

Post-traumatic stress disorder in children

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In the past ten years, there has been increasing recognition that children who have been exposed to traumatic events can, like trauma-exposed adults, develop post-traumatic stress disorder (PTSD). Practitioners therefore need to be able to recognise and treat post-traumatic stress reactions in children. However, the direct application of adult diagnostic criteria for PTSD can result in the misdiagnosis of post-traumatic stress reactions in children, while research has only recently begun to investigate the effectiveness of different treatments for children with PTSD. This article discusses issues regarding the assessment and diagnosis of post-traumatic stress reactions in children at different developmental stages, considers neurobiological, cognitive and other factors that are theorized to increase the risk of PTSD in trauma-exposed children, and evaluates current psychotherapeutic and pharmacotherapeutic treatments for childhood PTSD. The need for more systematic research on the management of PTSD in children is noted.

Key words: Post-traumatic stress disorder, children and adolescents, diagnosis, psychotherapy, pharmacotherapy

Post-traumatic stress disorder (PTSD) first appeared in the DSM-III in 1980. The impetus for the development of this diagnostic category arose primarily from the need to account for the characteristic array of symptoms displayed by Vietnam veterans in the United States, and as such PTSD was conceptualized around traumatized adults. However, since that time there has been increasing recognition that children, too, can develop severe and debilitating reactions to traumatization.

Studies indicate that children can develop PTSD after exposure to a range of traumatic stressors, including violent crime, sexual abuse, natural disasters, and war. Where relatively standardized assessment methods have been used, the incidence of PTSD among child survivors of specific disasters ranges from 30 to 60% (1,2). As yet there are no epidemiological studies of the prevalence of PTSD among children in the general population; however, community studies in the United States have consistently indicated that around 40% of high school students have experienced some form of domestic or community violence, and between 3 and 6% have PTSD (3,4).

High rates of trauma exposure and evidence of PTSD among child populations suggest that mental health practitioners worldwide need to be able to recognize those post-traumatic reactions in children that require intervention, and offer timely and effective treatments. This is particularly critical given the substantial challenges that post-traumatic stress poses to the healthy physical, cognitive and emotional development of children and adolescents (5).

DIAGNOSIS AND ASSESSMENT

The DSM-IV-TR describes three symptom clusters in PTSD: persistent re-experiencing of the trauma (e.g., intrusive memories and flashback experiences, often triggered by exposure to traumatic reminders, and recurring trauma-related nightmares); avoidance of traumatic reminders (including places, people, and conversations) and a general numbing of emotional responsiveness; and chronic phys-

iological hyperarousal, including sleep disturbances, poor concentration, and hypervigilance to threat. The DSM notes that, in children, re-experiencing may occur through repetitive play involving trauma-related themes, rather than through memories, and nightmares may have generalized, rather than trauma-specific, content. Following a traumatic experience, it is normal and expectable for children and adults to exhibit some intrusive, avoidance and hyperarousal symptoms, which remit spontaneously within a few days or weeks. In order to meet the PTSD diagnosis, at least one re-experiencing symptom, three avoidance/numbing symptoms and two hyperarousal symptoms should be present for at least one month, and must cause significant distress or functional impairment. When symptom duration is less than one month, a diagnosis of acute stress disorder (ASD) is made.

Childhood PTSD lends itself to both over- and underdiagnosis, especially when assessments are not thoroughly or expertly conducted. There are a number of assessment instruments available to aid the diagnosis of PTSD in children. Several structured psychiatric interviews for children, such as the Diagnostic Interview for Children and Adolescents - Revised (DICA-R, 6) and the Diagnostic Interview Schedule for Children-Version IV (DISC-IV, 7), include a PTSD module. Similarly, the Schedule for Affective Disorders and Schizophrenia for School Age Children (K-SADS, 8) contains a PTSD module reflecting both DSM-III-R and DSM-IV criteria.

There are also some PTSD-specific interviews, such as the Clinician-Administered PTSD Scale - Child and Adolescent Version (9), the Child PTSD Checklist (10), and the Child PTSD Symptom Scale (11). Finally, a number of scales are available for assessing the severity of PTSD symptoms in children, such as the Child Post-Traumatic Stress Reaction Index (12), the Child and Adolescent Trauma Survey (13) and the Trauma Symptom Checklist for Children (14).

While PTSD in older adolescents is similar to adult PTSD, there are two major limitations of the PTSD diagnostic criteria when assessing post-traumatic pathology in young children. Firstly, eight of the eighteen PTSD criteria

require a verbal description of internal states and experiences, a task beyond the cognitive and expressive language skills of young children (15). The clinician must therefore attempt to infer from behavioral observations whether the child's thoughts and feelings are consonant with PTSD symptoms. Direct reports from parents, teachers and other observers in the child's milieu are an important component of the evaluation, although it should be borne in mind that parents often minimize the child's PTSD symptomatology (15). The DISC-IV, DICA-R and K-SADS all determine diagnostic status on the basis of combined child and parent reports. The use of multiple assessment instruments and multiple informants to measure PTSD across different areas of functioning is therefore recommended (15). That said, nothing can replace a properly conducted and comprehensive clinical interview.

Secondly, while traumatized children often display the core symptom clusters of adult PTSD, they also commonly present with an array of symptoms not typically assessed by existing structured interviews and scales. These may include the loss of recently acquired developmental skills (regression), the onset of new fears or the re-activation of old ones, accidents and reckless behavior, separation anxiety (often manifested in anxious clinging), and psychosomatic complaints such as stomach aches and headaches (16,17). Additionally, young children may express post-traumatic anxiety through hyperactivity, distractibility and increased impulsivity, symptoms that may be confused with attention-deficit/hyperactivity disorder. The persistence of PTSD symptoms coupled with an accumulation of post-trauma adversities can also produce a secondary depression and, when the traumatic context also includes the death of a family member, children can present with complicated grief and bereavement (5). Therefore, while a structured interview may seem to indicate that a traumatized child does not fully meet the DSM's "adulto-centric" (2) diagnostic criteria for PTSD, there may nonetheless be a range of post-traumatic responses that warrant intervention.

Thirdly, recent findings support the hypothesis that children with subthreshold criteria may not differ significantly from children meeting all three cluster criteria (re-experiencing, avoidance, hyperarousal) with regard to functional impairment and distress. In a study by Carrion et al (18), children with subthreshold PTSD had functional impairment that was specific to PTSD symptoms and was not due to comorbidity. This suggests that it might be more precise to make a diagnosis of PTSD in children and adolescents based on the intensity of symptoms and their relationship to functional impairment, than on the threshold number of symptoms.

Fourthly, while prospective studies in adults have shown that ASD is associated with later PTSD (19,20), there is little published empirical data regarding this entity in children. A recent prospective study in children has raised questions about the appropriateness of the current diagnostic criteria, in that 60% of children with traffic-

related injuries in the study who went on to develop PTSD did not meet criteria for even subsyndromal ASD within the first month of injury (21). These findings suggest that it is crucial to include developmental and social contextual factors possibly mediating or moderating the transformation of ASD into PTSD (e.g., age, gender, psychiatric morbidity, other life events, family functioning, parental psychopathology) in the assessment of ASD in children (22).

ETIOLOGY AND RISK FACTORS

Since not all children (or adults) who experience a trauma will go on to develop PTSD, identification of etiological mechanisms and risk factors for development of the disorder has been an important recent thrust in PTSD research.

Neurobiological theories have to a large extent implicated adrenergic, serotonergic, dopaminergic, gamma-aminobutyric acid, opioid, N-methyl-D-aspartate, and neuroendocrine systems in the pathophysiology of PTSD (23). Current evidence indicates that traumatized children, like traumatized adults, demonstrate altered hypothalamic-pituitary-adrenal (HPA) axis circadian rhythmicity, although there is little consensus on whether cortisol levels are elevated or reduced in pediatric PTSD. For example, a recent study in adolescents did not find evidence for enhanced suppression of morning cortisol in multiply traumatized adolescents with or without PTSD (24), in contrast to reports in adults with PTSD. In adults, recent data suggest that low cortisol levels may be an early predictor rather than a consequence of the disorder. For example, in a study examining cortisol responses in the acute aftermath of rape, low cortisol was associated with a prior rape or assault (risk factors for PTSD) but not with the development of PTSD *per se* (25). These findings have not yet been replicated in child and adolescent PTSD.

Brain imaging studies that have specifically assessed the effects of childhood trauma and PTSD on brain volumes are limited. De Bellis et al (26) found no evidence of reduced hippocampal volumes in survivors of childhood abuse, but did demonstrate smaller intracranial, whole brain and corpus callosum volumes, which may suggest an impact on global brain development. In a follow-up analysis, controlling for socio-economic status (27), the authors found that brain volumes positively correlated with age of onset of PTSD and negatively correlated with the abuse. Debate continues on whether reduced hippocampal volumes predate or follow the development of PTSD and to what extent this predicts response to trauma. However, the findings of a recent study in twin-pairs discordant for trauma exposure and PTSD suggest that lower preexisting hippocampal volumes may, in fact, predispose a person to develop PTSD after trauma (28).

Cognitive-behavior theories have highlighted the involvement of information-processing and learning in the development of PTSD. For example, Foa et al (29) suggest that, following a trauma, a fear network that stores information about sources of threat is formed, and these trauma-related representations are activated by external and internal cues.

In people with PTSD, this fear structure includes an especially large number of stimuli elements and is therefore easily accessed. Similarly, Keane et al (30) propose that the PTSD fear response develops through a process of classical conditioning, whereby fear comes to be associated with cues present during the actual trauma (e.g., gunfire), as well as through a process of stimulus generalization, whereby any stimuli associated with these cues (e.g., a car backfiring or a firecracker exploding) also produce a fear response. Continued avoidance of traumatic cues reinforces the fear response, which has no opportunity to be “un-learned”.

Etiological formulations of childhood PTSD must necessarily incorporate a developmental perspective. For example, subjective cognitive appraisals of traumatic events vary with the developmental level of the child, as does the way in which traumatic memories are encoded and recalled (5). Much remains to be understood about the role of developmental factors in the neurobiological, cognitive and other mechanisms that may create a vulnerability to PTSD.

There is some evidence that, as for adults, the risk of PTSD in children increases with physical proximity to the trauma and previous trauma exposure, and (due to biological and/or socio-cultural factors) may be greater for girls than for boys (see 31 for a review). Additionally, for children, parental trauma-related distress increases the risk of developing PTSD (15), since it affects the parent’s capacity to create a post-trauma climate of safety and security and to emotionally contain the child’s fear and anxiety.

TREATMENT

Intervention with children with PTSD is typically multimodal, including treatment for the child, intervention with parents or caregivers, and optimizing the support provided by the school environment. Before psychotherapeutic work can begin, it is important that the physical safety of the child be established, particularly if the child has been the victim of abuse; this may entail liaison with appropriate agencies (e.g., social services, police or the legal system). Current practice parameters recommend that the first-line treatment for PTSD in children should be psychotherapy, and psychopharmacology should be considered as an adjunctive treatment in those children who have prominent comorbid depressive or panic symptoms (15). Recent evidence suggests that some medications may also be effective in addressing the core symptoms of PTSD in children.

As the systematic empirical study of the efficacy of PTSD interventions for children is still in its infancy, there is as yet no empirical evidence to demonstrate either the superiority of psychotherapy over medication, or that the combination of the two is more effective than either one alone.

Psychotherapy

Psychotherapeutic interventions for children are generally based on those developed for traumatized adults, with age-

appropriate modifications, although there is less empirical evidence regarding the effectiveness of these interventions for children than there is for adults. Intervention with the child usually includes the following components: psychoeducation, direct exploration of the trauma, symptom management techniques, exploration and modification of inaccurate cognitive attributions regarding the trauma (15,32).

The effectiveness of cognitive-behavioral therapy (CBT) for PTSD in children has been empirically demonstrated more often than other interventions, although randomized controlled studies of CBT are still few (33). Arguably the most rigorous studies (usually random assignment to well-defined manualized treatment versus comparison treatment or waitlist control) have focused on trauma-focused CBT in sexually abused children (34), although CBT treatments have been extended to children exposed to other types of trauma (35,36). These studies have added to the growing evidence supporting the efficacy of trauma-focused CBT on measures of PTSD, depression, and behavior problems in children with PTSD (37).

Typically gradual exposure is used with children and this consists of detailed discussion of the traumatic experience, and memories, thoughts, and feelings that occurred associated with the event. This can be facilitated by having the child or adolescent write a report about the trauma, which the child and therapist can re-read during therapy sessions (38). This helps the child to develop a sense of mastery over symptoms and overwhelming feelings. Distorted cognitive assumptions regarding the trauma (e.g., self-blame) are also explored, and alternative, more realistic, assumptions are developed. Other psychotherapeutic interventions supported by anecdotal evidence but, as yet, little empirical data include psychodynamic therapy and eye movement desensitization and reprocessing (33).

There is also general consensus that parents should be included in the psychotherapeutic intervention for children with PTSD (15,33,39). At a minimum, this should entail some psychoeducation, including normalization and explanation of post-traumatic responses, and information on how these can be managed in the child’s home environment. Where the parents appear to be experiencing significant emotional distress as the result of the trauma, intervention should also assist them to explore and resolve these feelings, so that they can better respond to the child’s emotional needs. Psychoeducation can also be provided to the child’s teachers, so that they may understand and be responsive to the child’s emotional needs, and develop appropriate expectations and behavioral management techniques.

Little is known about the potential benefits or harm of providing early psychosocial interventions to children in the immediate aftermath of trauma (40). It has been suggested that there may be inherent dangers in exposing traumatized children to a psychosocial intervention prematurely, as one runs the risk of sensitizing children to traumatic reminders of the event without permitting timeous resolution of the experience (40).

To date, no empirical studies have evaluated psychological debriefing for children and adolescents within the first month of a traumatic event. However, studies in adults suggest that psychological debriefing may result in poorer long-term outcomes than no debriefing at all. Based on empirical evidence, trauma-focused CBT can be recommended as an early intervention (1-6 months post-trauma) for symptomatic children, particularly in the context of sexual abuse (40).

Pharmacotherapy

Pharmacological agents for childhood PTSD have received little empirical investigation. Effective pharmacological agents are ideally those which: a) target disabling symptoms, b) improve the quality of life of the child/adolescent allowing for normal growth and development in the long-term, and c) facilitate the process of psychotherapy by allowing traumatized children to deal with emotionally distressing material and work through their distress (41).

Adrenergic agents (e.g. the α_2 -adrenoreceptor antagonists clonidine and guanfacine, and the β -adrenoreceptor antagonist propranolol) reduce sympathetic arousal and have been shown to be effective in treating the hyperarousal, re-experiencing, and impulsivity seen in PTSD. In two open-label trials, oral clonidine (0.05 to 0.1 mg/day) (42) and clonidine transdermal patches (0.1 to 0.2 mg/day) (43) were effective in reducing PTSD symptoms in children, particularly anxiety, arousal, insomnia, and impulsive and aggressive behavior. Guanfacine was reported to be effective in reducing nightmares in a single case study (44). Propranolol significantly reduced intrusion and arousal symptoms over 5 weeks in 8 of 11 abused children with PTSD (45).

Selective serotonin reuptake inhibitors (SSRIs) are widely used to treat adult PTSD. Consistent with controlled data in adults, there is emerging evidence for their efficacy in anxiety disorders other than PTSD in children and adolescents (46). While there are no published controlled trials of SSRIs in childhood PTSD, some open-label data exist for citalopram in adolescent PTSD, showing efficacy on all three symptom clusters (47). Given that the SSRIs target broad-band symptom clusters and have a favorable side effect profile, they are likely to be used as first-line agents in PTSD. Other serotonergic agents such as nefazodone and cyproheptadine have been used in this age group, but safety data are lacking (48,49).

While randomized clinical trials have demonstrated the efficacy of tricyclic antidepressants and monoamine oxidase inhibitors in adult PTSD, no controlled studies have been reported in pediatric PTSD. The dopamine blocking agent risperidone (50) and the anti-kindling medication carbamazepine (51) have demonstrated promise in small open studies of children and adolescents respectively with chronic PTSD.

The utility of benzodiazepines for pediatric PTSD has not been established. Lack of evidence for their efficacy in reducing ASD/PTSD symptoms in traumatized adults

coupled with an unfavorable side effect profile make them a less than ideal choice in youth.

There are almost no controlled studies to guide the use of very early medication interventions in traumatized children (40). There has been one published double-blind randomized study in children with ASD in the context of acute burns. Imipramine was compared to chloral hydrate over a 7 day period in 25 children with ASD (52) and was found to be superior in treating ASD symptoms. In a more naturalistic study, Saxe et al (53) investigated the use of an opiate medication (morphine) as a possible preventive agent in children with burns-related PTSD. The dose of morphine administered to children during hospitalization for burn injuries was associated with a significant reduction in PTSD symptoms over a 6-month period.

CONCLUSIONS

PTSD is increasingly recognized to be a prevalent and disabling disorder in children and adolescents, in both the developed and the developing world. Although much remains to be learned, there have been important advances in understanding its risk factors and pathogenesis. Research on the management of PTSD in this age group is itself relatively young, and there is an urgent need for additional randomized controlled trials. Nevertheless, we now have a number of interventions at our disposal.

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