidance), and at least two symptoms from criterion D (arousal). The full-symptom picture must be present for longer than one month (criterion E), and the disturbance must cause clinically significant distress or impairment in important areas of functioning, such as work or social relations (criterion F).

There is wide recognition that the DSM-IV-R criteria for PTSD lack developmentally informed considerations for infants, toddlers, and preschoolers. For the past 15 years,

researchers have attempted to remedy this limitation by developing alternative diagnostic criteria specific to early childhood. Empirical findings have repeatedly pointed to the need for alternative PTSD criteria for children from ages birth to five. Scheeringa et al. (2003) compared 62 traumatized preschool children to 63 nontraumatized preschool children, all aged 20 months through 6 years. The children were recruited from the community, including clinics, shelters, an intensive care inpatient unit of a Level-1 trauma center, and a Head Start center. Parents completed interviews and a behavior checklist about their children. They found that none of the traumatized children met the DSM-IV criteria for PTSD. However, when using the alternative criteria algorithm of one cluster B (re-experiencing) symptom, one cluster C (avoidance/numbing) symptom, and two cluster D (arousal) symptoms, as well as four novel symptoms, they diagnosed PTSD at a rate of 26% in the same group of children. This group of children diagnosed with PTSD using the revised algorithm had significantly more comorbid symptoms (separation anxiety disorder; oppositional defiant disorder; major depressive disorder; attention-deficit/hyperactivity disorder; and CBCL internalizing, externalizing, and total problems) when compared to children in the trauma/no-PTSD group or the no-trauma group.

Using the same community sample of traumatized children versus nontraumatized children, Scheeringa and colleagues (2005) re-examined the children's functioning one and two years following the initial time point and obtained information on community treatment. They found that those children initially diagnosed with PTSD at time 1 (from Scheeringa et al. 2003) showed significantly more PTSD symptoms and functional impairment in more domains over the course of two years than did children without PTSD. Children with PTSD symptoms did not show decreases in symptom levels over two years, even with community treatment. Specifically, avoidance/numbing symptoms increased over time (particularly at one-year follow-up), whereas

re-experiencing symptoms decreased over time.

Subsequent studies also supported the idea of an altered algorithm for diagnosing PTSD in young children in addition to altering the items to be behaviorally appropriate. Scheeringa et al. (2006) found in a subsample of preschool-aged children who were admitted to an inpatient unit in a Level-1 trauma center that participants did not exhibit the required DSM-IV criteria threshold of three symptoms for criterion C (avoidance/numbing) for diagnosing PTSD. Only one child (4.8%) between ages 0 and 6 met the DSM-IV threshold for criterion C versus five children (23.8%) when using a one-symptom threshold. In a sample of children ranging in age from 2 to 10 years who had experienced motor vehicle accidents and sought medical attention at an emergency department, Meiser-Stedman and colleagues (2008) again compared this alternative symptom algorithm for PTSD versus the standard DSM-IV criteria for PTSD using parent-report data. Data were collected at two to four weeks post-trauma and at a six-month follow-up. They found that at the six-month follow-up across both age groups, the alternative algorithm yielded a higher percentage of PTSD diagnosis (14%) as compared to the DSM-IV criteria (<2%). In the acute phase (two to four weeks post-trauma), parent report for the 2- to 6-year-old group indicated a 6.5% prevalence rate for the alternative algorithm of PTSD and 1.6% based on the standard DSM-IV diagnosis. Together, these findings argue for lowering the cluster C symptom threshold criteria for younger children while keeping cluster B and D symptom threshold criteria the same.

In 2003, the American Psychiatric Association's Committee on Pre-School Children formed the Task Force on Research Diagnostic Criteria: Infancy and Preschool. The Task Force issued a call for systematic and large-scale research on psychiatric disorders in infants and preschool children (Task Force Res. Diagnostic Criteria: Infancy and Preschool 2003). The Task Force pointed out that the first step in such a process includes developing

appropriate measures—standardized and comprehensive diagnostic interviews—which have been lacking in the past. To date, studies have used parent-report dimensional scales that tend to identify problem behaviors; standardized interviews with older children (typically 5-year-olds or older); and best-estimate diagnoses, which lack reliable and operationalized criteria for developmentally appropriate research. Additionally, another important step is to develop clearly specified diagnostic criteria that can be reliably applied by researchers. In order to promote these steps, the Task Force examined recent studies that have specifically focused on validating diagnoses in young children and produced the Research Diagnostic Criteria-Preschool Age (RDC-PA; Task Force Res. Diagnostic Criteria: Infancy and Preschool 2002). For PTSD symptoms in preschool children, the RDC-PA includes the same three symptom clusters as the DSM-IV (re-experiencing, avoidance/numbing of responsiveness, and hyperarousal). The Task Force recommended that a diagnosis of PTSD be derived from one re-experiencing symptom, two hyperarousal symptoms, and one avoidance/numbing of responsiveness symptom, a formula that corresponds with the alternative criteria developed by Scheeringa and colleagues. They also modified the symptom criteria to make them less dependent on internal thoughts and feelings and to rely more extensively on behavioral observations, and removed two items (inability to recall; sense of a foreshortened future) because they were developmentally inappropriate. While no consensus currently exists for the best diagnostic criteria, the field continues to move in the direction of more developmentally appropriate approaches to diagnosis.

A new diagnostic manual, the *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood* (DC:0-3 and DC:0-3R) was created recently by Zero to Three: National Center for Infants, Toddlers and Families to meet the specific needs of children aged birth to five (Zero to Three 1994, 2005). The diagnostic criteria for PTSD in the DC:0-3R manual specifically

reflect the developmental manifestations of traumatic stress in the first five years of life. The criteria are written to conform to the algorithm initially proposed by Scheeringa and colleagues: at least one reexperiencing symptom (post-traumatic play, recurrent and intrusive recollections of the traumatic event outside play, repeated nightmares, physiological distress, and episodes of flashbacks or dissociation), at least two hyperarousal symptoms (sleep problems, concentration problems, hypervigilance, exaggerated startle response, irritability/anger), and at least one numbing of responsiveness or interference with developmental progress symptom (increased social withdrawal, restricted range of affect, markedly diminished interest or participation in significant activities, and efforts to avoid trauma reminders). The diagnostic criteria also include associated symptoms (regression of developmental skills, new aggression, new fears, and inappropriate sexual behaviors). This pattern of symptoms should last for at least one month.

PTSD or Traumatic Stress Disorder?

It is worth noting that the diagnosis of PTSD is predicated on the notion that trauma continues to have psychological sequelae after the traumatic event is no longer present. This assumption does not reflect the everyday reality of millions of children exposed to ongoing maltreatment and community violence as well as recurrent exposure to other traumatic stressors.

The original version of the DC:0-3 (Zero to Three 1994) incorporated a recognition of this reality and used the label “traumatic stress disorder” as its diagnostic category for a mental health disorder stemming from traumatic exposure. This label was changed to PTSD in the revised version of the manual (Zero to Three 2005; DC:0-3R) in an effort to align the diagnosis for young children with the parallel DSM-IV-R diagnosis. Researchers and clinicians should incorporate an awareness of present trauma in their study designs and clinical interventions and monitor for the ever-present possibility of new traumas in the

lives of the children and families they study or treat.

Assessment Methodology

The diagnosis of PTSD in the first five years of life is further complicated by young children's relatively undeveloped linguistic skills. Currently, the field relies on parent reports of children's post-traumatic symptoms using semistructured interviews or behavior checklists, which can be biased, subjective, or insufficiently detailed. There remains a need to have standardized instruments that improve reliability and validity, with objective and precise reports of symptoms. Some valuable contributions toward this goal are described below.

The Preschool Aged Psychiatric Assessment (PAPA) is a structured psychiatric assessment interview based on the parent version of the Child and Adolescent Psychiatric Assessment for 9- to 18-year-olds (Egger & Angold 2004b). The PAPA is conducted with the parent of a child aged 2 to 5 years. When symptoms are reported by the parent, the interviewer probes for the frequency, duration, date of onset, and the context in which the symptom occurs. The interview contains 25 modules, which can be administered individually or in combinations as needed. The items cover age-specific diagnostic criteria from the DSM-IV-TR, *International Classification of Diseases*-tenth revision, RDC-PA, and DC:0-3 diagnoses, and additional potentially relevant behaviors and symptoms experienced by preschoolers and their families not specified in current diagnostic criteria. For the PTSD diagnosis, the PAPA utilizes the RDC-PA diagnostic criteria for this age group. Empirical findings to date show sound psychometric properties for the PAPA. From a pediatric clinic, Egger et al. (2006) initially screened 1073 parents with children between the ages of 2 and 5 with the CBCL. A total of 193 parents of children with high scores on the CBCL and 114 parents of children with low scores also completed the PAPA interview. To examine test-retest reliability, these same participants repeated a second PAPA interview.

Test-retest interval ranged from three days to one month, with the mean interval at 11 days. Reliabilities across subscale scores on the PAPA were acceptable (kappas and ICCs ranged from 0.49–0.89) and comparable to other measures that are widely used and well established for children and adults. Using the same sample and data (from time 1 of Egger et al. 2006), Sterba and colleagues (2007) conducted a factor analysis indicating that the interview loaded on three emotional syndrome factors (social phobia, separation anxiety, and depression/generalized anxiety) and three disruptive syndrome factors (oppositional defiant/conduct syndrome, hyperactivity/impulsivity, inattention).

Birmaher et al. (2009) administered the Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime Version (K-SADS-PL) to a community sample of 204 parents of preschool children ages 2 to 5 years. The K-SADS-PL contains screening and diagnostic assessments for 20 different psychiatric disorders. Parents also completed the Early Childhood Inventory-4 and the CBCL. The K-SADS-PL showed good convergent and divergent validity with corresponding significant correlations to CBCL subscales, excellent discriminant validity compared to Early Childhood Inventory-4 severity scores, and good predictive validity at a two-year follow-up with 126 children. Inter-rater reliability for all diagnoses was good (kappa ranged from 0.70 to 0.90). Parents of 14 preschoolers also completed the PAPA, and the K-SADS-PL showed good correspondence with the PAPA diagnoses.

The widely used CBCL (Achenbach & Rescorla 2001) has been modified by several research groups to examine PTSD in young children. Dehon & Scheeringa (2006) used a modified CBCL-PTSD scale to screen for PTSD in a sample of traumatized preschool children (ages 1 to 6). The CBCL-PTSD scale score was significantly higher in children who had the full diagnosis of PTSD based on a semistructured diagnostic interview and correlated highly ($r = 0.66, p < 0.001$) with the number of PTSD symptoms from the same

PAPA: preschool-aged psychiatric assessment

interview. The CBCL-PTSD scale explained 43% of the variance in children's PTSD symptoms, whereas neither the externalizing or internalizing scale scores explained significant additional variance in children's PTSD symptoms. Additionally, if dichotomizing item responses, with all positive responses (1's and 2's) considered as presence of symptoms and all negative responses considered as absence of symptoms, a threshold cutoff of nine endorsed symptoms identified 75% of all positive PTSD diagnoses and 84.4% of all negative PTSD diagnoses from the interview. Furthermore, 63% of children who scored nine or higher were diagnosed with PTSD, while 90% of children who scored lower than nine did not have PTSD.

CLINICAL INTERVENTIONS

There is evidence that clinical treatment and service intervention approaches promoting resiliency through the parent-child relationship are the most effective vehicles to recovery from trauma because parental functioning predicts both child resiliency and child response to trauma (Masten 2006). A meta-analysis of 40 different early prevention programs for families with young children (0 to 3 years old) at risk for physical child abuse and neglect showed a treatment effect size of 0.29 (Geeraert et al. 2004). The programs, mostly with nonrandomized designs, showed significant decreases in abusive and neglectful parenting and increases in child functioning, parent-child interaction, parent functioning, and family functioning. In 2007, The American Academy of Child and Adolescent Psychiatry established the Preschool Psychopharmacology Working Group (PPWG) to review existing literature to develop treatment recommendations for preschool children. In their report, the PPWG made several recommendations for the assessment and treatment of PTSD in preschool children (Gleason et al. 2007). They recommended the adoption of developmentally sensitive use of the DSM-IV criteria in assessing PTSD in preschoolers. They also suggested that there should be regular monitoring for baseline symptoms with a

structured measure such as the CBCL. Regarding treatment, the PPWG recommended child-parent psychotherapy and preschool-specific cognitive-behavioral therapy as first-line therapeutic interventions for preschoolers exposed to traumatic events. In light of the empirically documented treatment effects of psychotherapeutic interventions for preschoolers with PTSD, the PPWG did not recommend the use of psychopharmacological treatment for PTSD in preschoolers.

Relationship-Based Interventions

Child-parent psychotherapy (CPP) is a relationship-based intervention grounded in psychoanalytic, attachment, and trauma theory that also includes social learning and cognitive behavioral intervention strategies as vehicles for change (Lieberman & Van Horn 2005, 2008). Because young children organize their responses to stress and danger around their caregiving relationships, CPP is organized around the premises that young children turn preferentially to their parent(s) or primary caregivers for protection and safety and that trauma shatters the child's perception of the parent as a competent and reliable protector. Using the format of joint child-parent sessions, CPP therapists help to translate the emotional meaning of behaviors between the parent and the child, enabling them to co-construct a trauma narrative that holds developmentally appropriate meaning for both partners. In a randomized controlled trial comparing CPP to case management plus community intervention as usual, CPP was significantly more effective than the control group treatment in reducing (*a*) children's behavior problems and PTSD symptoms and (*b*) mothers' symptoms of avoidance (Lieberman et al. 2005). The improvements in behavior problems were sustained at a follow-up conducted six months post-treatment (Lieberman et al. 2006). PTSD symptoms were not measured at the six-month follow-up for either mother or child, but general functioning continued to improve in mothers who received CPP whereas

functioning of the mothers in the comparison group did not.

Cicchetti et al. (2006) also compared a similar relationship-based therapy with infants, infant-parent psychotherapy (IPP), with a psychoeducational parenting intervention (PPI) and community standard (CS) controls who received usual standard of care under Department of Human Services management, all administered to maltreated children. These groups were compared to a normative comparison group with nonmaltreating families. At baseline, mothers in the maltreatment groups reported having experienced more abuse and neglect in their own childhoods, more negative representations of their childhood, and more negative relationships with their own mothers currently as compared to the mothers in the nonmaltreatment group. They also reported less availability of social support from family members, higher current parenting stress, less parenting competence, more social isolation, more health concerns, and less understanding of appropriate parenting attitudes and practices. During mother-child observations, the mothers from the maltreatment groups also demonstrated lower sensitivity in interactions with their infants. Infants in maltreating families exhibited significantly higher rates of insecure attachment with their mothers, and only one infant (<1%) was classified as securely attached. In contrast, the rate of secure attachment for infants in nonmaltreating families was 32.7%. At postintervention, the rate of secure attachment increased significantly in the two intervention groups (IPP and PPI) to 60.7% and 54.5%, respectively. In comparison, the rate of secure attachment in the CS group remained low (1.9%). Furthermore, the rate of secure attachment in the normative comparison group remained at 38.6%, which was also higher than the CS group.

Dozier and colleagues (2002) developed a 10-week manualized Attachment and Biobehavioral Catch-up (ABC) intervention that targets young foster children's dysregulation by helping foster parents create an environment that enhances regulatory capabilities. Various

components of the intervention help caregivers to (a) follow the child's lead, (b) appreciate the value of physical contact with their child, (c) create conditions that allow their child to express, recognize, and understand emotions, and (d) provide nurturing care. Sessions include psychoeducation, discussions, and interactions between the foster parent and child. Dozier et al. (2006) examined preliminary data from the first 60 children who were randomly assigned to receive the ABC treatment or an educational comparison intervention (Developmental Education for Families, which targets cognitive development) and an additional 104 children in a nonfoster care control group. At one-month post-treatment, children whose foster caregiver received the ABC intervention showed AM and PM cortisol levels comparable to the nonfoster care group. Children whose foster caregiver received the control intervention displayed higher-than-typical levels of cortisol across the day. For children in the ABC intervention group, older children (18–36 months) had lower problem behaviors based on parent report as compared to younger children (0–17 months).

Over a 12-month period after a new foster care placement, Fisher & Kim (2007) examined changes in attachment-related behaviors among preschool children (ages 3 to 6) in foster care who also participated in a randomized trial of the Multidimensional Treatment Foster Care Program for Preschoolers (MTFC-P). Foster parents participating in MTFC-P completed 12 hours of intensive training prior to placement. After receiving a foster child, foster parents received daily telephone calls with a consultant who provided support and supervision, weekly support groups, and 24-hour on-call access. Children received services from a behavior specialist and attended weekly therapeutic play-group sessions. If possible, a family therapist worked with birth parents or additional adult caregivers to familiarize them with parenting skills. These services lasted for 6 to 12 months, including any transition periods to a permanent placement. Parents kept a caregiver-report diary at three-month intervals

during treatment on children's attachment-related behavior toward foster parents. Fifty-seven children who participated in the intervention showed significant increases in secure behavior and decreases in avoidant behavior as compared to 60 children in the control condition who received foster care services as usual. Both groups showed significant decreases in resistant behavior over 12 months. For participants in MTFC-P, children who entered foster care at older ages experienced greater increases in secure behavior over time compared to children in the control condition, who showed the opposite pattern. Fisher & Stoolmiller (2008) also found that foster parents who received the intervention reported a significant decrease in parenting stress related to child problem behavior as compared to an increase in caregiver stress in foster parents who were in the control condition. Furthermore, higher caregiver stress in response to child problem behavior was significantly associated with more blunted diurnal cortisol levels.

Cognitive-Behavioral Interventions

Cohen & Mannarino (2008) described an evidence-based treatment, Trauma-Focused Cognitive Behavioral Therapy, for parents and traumatized children. This particular intervention provides children and parents with stress-management skills prior to the processing of children's traumatic experiences together. Outcome studies have not yet been conducted.

Fantuzzo and colleagues (2005) tested the effectiveness of Resilient Peer Treatment, a peer-mediated classroom-based intervention for socially withdrawn preschool children with a history of maltreatment. Resilient Peer Treatment involved 15 play sessions (three per week) over a two-month period. The target child was paired up with a play buddy in the same classroom who was coached by a play supporter in positive play interactions with the target child. Eighty-two socially withdrawn children, with and without histories of maltreatment, were randomly assigned to Resilient Peer Treatment or attention-control interventions. Teacher

report and observational coding indicated that treatment led to higher levels of collaborative peer play interactions as compared to the control intervention. This treatment effect was present for both maltreated and nonmaltreated children.

FUTURE DIRECTIONS/ RECOMMENDATIONS

Research

There is a growing consensus that exposure to traumatic stress disrupts young children's normal development in a wide range of domains. The importance of identifying and addressing this disturbance as quickly as possible points to the need for more accurate and developmentally sensitive assessment measures of trauma histories, symptomatology, and general functioning for the birth-to-five age range. However, the mental health field continues to lag behind in establishing developmentally appropriate measures. The *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised* (Zero to Three 2005) represents an attempt to provide a developmentally appropriate lens to the assessment of post-traumatic stress. Researchers should continue their efforts to develop standardized and comprehensive instruments for early childhood. There is also an ongoing need to include measures that specifically target the first five years of life in epidemiological surveys and empirical studies. Longitudinal studies that investigate the impact of different forms of trauma should include the birth-to-five age range as a separate category to better understand the role of the early years in children's long-term developmental trajectory.

Another burgeoning area of research is the gene-by-environment literature. Caspi et al. (2002) first conducted the seminal study showing a gene-by-environment interaction on antisocial behavior. The authors found that adults with low-acting monoamine oxidase-A (*MAOA*) alleles who were maltreated as children were more likely to develop symptoms

of conduct disorder and antisocial personality and displayed more general violence when compared to adults with high-acting *MAOA* alleles who were also maltreated as children. Adults with high-acting *MAOA* alleles who were maltreated as children and nonmaltreated control participants had comparable rates of aggression. This finding has not been replicated consistently. Two recent meta-analyses reported small-to-medium effect sizes (0.17 and 0.18) for the *MAOA* genotype and maltreatment interaction for antisocial behavior (Kim-Cohen et al. 2006, Taylor & Kim-Cohen 2007). A recent study suggests that this gene-environment interaction is found in low-to-moderate levels of trauma exposure only, while extreme levels of trauma exposure overpower the interaction (Weder et al. 2009). The sample evaluated 73 children who had been recently removed from caregivers because of abuse and 41 comparison children, some of whom reported no trauma exposure and others who reported low levels of trauma exposure. Children with exposure to low-level trauma up to the moderate level and the low-activity *MAOA* allele had high rates of aggression as compared to peers with the high-activity *MAOA* allele. In contrast, children with exposure to extreme levels of trauma had high aggression scores regardless of genotype.

Another twin study also supports a gene-environment interaction for conduct disorder (Jaffee et al. 2005). The researchers found that in a sample of 1116 5-year-old twin pairs, the effect of physical abuse on the development of conduct problems was strongest among those children who were at high genetic risk. Genetic risk was calculated on a four-point scale based on the cotwin's conduct disorder status and the zygosity of the twin pair. A target twin's genetic risk was coded as highest if his or her monozygotic twin had a diagnosis of conduct disorder, next highest was if a target twin's dizygotic twin had a diagnosis of conduct disorder, followed by a target twin whose dizygotic twin did not have a diagnosis of conduct disorder, and risk was lowest if a target twin's monozygotic twin did not have a diagnosis of conduct disorder. Physical abuse was associated with an increase

of 2% in the probability of a conduct disorder diagnosis in children at lowest genetic risk as compared to an increase of 24% in children at highest genetic risk.

A third gene-by-environment interaction involves a polymorphism in the promoter of the serotonin transporter genotype and childhood maltreatment on adult depression, first reported by Caspi et al. (2003). Since then, many studies have sought to replicate the finding that individuals with specific polymorphisms are not at increased risk for developing depression unless these individuals also experience adverse life events, in particular childhood maltreatment, and to extend results to additional polymorphisms (for a review, see Brown & Harris 2008).

Although these studies together demonstrate the robustness of gene-by-environment interactions, many of these investigations tend to utilize older children or examine adults with retrospective reports of childhood abuse. Researchers tend not to parse out the effects of early- versus later-childhood maltreatment or adverse events. One exception is the work by Meaney and colleagues that has linked adverse fetal environments (e.g., maternal stress during pregnancy) with dysregulated HPA axis activity, which places individuals at risk for developing psychopathologies (including PTSD) and deleterious health outcomes (see Seckl & Meaney 2006). Additional future research needs to examine more proximal effects of the interaction between nature and nurture on younger children.

Clinical Intervention

Significant barriers remain to the development, adaptation, and dissemination of empirically supported treatments for children exposed to trauma. Children in the child welfare system have serious unmet mental health needs, with 75% of them not yet in treatment within 12 months after initial diagnosis (Natl. Res. Council. Inst. Med. 2006). Children aged birth to five are most at risk. According to the American Psychiatric Association's PTSD field trials, the

best predictors of PTSD and related comorbidities were the child's age at first trauma, trauma frequency, and perpetration by the parent (van der Kolk et al. 1996). In spite of these findings, many practitioners and the public erroneously believe that young children's cognitive immaturity and plasticity render them immune to the effects of trauma (Brom et al. 2009, Natl. Res. Counc. Inst. Med. 2000).

Early identification requires specialized training because young children's trauma responses mimic other behaviors and are commonly misdiagnosed as developmental delays, "difficult temperament," or behavior problems (Zero to Three 2005). This training has not to date been systematically incorporated in curricula across mental health disciplines, which give at best cursory attention to infancy and early childhood. The result is a dearth of practitioners trained to treat young children. Clinicians tend to learn individual treatment approaches not optimal for children aged birth to 5 because parents are not included. This service gap is larger for minorities owing to the shortage of service providers knowledgeable about the language, values, and parenting practices of minority populations, and it is most pressing for fast-growing ethnic groups such as Latinos, who are the largest minority group in the country, have the highest birth rate, and are often monolingual in Spanish (U.S. Census Bur. 2003). The current economic downturn aggravates barriers to timely and effective intervention. Staff layoffs in community programs and the child welfare system create higher case loads, lower morale, and increase staff vicarious traumatization. Training and technical assistance at all system levels are needed to close these service gaps with workforce development in culturally appropriate treatment, agency capacity, and infrastructures for intersystem collaboration (President's New Freedom Commis. Mental Health 2003).

Prevention

Shonkoff et al. (2009) called for a focus on reductions of significant stress and adversity

in early childhood as a new way of preventing disease and promoting health, instead of traditional approaches that emphasize pharmacological interventions. The authors reviewed two different theories on the impact of early experience on adult health—by the accumulation of damage over time or by the critical timing of adversities during sensitive developmental periods. Empirical data consistently show associations between greater childhood trauma exposure and greater prevalence of a wide range of health impairments in adulthood. Although the specific mechanisms remain unclear, one general explanation may be through the breakdown of physiological state under conditions of chronic challenge, also referred to as allostatic load. Researchers should pay closer attention to the disproportionate exposure of low-income children to environmental stressors (e.g., neighborhood violence, dysfunctional schools), traumatic experiences, and family chaos and the resulting physiological and emotional dysregulation as cumulative risk factors for early childhood development and long-term adult functioning.

Policy

Public policy must systematically address the deficits in access to services for traumatized young children and their families. These deficits and efforts to remedy them need to be the result of a partnership between professionals working with young children, elected representatives, and public interest advocates (Harris et al. 2006, 2007). The service delivery system for children aged birth to five with exposure to traumatic stress has several possible entry points. Pediatric care providers are the most immediate service providers, but their effectiveness in early trauma identification and referral is hampered by the short duration of pediatric visits, lack of trauma training, and lack of information about appropriate referrals (Groves & Augustyn 2004). Mental health providers offer services in community mental health clinics, hospital-based clinics, DV programs, and other agencies but often lack

specialized knowledge on traumatized children under age 6 and their abusive parents. Child-care providers have opportunities for child observation that may facilitate early trauma identification and referral but lack the necessary training to respond appropriately. For example, 3- and 4-year-olds are three times more likely to be expelled from preschool than are children in grades K through 12, with African American and Latino children disproportionately affected (Gilliam 2005). DV shelter staff lack training in early childhood and tend to focus on meeting the service needs of battered women rather than children's needs. Welfare system child welfare workers focus on physical safety. Their lack of training in trauma identification in young children may result in placement decisions that do not address the child's developmental needs (Larrieu & Zeanah 2004). Police responding to DV calls can assuage children's traumatic stress when the response is trauma informed, but officers are largely unaware of the negative effects of their asking the child to report on the parents' violence (Osofsky 2004). The judicial system and the courts can mandate and enforce treatment referrals, but they contend with lack of appropriate guidelines about early trauma. An overriding problem across systems is the lack of awareness of cultural and contextual issues in childrearing values and practices, often leading to misidentification and miscommunication when the parents and the service providers differ in age, race,

ethnicity, culture, language, socioeconomic status, disability, and/or gender. When trauma is identified, the systems involved may not have mechanisms to promote service coordination. For example, the same family may have a case in the Dependency, Family, and Criminal Court system, and each court may place contradictory requirements on the family (Van Horn & Hitchens 2004). The problems in each of these services systems can be addressed through a partnership of concerned professionals and families with elected representatives. A current federal initiative, the National Child Traumatic Stress Network (funded by the Substance Abuse and Mental Health Services Administration), is an example of a successful effort to increase access to service and raise the standard of care for children and their families across the United States (see <http://www.nctsn.org>). Within this initiative, the Early Trauma Treatment Network is a collaborative of university-based infant and early childhood trauma programs at the University of California, San Francisco, Boston Medical Center, Louisiana State University Medical Center, and Tulane University that has the goal of creating, evaluating, and disseminating effective forms of intervention with traumatized young children and their families across systems of care. There is an urgent need to bring up to scale these and other efforts in order to bridge the long-standing gap in services for traumatized and underserved young children and their families.

SUMMARY POINTS

1. The first five years of life are the most vulnerable to traumatic death and injury as the result of interpersonal violence and accidents.
2. The incidence of traumatic events is pervasive in infancy and early childhood; however, trauma exposure is not consistently investigated as a possible factor in the etiology of psychological and behavioral problems in young children.
3. The interface between attachment and traumatic experiences needs to become an integral component in the assessment and treatment of infants, toddlers, and preschoolers with mental health and relationship problems.

4. Childhood exposure to trauma may lead to marked and persistent psychobiological abnormalities, problematic socioemotional and behavioral outcomes, and cognitive impairments.
5. There remains a need for developmentally informed diagnostic criteria for PTSD specific to early childhood and standardized instruments that improve reliability and validity of young children's post-traumatic symptoms.
6. Clinical treatment and service intervention approaches promoting resiliency through the parent-child relationship are the most effective vehicles to trauma recovery.

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