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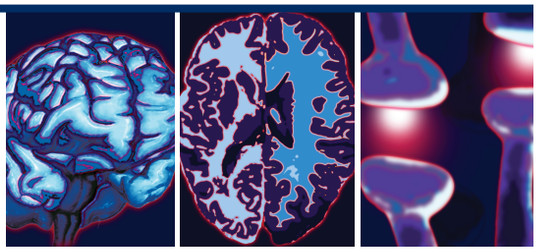

Screening and diagnostic considerations in childhood post-traumatic stress disorder

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Practice points

- Post-traumatic stress disorder (PTSD) is common in children and adolescents, and owing to the high comorbidity with other mental disorders and developmental differences in symptom expression, diagnosis is difficult.
- In children dependent on caregivers, an increased likelihood of chronic trauma exposure, decreased ability to verbalize complex symptoms, as well as expression of a variety of behavioral symptoms, can complicate diagnosis.
- Increased risk-taking behaviors in adolescents and developmental changes increase the risk of trauma exposure and, consequently, PTSD; adolescents may also be less likely to report trauma exposure and recognize emotional and behavioral changes as symptoms of PTSD.
- Current clinical practice is guided by the American Academy of Child and Adolescent Psychiatry (AACAP) Practice Parameters, which emphasize that developmentally appropriate screening and diagnostic approaches should be used to assist in early and correct identification of PTSD, information should be gathered from multiple sources and comorbid disorders should be identified and treated alongside PTSD.
- A variety of screening and diagnostic instruments are available, including self- or parent report, or reports of behavior observed. These can be administered on paper/other media or via interview, require various amounts of training to administer and score, and vary in cost, time to administer and how well their psychometric properties have been elucidated.
- Some instruments may be more suited to assessing specific types of trauma or to specific trauma populations, such as assessment of domestic violence, sexual abuse and PTSD in delinquent youth.
- Instruments are also available for other related aspects, such as the nature of trauma exposure, other symptoms and coping behaviors following a trauma, resilience-related factors and post-traumatic growth.
- As research regarding child and adolescent PTSD continues to expand, new tools or changes to existing tools are required to ensure that assessment remains scientifically and clinically relevant.

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SUMMARY Post-traumatic stress disorder is a common disorder across the lifespan. However, its presentation and symptom expression differs according to developmental stage. In this review, we focus on diagnostic aspects that are unique to children and adolescents and discuss some of the complexities involved in assessment and diagnosis. We briefly discuss the diagnostic criteria and changes that have been made in the DSM-5. We discuss clinical approaches used in diagnosis as well as current practice guidelines. We provide an overview of the diagnostic and screening instruments available to assess post-traumatic stress disorder in children and adolescents. Furthermore, we discuss tools for evaluating other unique features such as dysregulation symptoms, coping strategies and resilience. Finally, we consider the practical applications of screening and diagnostic instruments and highlight future directions.

Post-traumatic stress disorder (PTSD) is a prevalent stress-related disorder in children and adolescents that is well validated by evidence from longitudinal, neurobiological and treatment response studies [1]. Prospective longitudinal data in youth further suggest that PTSD is a stable diagnosis over time [2,3]. Globally, studies have documented high rates of trauma exposure and PTSD in adolescents [4–6]. A longitudinal study of adolescents found that at least 68% had experienced a traumatic event by 16 years of age [7]. The sex differences in adolescent PTSD parallel those in adult PTSD. The US National Comorbidity Survey of Adolescents found that the 6-month prevalence of PTSD was higher in adolescent females (6.3%) than males (3.7%). PTSD was more comorbid than other disorders with 62% of adolescents with PTSD meeting the criteria for major depressive disorder [8]. The more recent replication study of the US National Comorbidity Survey of Adolescents, documented a lifetime PTSD prevalence of 8.0% in females and 2.3% in males. Of all the anxiety disorders, the sex difference was greatest for PTSD [9]. The prevalence of PTSD showed a moderate but consistent increase with age [9]. Similarly, an earlier prevalence study in urban youth reported a lifetime prevalence of PTSD of 9.2% [10].

PTSD is frequently comorbid with other mental disorders, such as affective, anxiety and substance use disorders [8], which can make accurate diagnosis difficult. Those with PTSD are 80% more likely to have at least one other mental disorder [11]. In young children the most common comorbid conditions are oppositional defiant disorder and separation anxiety disorder [11]. Sexual abuse, in particular, is related to poor outcomes such as substance abuse, depression, conduct disorder [12], suicidality [13,14] and risky sexual behaviors [15].

Child and adolescent trauma exposure and responses are increasingly being examined separate to that of adults [16]. Risk factors for PTSD in children aged 6–18 years include low social support, subjective fear experienced during the trauma, perceived life threat, social withdrawal, comorbid psychological problems, poor family functioning, coping behaviors involving social withdrawal, distraction and thought suppression, and a prior history of PTSD [17].

Several differences between pediatric and adult PTSD have consistently been observed, including the nature of traumatic experiences, contextual factors relating to a child or adolescent's environment, differences in symptom expression and the effect on developmental trajectories [16]. The high prevalence of trauma exposure and PTSD symptoms in children and adolescents, as well as the pervasive detrimental consequences in the aftermath of trauma exposure, highlights the importance of correctly and timeously identifying the disorder.

In this article, we review the diagnosis of PTSD, including the recently released DSM-5 diagnostic criteria, in youth and focus on the developmental aspects that are relevant to diagnosis. In addition, we provide a comprehensive yet practical review on screening and diagnostic instruments that have applicability in routine clinical practice. Overall, we aim to provide an overview of diagnostic considerations salient to PTSD in children and adolescents, as well as clinical guidelines relevant to screening and diagnosis. Finally, we direct the reader to some novel conceptualizations of child and adolescent PTSD that are currently being studied and evaluated.

Diagnostic criteria for PTSD

PTSD is currently most commonly diagnosed with the criteria set out in DSM-IV [18] and its text revision, the DSM-IV-TR [19]. However, with the release of the DSM-5 in May 2013 there have been some notable changes made to the diagnostic criteria. As the diagnostic criteria

in the DSM-5 will be gradually phased in and most current instruments have not been updated yet, we provide an overview of DSM-IV criteria first before discussing DSM-5 criteria.

■ DSM-IV-TR criteria

Criterion A describes both exposure to a traumatic event that involves actual or threatened injury to self or others, and immediate responsivity with emotions of intense fear, helplessness or horror. At least one of the five symptoms under criterion B, detailing different ways in which the event is persistently re-experienced, such as recurrent thoughts, dreams or increased distress at exposure to cues, must be present. In addition, at least three of the seven symptoms under criterion C, involving avoidance of trauma-related cues and generalized numbing of responsiveness, must be present The last group of symptoms, criterion D, describes symptoms of increased arousal, such as difficulty sleeping and hypervigilance of which at least two out of the five symptoms must be present. Criterion E and F elaborate on symptom duration (must be present for at least 1 month) and impact (symptoms must cause clinically significant distress or impairment in different areas of functioning). Specifiers include acute (representing a duration of less than 3 months), chronic (more than 3 months) and delayed onset PTSD (onset of PTSD symptoms 6 months after the traumatic incident).

■ DSM-IV-TR specifiers relevant to children & adolescents

The same DSM-IV-TR diagnostic criteria used in adult populations have also been used, for almost two decades, to diagnose PTSD in children and adolescents [19]. However, there are a few qualifiers to characterize symptoms that are specific to children. Criterion A2 allows for children to respond with disorganized or agitated behavior instead of intense fear, helplessness or horror. A few exceptions under criterion B are also noted. Instead of trauma-specific dreams, any nightmares are allowed and repetitive play involving trauma-related themes may replace distressing recollections of the event. Instead of reports of feeling that the trauma is recurring, re-enactment may be more common in younger children.

■ DSM-IV-TR text

In the DSM-IV-TR text a few extra provisions specific to children have been added [19]. For children, sexually traumatic events may include any developmentally inappropriate sexual experiences. Children may not be able to verbalize diminished interest in activities or a constriction of affect, and collateral evidence from caregivers and observers is, therefore, recommended. In children a sense of a foreshortened future may also be evidenced by beliefs that they will not grow up to become an adult or beliefs that they can foresee future untoward events or omens. As is true for a number of other psychiatric disorders, children may exhibit more physical symptoms, such as headaches and stomach pains. These provisions were included to make the criteria more developmentally appropriate. However the DSM-IV-TR criteria were only field tested in populations aged 15 years and older. In the DSM-5, therefore, attempts were made to ensure the criteria were more applicable across developmental stages.

■ DSM-5 criteria

The DSM-5 was released in May 2013 [11]. We mention notable changes applicable to diagnosing PTSD in children and adolescents. Criterion A has been expanded to include learning of traumatic events occurring to a close relative or friend, as well as repeated exposure to details of traumatic events (e.g., police officers hearing repeated accounts of abuse). Criterion A2, denoting the acute response of intense fear or horror has been omitted. The three factor model has been split into a four factor model consisting of avoidance and numbing, with numbing also being expanded to include more symptoms of altered mood and cognition. This cluster includes symptoms such as negative beliefs about self, inappropriate blame, persistent negative emotional states or inability to experience positive emotions, and feelings of detachment. The arousal cluster will now include irritability or angry outbursts, and reckless behaviors. Whether dissociative symptoms (depersonalization and derealization) are present must be specified. Again the same criteria set is issued for adults and children/adolescents, however, a separate subtype for PTSD in preschool children (< 6 years) has been added. These criteria have been designed to be more developmentally appropriate for young children and include caregiver-child-related losses and focus on behaviorally expressed PTSD symptoms. The preschool subtype excludes symptoms such as negative self-beliefs and blame, which are

dependent on the ability to verbalize cognitive constructs and complex emotional states. The preschool subtype of PTSD was based on Scheeringa *et al.*'s proposed alternative algorithm, which was derived from studies performed in young children using modified DSM-IV PTSD criteria [20].

■ DSM-5 text

Associated features of PTSD in children and adolescents that support the diagnosis, such as developmental regression, have also been expanded on in the text [11]. According to the DSM-5, PTSD can develop at any age after 1 year of age. Clinical re-experiencing can vary according to developmental stage, with young children having frightening dreams not specific to the trauma. Young children are more likely to express symptoms through play, and they may lack fearful reactions at the time of exposure or during re-experiencing phenomena. It is also noted that parents may report a wide range of emotional or behavioral changes, including a focus on imagined interventions in their play. In addition to avoidance they may also become preoccupied with reminders. Avoidant behavior may be associated with restricted play or exploratory behavior, reduced participation in activities and reluctance to pursue developmental opportunities. Older children and adolescents may view themselves as cowardly and adolescents may harbor beliefs that they have been changed in ways that make them socially undesirable. Irritable or aggressive behavior can interfere with school and peer relationships. Reckless behavior may lead to accidental injury to self or others or thrill-seeking or high-risk behaviors.

■ Developmental considerations

There are a number of difficulties with applying PTSD criteria, field tested in adult samples, to children and adolescents [21]. The DSM-5 notes that the lower prevalence of PTSD reported in children and adolescents following serious traumatic events may be related to the diagnostic criteria not previously being developmentally informed [11]. Not all traumatized children develop PTSD, however, a number of diverse long-term outcomes may result. These include other internalizing disorders, disruptive disorders, juvenile delinquency, borderline personality traits/disorder, physical illness or even no disorder [22].

■ Preschool (children aged <6 years)

Rates of PTSD in preschool children diagnosed with DSM-IV criteria are lower than in other age groups. This may be a consequence of cognitive immaturity or may reflect criteria that are not developmentally sensitive enough to detect PTSD in younger children [20]. Thus, the DSM-5 now contains a preschool subtype as described above. In preschool children the most common comorbid disorders are separation anxiety and oppositional defiant disorder [23,24]. As symptoms of these disorders may be more visible than PTSD (with its situationally triggered and highly internalized symptoms) a diagnosis of PTSD may be missed [1]. Multiple traumatic and early chronic trauma exposures are not addressed by DSM-IV criteria, and these types of trauma exposure often begin in early life [20]. Prolonged or multiple traumas, such as child abuse, may lead to a range of problems such as difficulties in regulating emotions, maintaining stable interpersonal relationships or dissociative symptoms [11]. Multiple or complex trauma has been described by Terr as type II trauma [25]. Whereas type I trauma consists of single, well-defined incidents, such as accidents or natural disasters, type II trauma consists of multiple, prolonged or complex traumatic experiences such as neglect, maltreatment or sexual abuse. Type I trauma tends to produce more classical symptoms of PTSD, however, type II trauma may result in more heterogeneous psychological difficulties such as dissociation, personality pathology, impaired emotional regulation and somatization [25]. As children are more likely to be exposed to these complex interpersonal or type II traumas their consequent psychopathology frequently does not conform to PTSD diagnostic criteria especially at younger ages. A separate diagnostic category 'developmental trauma disorder' has been suggested to better encompass the psychopathology found in these cases, however, it has not been included in the DSM-5 [26,27]. Furthermore, owing to children's dependence on parents or other primary caregivers, perceived or real losses of their primary protective figures may be particularly traumatic [20]. Based on studies performed in younger children, Scheeringa *et al.* have commented that as DSM-IV criteria are highly dependent on a verbal description of symptoms, this may contribute to PTSD being missed in children. Behavioral manifestations, therefore, need to be carefully characterized [21,28]. Criterion C (avoidance and

numbing) items are particularly problematic as they are highly internalized phenomena that are either developmentally inconsistent with presentations in young children or are very difficult to detect [1]. Additionally, children and adolescents may have wide-ranging internalizing symptoms that are difficult to distinguish from other mood and anxiety disorders [1]. Other symptoms of PTSD found in young children include new onset aggression or oppositional behavior, regression of developmental skills, separation anxiety or other new onset fears [29]. Current DSM-IV-based criteria require reporting of complex internal states that may be difficult for young children to endorse or caregivers to observe and may, therefore, not be developmentally sensitive enough.

■ Subthreshold PTSD

Another concern is that children may have clinically significant impairing levels of PTSD symptoms but not fulfill full diagnostic criteria. A number of studies have found that children who meet partial PTSD criteria (e.g., criteria in two but not three diagnostic clusters) have the same level of functional impairment as children who reach the threshold for a PTSD diagnosis [30,31]. In a prospective follow-up study of preschool children, the authors found that significantly more children were impaired in at least one cluster (48.9%) than those who had the full diagnosis of PTSD (23.4%) [3]. Thus, the intensity of symptoms may be more relevant than the frequency of symptoms [1].

■ Adolescents

The difficulty with applying PTSD criteria also extends to older children. In a study of school-age children in the USA, the lifetime prevalence of PTSD diagnosed with DSM-IV criteria was 0.1%, while the 3-month prevalence was 0.03% [7]. These rates are considerably lower than those reported in adults and raise questions about the developmental appropriateness of DSM-IV criteria in this age group as well [20]. Adolescence is also a unique period characterized by significant neurobiological, physical, psychological and physiological changes. Developmental tasks involving separation and individuation may involve increased risk-taking behaviors. Consequently, adolescents are at an increased risk of trauma exposure and physiological changes that also increase their risk for PTSD [32]. A variety of factors may make accurate detection of PTSD in adolescents problematic. Habib and Labruna have set out a number of these factors [32]. First, adolescents may conceal traumatic exposures and resultant symptoms out of fear of what people will think of them or out of fear that their behavior may lead to punishment from caregivers. Second, adolescents' general cautiousness or distrust of authority figures may result in them failing to report trauma exposure or traumatic stress symptoms. Third, avoidance symptoms associated with PTSD may be associated with reluctance to discuss traumatic experiences. Fourth, the tendency for adolescents to minimize real risks often results in a failure to accurately report trauma histories. Adolescents may under-report or exaggerate symptoms depending on who they are talking to and whether it will enhance their social status. Fifth, adolescents may fail to recognize behavioral or affective changes as symptoms [32]. It is, therefore, clear that a variety of developmental factors need to be considered in the diagnosis of PTSD in children and adolescents.

Clinical assessment

According to the American Academy of Child and Adolescent Psychiatry (AACAP) PTSD Practice Parameters [33], screening of possible trauma and PTSD symptoms should form a part of the routine psychiatric assessment of children and adolescents. Screening should incorporate developmentally appropriate methods and be based on DSM criteria. Trauma can disrupt a child's development and functioning making it even more difficult to conduct an appropriate assessment [34]. Multi-informant questioning should be used to improve diagnostic accuracy. Given the complexity of post-traumatic stress symptom presentations, structured or semistructured interviews are arguably the most reliable and valid method of assessing PTSD, especially for detailing reactions to numerous traumatic events [32]. The AACAP Practice Parameters recommend as a clinical guideline that school- or community-based screening for PTSD be done after mass traumatic events in order to assist with secondary prevention and early identification [33]. Effective models exist for successful school-based screening after disasters and it is recommended that screening be initiated approximately 1 month after the trauma [35].

Taking a proper history regarding the onset of symptoms following a trauma can assist in accurate diagnosis of PTSD and other disorders

that develop post-trauma. However, accurate assessment of PTSD can be more time consuming, difficult and an emotional experience for a clinician [1]. According to the AACAP Practice Parameters, the first step in assessing for possible PTSD is establishing that a traumatic event has occurred and symptoms have followed in its aftermath [33]. Children and adolescents may deny exposure to a trauma. Parents may also under-report trauma as they may be unaware of, or may be the perpetrator(s) of, the traumatic incident. Levels of agreement between child and parent of trauma exposure and PTSD symptoms have been examined, and poor concordance has been found overall between parent and child reports of trauma exposure, avoidance and hyperarousal symptoms, and the impact of trauma [36,37]. Parents tend to under-report levels of trauma exposure, its impact and PTSD symptoms [37]. Children tend to be better at reporting their own subjective experience and symptoms such as anxiety [38]. Adults may be better at reporting on a child's behavior such as aggressive outbursts [39]. Clinicians should, therefore, adopt a multimodal approach that includes informants from home and school settings, direct reports by the child, as well as observation of behaviors (such as play) in making a PTSD diagnosis. We would recommend that where the reports are conflicting, greater weight be given to the presence of possible PTSD, and where necessary further evaluation (screening and diagnosis) and collateral sources of information be used to make a diagnosis. During the interview, the clinician should keep in mind the developmental level of the child, in particular cognitive, language and emotional development [40]. For an elaboration of these guidelines the reader is referred to the AACAP Practice Parameters, which is an evidence-based, expert consensus on the current best assessment and treatment of children and adolescents with possible PTSD [33].

Screening & diagnostic instruments for PTSD

Rating scales for screening and diagnosis in clinical and research practice offer rapid, accurate and reliable assessment of symptoms [34]. Their screening or diagnostic utility is dependent on the population being studied (e.g., clinic- versus community-based samples) [41]. Rating scales and diagnostic interviews differ in the amount of training required to administer and evaluate them, the number of items or scales/subscales, and the type of informant (parent, child or multiple informants). In addition, different measures may be required depending on whether the exposure is a single traumatic incident (type I) or prolonged or multiple traumas (type II) [25]. Most tools in existence are suited for assessing single trauma exposure. For multiple or complex traumas it may be better to use tools that assess generalized trauma symptoms [41,42]. Various tools exist to measure trauma exposure, with some designed to measure trauma exposure only such as the Dimensions of Stressful Events Rating Scale (DOSE) and Traumatic Events Screening Inventory (TESI) [201]. For a recent review of measures used to examine children's exposure to violence the review by Acosta *et al.* can be consulted [43]. Kerig *et al.* have emphasized that the ideal measure to assess functioning should be integrative, consider the child as a whole person and take many different domains of functioning into account. They should also be contextually appropriate, consider the child in the context of the family, school, peer group and larger society, and developmentally sensitive to the ways in which children interpret and respond to traumatic experiences at different ages [40]. Screening tools can greatly assist clinicians in screening for symptoms and making a diagnosis of PTSD. Several of these tools are available on PTSD websites such as the National Child Traumatic Stress Network [202].

Pertinent issues when using screening & diagnostic instruments

Severe and chronic PTSD can cause extreme abnormalities of physical, affective, behavioral, cognitive and interpersonal functioning that may not be adequately captured by current assessment tools [33]. Instruments that can be applied to diverse multiethnic populations and that are easily adaptable to different languages and cultures are ideal [44]. Using instruments that have been developed and validated for one population in another ethnic or cultural setting without assessment of the variability in symptom expression and validity is problematic [44]. A number of reviews have emphasized the need for standardized tools that can accurately assess trauma exposure in children and adolescents [42,45]. In their review, Hawkins and Radcliffe focused on seven measures frequently used to assess PTSD symptoms in children and adolescents. The authors highlight the need for well-validated DSM-IV-based measures and

recommend that the following areas require further clarification: clearer and more consistent definitions of traumatic events, appropriate time frames for assessment and development of more robust measures to assess treatment outcomes. They also emphasized the need for tools that permit assessment of type II trauma exposures and tools that are more suited to preschool-aged children [42]. Self-report instruments need to be used with caution given that responses are dependent on factors such as a child or adolescent's developmental level, the way questions are asked and factors that are related to the event itself [42]. In addition, individuals who are symptomatic tend to endorse a traumatic experience as more threatening [46]. Self-report instruments and interviews that assess for childhood PTSD often ask respondents to select 'the worst' traumatic event that he or she has experienced and to rate all PTSD symptoms in relation to a specific event [1]. It may be difficult for children exposed to multiple traumas to decide on the worst event or to accurately attribute symptoms to a specific trauma [1]. Some instruments may be more suited to assessing specific types of trauma or specific trauma populations. For example, domestic violence exposure in children and adolescents is a major risk factor for childhood PTSD, however it is often neglected in assessment and, thus, tools are required to assess for it specifically [40]. Delinquent youth are a group at high risk of developing PTSD, yet there may be difficulties establishing the rapport necessary for undertaking a proper assessment in this population. This may also complicate the assessment of PTSD and more sensitive tools may be required [47]. Sexual abuse is an area of particular concern in children and adolescents, and tools are available to specifically assess sexual abuse incidents [48]. Generally self-reports (telephonic, face to face interview and questionnaires) are commonly used and are an accurate source of information in sexual abuse assessment. However, ethical and legal questions regarding the investigation of sexual abuse in children adds to the complexity of the assessment [48]. This includes issues relating to the responsibilities of the researcher to report sexual abuse and provision of further treatment and follow-up in children who disclose [48]. Concerns that probing sexual abuse and discussing abusive experiences may of themselves be traumatizing to children, and questions about parents' right to know about their child's abuse also arise [48]. Generally, most guidelines advocate for acting to protect the safety and well-being of the child.

Choice of screening & diagnostic instruments for trauma & PTSD

■ Screening & diagnosis

The AACAP Practice Parameters for PTSD [33] recommend the use of the Juvenile Victimization Questionnaire (JVQ) to screen for trauma as it has been validated in ethnically diverse samples of children aged 2–17 years [49]. For preschool children a screening tool, such as the PTSD for Preschool-Age children [50] or the PTSD subset of the Child Behavior Checklist (CBCL) [51], is advised and should be administered to parents owing to the limited capacity of children to self-report symptoms. For children aged 7 years and older, a self-report measure, such as the University of California at Los Angeles Post-traumatic Stress Disorder Reaction Index (UCLA-PTSD-RI) [52] or the Child PTSD Symptom Scale (CPSS) [53], is recommended by the AACAP Practice Parameters [33]. For a wider assessment of symptoms following trauma, the Trauma Symptom Checklist (TSCC) may be appropriate [54]. The parent and child should be questioned about functional impairment and a scale, such as the CPSS [53], can be used to monitor functioning. For younger children a visual analog scale, such as a fear thermometer, is recommended. To assist diagnosis a structured interview, such as the Clinician Administered PTSD Scale for Children and Adolescents (CAPS-CA) [55,56] or the Schedule for Affective Disorder and Schizophrenia for School-Age Children Present and Lifetime version (K-SADS-PL) [57], is recommended. For preschool children the Post-traumatic Stress Disorder Semi-Structured Interview and Observational Record for Infants and Young Children (which is an interview for caregivers) is advised [23]. We highlight commonly used screening measures for PTSD in **Box 1** and diagnostic schedules in **Box 2**. The presence of dissociative symptoms is a specifier in the DSM-5 criteria and in **Box 3** we highlight some of the instruments used to assess dissociative symptoms and emotional distress. To our knowledge, no PTSD measures have yet been validated according to the DSM-5 criteria. However, the National Centre for PTSD indicated that they are in the process of revising and validating a number of PTSD assessments, including the Clinician-Administered Post-Traumatic Stress

Box 1. Screening measures for post-traumatic stress disorder.

CPTSD-RI

- The CPTSD-RI was originally designed to be used as an interview, but is mostly used as a self-report measure [42,73,74]. It is not a diagnostic tool but screens for post-trauma symptoms and has strong psychometric properties. The CPTSD-RI has 20 items that cover three factors: intrusive, avoidant and numbing symptoms; anxiety symptoms; and problems with concentration and sleep. It is frequently used as a self-report measure in children and adolescents. The CPTSD-RI has been widely used and its inter-rater reliability κ-score was found to be 0.87 [73]. It has been translated into many languages and these have also been shown to have good psychometric properties [75].

UCLA-PTSD-RI

- This measure is a 20-item revised measure based upon the CPTSD-RI, and is a self-report tool for use in children and adolescents [42,45,52,76]. It can also be administered in an interview format. It includes a child (age: 7–12 years), adolescent (age: ≥13 years) and parent version. The UCLA-PTSD-RI screens for the presence of any traumatic event and the frequency of DSM-IV-based PTSD symptoms. It has been shown to be a valid and reliable tool [77]. The first section contains 12 items asking about possible traumatic exposures; the second section enquires about feelings during or after the event and the third section assesses symptoms on a five-point Likert scale. The UCLA-PTSD-RI has been administered in different languages and populations [78,79]. It has been validated in low resource settings such as Zambia [80]. The psychometric properties of UCLA-PTSD-RI were recently thoroughly evaluated and it showed good to excellent internal reliability scores between 0.88 and 0.91 [81].

TSCC

- The TSCC is a self-report measure for use in children and adolescents (age: 8–16 years) [42,45,54]. It is not a diagnostic tool; however, it assesses trauma exposure as well as a wide array of symptoms such as PTSD, depressive, anxiety, dissociative and anger symptoms. Score interpretation requires specialized training. The PTSD scale is one of six clinical scales in the complete version consisting of 54 items. The measure has good psychometric properties and has been standardized in large samples of racially and economically diverse children [54,82,83]. Settings in which the TSCC has been validated include Sweden [84] and in HIV-positive children in China [85]. The TSCC has been evaluated in psychiatrically ill adolescents, and its individual scales were found to be reliable and significantly intercorrelated with its subscales [86].

TSCYC

- This companion instrument to the TSCC is for younger children aged 3–12 years and is used to measure behavioral manifestations of complex trauma in children younger than 7 years of age [45,54]. The measure contains 90 items to be answered by the parent or caretaker. It contains eight scales with three assessing PTSD symptoms, while the others assess other emotional and dysregulation symptoms. The TSCYC has good psychometric properties [87] and its PTSD subscale correlates well with PTSD scores on the UCLA-PTSD-RI in young children [33,88]. In one study, the TSCYC showed moderate convergent and discriminant validity with the TSCC; however, there was a relatively low association between the relevant scales of the TSCC and TSCYC, possibly reflecting differences in child/parent perceptions of the child's symptomatology [89]. However, in another study, the TSCYC showed good convergent validity with other parent ratings, such as the UCLA-PTSD-RI, but weak agreement with the TSCC, again indicating differences between parent and child reports [90]. The instrument has also been tested in mixed racial and ethnic groups with little evidence of racial bias.

IES-R

- The IES-R [42,91] is a modified version of the IES [92] and is a self-report measure that was designed to assess intrusive, avoidant and hyper arousal symptoms following trauma. It consists of a 15-item, four-point scale, and has two subscales of intrusion and avoidance. It was designed for use in adults and is not a diagnostic instrument. Although not designed for use in children, it has been used as a screening measure in studies involving children and adolescents. The IES has recently been validated in a study from Taiwan and demonstrated excellent internal reliability (Cronbach's $\alpha = 0.94$), a cut point score of 19 out of 20, a sensitivity of 85.7% and a specificity of 84.1% [93]. The IES has also been administered and validated in children exposed to war [94] and earthquakes in China [95].

LASC

- The LASC was designed to measure PTSD and general distress in adolescents [45,96]. It is a 43-item self-report checklist that has been modified for use in adolescents [97,98]. It includes items based on DSM-IV PTSD criteria and other items based on more general stress-related problems for which a total score is obtained. It uses a four-point Likert scale to indicate how much of a problem a symptom is. PTSD symptoms can be scored continuously and separately from the total measure. The LASC shows good psychometric properties, but work is needed to further validate the adolescent version. The psychometric properties of the LASC were evaluated in an adolescent sample and internal consistency estimates were 0.90 for the 17-item index, 0.95 for the 43 full-scale index and confirmatory factor analysis supported three highly correlated factors representing the DSM-IV symptom categories [97].

CITES-R: Children's Impact of Traumatic Events-Revised; CPTSD-RI: Child Post-Traumatic Stress Disorder Reaction Index; CROPS: Child Report of Post-Traumatic Symptoms; IES: Impact of Events Scale; IES-R: Impact of Events Scale Revised; LASC: Los Angeles Symptom Checklist; PROPS: Parent Report of Post-Traumatic Symptoms; PTSD: Post-traumatic stress disorder; TSCC: Trauma Symptom Checklist for Children; TSCYC: The Trauma Symptom Checklist for Young Children; UCLA-PTSD-RI: University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index.

Box 1. Screening measures for post-traumatic stress disorder (cont.).

Angie/Andy Cartoon Scale

- The Angie/Andy Cartoon Scale is a tool for use in children aged 6–11 years and was designed to capture the inner experiences of a child following traumatic exposures [45,99]. It has a cartoon-based format with drawings of children manifesting traumatic stress symptoms. Responses by the child are given by pointing to a thermometer that indicates the frequency of experienced symptoms. The original 110-item Angie-Andy Cartoon Scale takes about 45 min to administer and gives information on six scales with the first two measuring post-traumatic stress symptoms. The authors report fairly good psychometric properties, with an internal α-coefficient ranging from 0.70 to 0.95 and good parent/child agreement [99].

CROPS & PROPS

- A screening instrument for post-traumatic symptoms in children aged 6–18 years [45,100], CROPS is a child self-report measure and PROPS is a parent-report measure. The instruments can be administered on paper or verbally. Each measure takes about 5 min to administer and responses are on a three-point Likert scale. Cutoff scores have been developed to indicate the likelihood of PTSD [101]. The measures have been translated into different languages, been used in diverse ethnic and international populations, and show fairly good psychometric properties [102].

CITES-R

- This instrument is designed to assess PTSD symptoms as well as other sexual symptoms in sexually abused children aged 8–16 years [45,103,104]. The CITES-R comprises 78 items falling into 11 scales, takes between 10 and 40 min to administer, and has modest psychometric properties.

CITES-R: Children's Impact of Traumatic Events-Revised; CPTSD-RI: Child Post-Traumatic Stress Disorder Reaction Index; CROPS: Child Report of Post-Traumatic Symptoms; IES: Impact of Events Scale; IES-R: Impact of Events Scale Revised; LASC: Los Angeles Symptom Checklist; PROPS: Parent Report of Post-Traumatic Symptoms; PTSD: Post-traumatic stress disorder; TSCC: Trauma Symptom Checklist for Children; TSCYC: The Trauma Symptom Checklist for Young Children; UCLA-PTSD-RI: University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index.

Disorder Scale (CAPS), Primary Care Post-Traumatic Stress Disorder Screen (PC-PTSD) and Post-Traumatic Stress Disorder Checklist (PCL) [203].

Assessment of associated features

PTSD is a complex disorder and especially in the case of complex trauma multiple psychopathological symptoms can ensue in its aftermath. Investigators are also increasingly interested in factors that increase the risk for PTSD as well as those that enhance resilience. Screening instruments that assess for comorbidity are necessary as PTSD is known to have high comorbidity with other psychiatric conditions. However, a discussion of screening measures available to detect comorbid psychiatric conditions is beyond the scope of this review.

■ Complex trauma assessments

Assessment of complex traumatic stress reactions is another important area due to it being a common form of trauma exposure in childhood. Complex traumatic stress reactions can take many forms, cause significant impairments in development and functioning, and may not be amenable to comprehensive assessment using a single measure or battery of tests. Ford recommended adopting the following approach when assessing and treating children with complex trauma exposure [58]. First, assess for the presence of a complex trauma history and then evaluate for affective/cognitive/behavioral/somatic dysregulation using developmentally validated self-report and caregiver report tools [58]. Ford suggests that complex traumatic stress reactions can be conceptualized as forms of impaired self-regulation and can be assessed with measures of post-traumatic dysregulation of emotion, cognition, behavior and bodily functioning. Some of the measures frequently used to assess dysregulation include the Five Factor Personality Inventory for Children [59], which assesses affective and behavioral dysregulation in children; the Minnesota Multiphasic Personality Inventory for Adolescents (MMPI-A) [60], which assesses affective and somatic dysregulation in adolescents; the Abbreviated Dysregulation Inventory (ADI) [61], which assesses a broader range of affective, behavioral and cognitive dysregulation in children and adolescents; and as previously mentioned measures such as the TSCC [54], which measure multiple symptom dimensions [58].

■ Assessment of coping

A number of instruments are specifically designed to assess the construct of coping or adapting after traumatic events. Self-report questionnaires that assess the frequency of coping strategies in children and adolescents include the Coping Orientation for Problem Experiences (COPE) [62], Children's Coping Strategies Checklist (CCSC) [63] and Kidcope [64]. Examples of measures that

Box 2. Diagnostic measures for post-traumatic stress disorder.

CPSS

- The CPSS [42,45,53] is a modified version of the PSS [105] for use in children and adolescents (ages: 8–18 years). The PSS was designed as a self-report or semistructured interview for use in adults. The CPSS is a self-report measure designed to diagnose and assess the severity of DSM-IV PTSD symptoms as well as functional impairment in children and adolescents. It uses a four-point Likert scale format for symptom severity and can be administered individually or in a group format. A cutoff score of 16 or above has recently been suggested [106]. It takes about 15 min to complete and has been translated into various languages [107]. The CPSS demonstrates good psychometric properties [106,108]. The revised version of the measure also shows good psychometric properties, with internal reliability scores between 0.83 and 0.90, sensitivity of 84% and specificity of 72%. The point-biserial correlation with a diagnosis of PTSD was 0.51 [106]. The CPSS also includes a rating of functional impairment that can be used to monitor improvement in treatment settings.

DICA-R

- The DICA-R is a diagnostic instrument comprising semistructured interviews with both the child and parent [42,109]. It was initially developed in 1969 for both clinical and research purposes, and has since been revised many times. The DICA-R can be used to diagnose both present and lifetime PTSD. In the interview, the child is asked to identify an event considered to be traumatic. Diagnosis is based on either the child or parent interview, but both should be taken into consideration. It can be administered by lay interviewers after 2–4 weeks of training. The PTSD module contains 17 questions and is one of 18 diagnostic scales. The DICA-R's psychometric properties are good and have been well described [110].

K-SADS-PL

- The K-SADS-PL was originally designed to make a comprehensive assessment of psychopathology in children [42,57]. The K-SADS-PL is a semistructured interview involving reports from both the child and parent. The clinician needs to integrate both reports as well the child's observed behavior when formulating a diagnosis. The K-SADS-PL can be used to make a current and lifetime, as well as partial or full, diagnosis of PTSD and other disorders, and requires intensive training. The PTSD module is one of 32 scales and varies in length depending on the number of items endorsed. The scale initially assesses whether a variety of recent or past traumatic events has occurred and then uses one traumatic event and assesses symptom presence based on an index event. The K-SADS-PL uses developmentally adapted wording, for example, in assessing detachment, the child is asked whether it is hard to trust other people or whether he/she likes being alone more often. The test–retest reliability κ-coefficient for PTSD diagnosis was found to be in the good range (0.63) and inter-rater agreement was high [57].

CAPS-CA

- The CAPS-CA is a semistructured clinical interview conducted with the child or adolescent only [42,45,55,56]. The CAPS-CA is a modified version of the CAPS [111], and is developmentally appropriate for the assessment of PTSD and associated symptoms in children and adolescents (ages: 8–15 years). It evaluates current and lifetime diagnosis, frequency and intensity of symptoms, as well as the child's social, developmental and scholastic functioning. The CAPS-CA consists of 36 questions based on an event that the child identified as most distressing. Clinical judgment regarding the nature of the trauma as well as its impact on functioning is incorporated into the diagnosis. To administer the entire interview 30 min to 2 h is needed. The CAPS-CA has very good psychometric properties and a Dutch version was also recently shown to be equal to the English version [112].

CPTSDI-C

- The CPTSDI-C is used to assess both a history of trauma exposure (single or multiple events) and the presence of PTSD symptoms based on DSM-IV criteria [45,113]. It is designed for use in children and adolescents aged 7–18 years and has a parallel parent version the CPTSDI-P. It is clinician administered, and comprises structured interviews with the child and parent, enquiring about trauma exposure, PTSD symptoms, anxiety, depression, dissociation and other dysregulation symptoms. The parent version includes additional questions regarding behavioral symptoms. The interview takes about 30 min to administer. The CPTSDI-C correlates moderately well with the Child Behavior Checklist [113].

Children's PTSD Inventory

- The Children's PTSD Inventory assesses both a history of trauma exposure and the presence of PTSD symptoms [43,114]. It is a clinician-administered measure designed for use in children and adolescents (aged: 7–18 years) and has five subscales, with the first subscale screening for trauma exposure and the other subscales assessing PTSD symptoms as well as significant distress. The measure contains instructions and scoring for each subtest. It takes approximately 10–15 min to administer. Administrators require about 2 h of professional training. The Children's PTSD Inventory has fairly good psychometric properties with a Cronbach's α of 0.95 and inter-rater reliability κ-score of 0.96 at the diagnostic level [114,115].

CAPA (CAPA-C and CAPA-P)

- The CAPA-C is intended for use in adolescents aged 9–17 years of age [45,116]. It is a comprehensive diagnostic interview designed to obtain information for psychiatric diagnoses adhering to DSM-IV criteria. A parent interview is also available (CAPA-P). The measure is divided into different modules. The life events and post-traumatic stress module assess trauma exposure and PTSD symptoms, respectively. The CAPA can discriminate between acute, chronic and delayed onset subtypes. The interview takes approximately 1 h and is extensive. The CAPA has fair psychometric properties and requires training [117].

CAPA: Child and Adolescent Psychiatric Assessment; CAPA-C: Child and Adolescent Psychiatric Assessment – Child; CAPA-P: Child and Adolescent Psychiatric Assessment – Parent; CAPS: Clinician-Administered Post-Traumatic Stress Disorder Scale; CAPS-CA: Clinician-Administered Post-Traumatic Stress Disorder Scale for Children and Adolescents; CPSS: Child Post-Traumatic Stress Disorder Symptom Scale; CPTSDI-C: Childhood Post-Traumatic Stress Disorder Interview – Child; CPTSDI-P: Childhood Post-Traumatic Stress Disorder Interview – Parent; DICA-R: Diagnostic Interview for Children and Adolescents – Revised; K-SADS-PL: Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime; PSS: Post-Traumatic Stress Disorder Symptom Scale; PTSD: Post-traumatic stress disorder.

Box 3. Emotional distress and dissociative measures.

PEDS

- This is a tool designed to detect symptoms and behavioral changes in children aged 2–10 years following a traumatic exposure [45,118,119]. It is a 21-item parent-report scale, with 17 general behavior and four trauma-specific items, using a four-point Likert scale. The PEDS and its scales have fair psychometric properties [119].

CDC

- The CDC was designed to measure dissociative symptoms in children aged 5–12 years [45,120]. The caregiver or adult observer responds to a 20-item report of dissociative behaviors across six different domains. It takes about 5 min to administer [121]. The Child Dissociative Checklist has good psychometric properties, although further psychometric investigation and cross-cultural validation is required [118,121,122].

A-DES

- The A-DES is designed to measure dissociative symptoms in adolescents aged 12–18 years [45,123]. It is a 30-item self-report measure with responses to statements scored on a ten-point Likert scale. A total score as well as scores for four subscales (of different types of dissociative experiences) can be calculated. Psychometric evaluation of the A-DES indicates fair reliability and validity [123].

A-DES: Adolescent Dissociative Experience Scale; CDC: Child Dissociative Checklist; PEDS: Pediatric Emotional Distress Scale.

include parental and family reports of coping are the Responses to Stress Questionnaire (RSQ) [65] and Family Crisis Oriented Personal Evaluation Scale (FCOPES) [66]. These instruments assess behavioral, emotional and cognitive factors that are involved in a range of processes that assist an individual to adapt and function. Investigating how children and adolescents adapt and cope after trauma is a relatively new area of investigation. As there is still some uncertainty about how to accurately assess coping responses, methods in use are still quite varied. Pfefferbaum *et al.* have specifically reviewed the literature regarding the assessment of children and adolescent's coping responses after mass trauma [67]. They emphasize that an enhanced understanding of what assists children and adolescent to successfully adapt after mass trauma can assist in the design of interventions to enhance resilience [67].

Assessment of post-traumatic growth

Another growing area in the trauma assessment field is post-traumatic growth [68]. This field is informed by a positive psychological perspective and the focus is on how individuals develop increasingly healthy behaviors following a traumatic incident. Whereas the focus in resilience studies is on adaptation and return to normal functioning, studies of post-traumatic growth focus on enhanced functioning. Positive psychology-based treatments of PTSD are recovery orientated, and aim to help a child or adolescent find meaning and make positive changes. Post-traumatic growth has been largely studied in adults, and there is a dearth of research in children and adolescents [68]. The most commonly used self-report measure in adults is the Post-traumatic Growth Inventory (PTGI) [69], which covers five subscales of growth: 'new possibilities', 'relating to others', 'personal strength', 'appreciation of life' and 'spiritual change'. This adult measure has been adapted for use in adolescents [70,71] and in children, called the PTGI for Children (PTGI-C) [72]. Development of reliable and valid tools for the assessment of post-traumatic growth in children and adolescents can help to enhance the effects of established treatments for childhood PTSD, such as cognitive–behavioral therapy [68].

Conclusion & future perspective

We have attempted to provide an overview of assessment measures for PTSD in children and adolescents. We have also highlighted the complexities of diagnosing PTSD in this age group. The assessment instruments discussed here are not an exhaustive inventory of instruments but reflect instruments that measure core- and related- symptoms in pediatric PTSD. The field of pediatric PTSD is still evolving with changes in our understanding of what constitutes a traumatic experience, and of the consequences and symptoms that extend beyond core symptoms. Several risk and resilience factors have been identified, and coupled with this, new tools for assessing etiological factors and post-traumatic growth in children and adolescents have been developed. With changes in the diagnostic nomenclature for PTSD, existing instruments will need to be updated and new instruments developed. Assessment tools need to be developmentally sensitive, psychometrically robust, and considerate of developmental features that are unique to different age groups (e.g., preschool, school age and adolescence). Screening and diagnostic tools are not only important for research purposes but are essential in clinical settings where they can

facilitate early identification of PTSD symptoms, and lead to enhanced diagnosis and treatment in children and adolescents.

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