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Review

PTSD IN CHILDREN AND ADOLESCENTS: TOWARD AN EMPIRICALLY BASED ALGORITHM

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In considering potential revisions for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), describing developmental influences on symptomatic expression is a high priority. This review presents a number of options and preliminary recommendations to be considered for DSM-V. Research conducted in the past 15 years is reviewed that pertains to expressions of posttraumatic stress disorder (PTSD) symptoms in preschool and school age children and in adolescents. This research has attempted to determine the usefulness of the DSM-IV criteria for PTSD in children and adolescents. Based on the studies of preschool children, evidence supports two sets of suggestions: first, we suggest that developmental manifestations are warranted in A-D criteria of PTSD; and second, we suggest that a developmental preschool PTSD subtype is warranted that lowers the C threshold from three to one symptom. For school-age children and young adolescents, the evidence is more limited. Nevertheless, there is also evidence suggesting that modifications in PTSD criteria A–D, including fewer Cluster C symptoms, may facilitate accurate diagnosis in this age group. Depression and Anxiety 28:770–782, 2011.

Key words: *posttraumatic stress disorder; classification; taxonomy; preschool children; children; adolescents; Diagnostic and Statistical Manual of Mental Disorders*

A challenge for *Diagnostic and Statistical Manual of Mental Disorders*, *Fifth Edition* (DSM-V) is to consider developmental differences in the expressions of disorders in different age groups more completely than the earlier editions of DSM have done. Developmental considerations will be included in the text descriptions of each disorder. In addition, prior research suggests that individuals of different ages may express features of the same specific criteria somewhat differently. For example, young children with attention-deficit/hyperactivity disorder may express the symptoms of hyperactivity by running about or climbing excessively. Adolescents, in contrast, may rather simply report that they have to exert great effort to resist moving about while in class or in other contexts while not appearing overtly hyperactive to observers in these settings. As such, the descriptions of criteria in DSM-V may need to be modified to reflect age differences in manifestations of the same underlying criteria. Finally, there may be sufficient differences in the expressions of some disorders to justify an age-related subtype of the disorder. With this type of developmental expression, an alternative algorithm or different criteria set may be used in different age groups, to adjust thresholds or to include signs and symptoms not described for other ages (Pine et al., in this issue).

This article, which reviews the evidence on developmental issues in PTSD in children and adolescents, was

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commissioned by the DSM-V Anxiety, Obsessive–Compulsive Spectrum, Posttraumatic, and Dissociative Disorders Work Group and by the Child and Adolescent Disorders Work Group of DSM-V. It represents the work of the authors for consideration by the work groups. Recommendations provided in this article should be considered preliminary at this time; they do not necessarily reflect the final recommendations or decisions that will be made for DSM-V, as the DSM-V development process is still ongoing. It is possible that this article's recommendations will be revised as additional data and input from experts and the field are obtained.

STATEMENT OF THE ISSUES

The purpose of this review is to consider developmental differences in the symptomatic expressions of PTSD symptoms, specifically considering possible age-related manifestations or age-related subtypes of PTSD in children and adolescents. This is important to consider because, although PTSD has been widely reported in children and adolescents, the DSM-IV criteria were developed from and field tested on adult samples—no individuals 15 years of age or younger were included.[1] Despite this, the DSM-IV makes several age-related comments about specific criteria, with notes added about different manifestations of signs and symptoms in Criteria A2, B1, B2, and B3 (see Table 1). Moreover, DSM-IV is often used as the basis to assign PTSD diagnoses to individuals younger than 15, but the same diagnostic algorithm is used for all ages. In fact, until recently, there were few data available about the symptomatology of children less than 18 years old and almost no data on the symptomatology of children less than 12 years who have been traumatized.

In the decade and half since the DSM-IV criteria were developed, a number of studies have carefully assessed symptoms and signs of PTSD in children less than 15 years old who have been exposed to serious traumatic events. This review focuses on research pertinent to two age groups, preschool children, and school age and young adolescents (7–14 year olds) to determine what developmental expressions of PTSD should be contained in DSM-V.

SIGNIFICANCE OF THE ISSUES

In a community sample of 1,420 children, 68% had experienced at least one potentially traumatic event and 37.0% had been exposed to more than one.[2] It is well established from studies of adults that while most individuals are resilient to trauma exposure, roughly 30% of traumatized adults will develop PTSD[3] and of that 30%, approximately 50%, will have an unremitting and impairing course.[4]

For children and adolescents, the data clearly show that posttraumatic symptoms are common following exposure to trauma. Preliminary findings also suggest that PTSD in these younger individuals does not quickly remit. A prospective study of 808 Australian schoolchildren (mean 8.2 years) showed no decrease in posttraumatic stress symptoms 26 months after a

TABLE 1. DSM-IV criteria for PTSD showing alternative algorithm changes

Diagnostic criteria for posttraumatic stress disorder

A. The person has been exposed to a traumatic event in which the following were present:
   1. the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others (no change from DSM-IV)

B. The traumatic event is persistently re-experienced in one (or more) of the following ways:
   1. recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. Note: In young children, repetitive play or repetitive *behaviors* may occur in which themes or aspects of the trauma are expressed. *Furthermore*, *recollections may appear not to be distressing in young children*
   2. recurrent distressing dreams of the event. Note: In children, there may be frightening dreams without recognizable content
   3. acting or feeling as if the traumatic event was recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). Note: In young children, trauma-specific reenactment may occur
   4. intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
   5. physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

C. Persistence avoidance of stimuli associated with the trauma and numbing of responsiveness (not present before the trauma), as indicated by *one* or more of the following:
   1. efforts to avoid thoughts, feelings, or conversations associated with the trauma
   2. efforts to avoid activities, places, or people that arouse recollections of the trauma
   3. inability to recall an important aspect of the trauma
   4. markedly diminished interest or participation in significant activities. Note*: In young children*, *this may be manifest as constriction in play*
   5. feeling of detachment or estrangement from others (e.g. unable to have loving feelings). Note*: In young children*, *this may be manifest as social withdrawal*
   6. restricted range of affect
   7. sense of foreshortened future (e.g. does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:
   1. difficulty falling or staying asleep
   2. irritability, outbursts of anger, or *extreme temper tantrums in young children*
   3. difficulty concentrating
   4. hypervigilance
   5. exaggerated startle response

E. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning

bushfire.[5] A group of 30 6- to11-year-old children, 21 months after surviving Hurricane Andrew, showed statistical improvement on PTSD symptoms, but 70% were still in the moderate-to-severe category of PTSD symptoms.[6] A group of 35 traumatized children aged 1–6 showed no significant decrease in PTSD symptoms when followed prospectively for more than 2 years.[7] Another group of young children were followed prospectively after motor vehicle accidents (MVA); 69% of those children diagnosed with PTSD retained the diagnosis 6 months later.[8] In fact, for a variety of traumatic experiences in children and adolescents, PTSD symptoms do not seem to remit spontaneously.[9]

The ultimate public health benefit emerging from appropriate recognition is obtaining adequate treatment. And obtaining adequate treatment requires an accurate diagnosis, which requires diagnostic criteria that are developmentally appropriate.

SEARCH METHODS

A computerized literature search was conducted using PubMed, PsycINFO, and the National Center for PTSD Published International Literature on Traumatic Stress databases for all studies pertaining to PTSD in children and adolescents in the past 15 years (since DSM-IV criteria were published). The DSM-IV Sourcebook was also reviewed. In addition, the authors made contact with investigators and clinicians active in the field, including those who participate in the National Child Traumatic Stress Network.

PRESCHOOL CHILDREN

The first question one might ask, for purposes of this review, is whether there is any evidence that PTSD exists in preschool children. Without question, many young children are exposed to trauma, placing them at risk for PTSD. A substantial number of studies have documented exposure of young children to potentially traumatic events, ranging from abuse[10,11] to witnessing interpersonal violence[12] to MVA[7,8,13] to experiences of natural disasters[14] and conditions of war.[15,16] Thus, there is no doubt that children in this age group experience serious and potentially traumatic events in large numbers.

Despite substantial exposure, several studies examining frequencies of PTSD using DSM-IV criteria found them to be surprisingly low (see Table 2). In severely traumatized young children, even consecutive clinic admissions of traumatized young children in which we might expect a high prevalence of PTSD, the frequencies of PTSD diagnosis ranged only from 13 to 20%. This contrasts with data in adults that typically show higher frequencies, such as from 32[17] to 59%.[18] In samples of children recruited to participate in studies following exposure to trauma, the frequencies were 0–12.7% (Table 2). Finally, a community study of 2–5 year olds[19] found a prevalence rate of 0.1% (Egger, personal communication). These frequencies may be low because young children are relatively protected, perhaps by cognitive and perceptual immaturity, from developing PTSD following the experience of trauma, or the frequencies may be low because the criteria themselves are not developmentally sensitive enough to detect the presence of manifestations of the disorder in this age group. The current evidence suggests that PTSD can be identified in preschool children using DSM-IV criteria, but that rates of PTSD in young children exposed to trauma seem lower than in older children exposed to trauma.

AN ALTERNATIVE ALGORITHM

Suggesting that the DSM-IV criteria needed to be more behaviorally anchored and developmentally sensitive to detect PTSD in preschool children, some of us[20,21] proposed previously an alternative to the DSM-IV criteria for children 6 years old and younger.

TABLE 2. Studies of PTSD in preschool children comparing DSM-IV and PTSD-AA criteria

Citation	Age	*N*	Sample	Traumatic events	DSM-IV diagnosis	Alternative algorithm	♯ PTSD symptoms
Scheeringa et al.[21]	1–3 years	12	Severely traumatized, clinic referred	Mixed	13%	69%[a]	
Scheeringa et al.[20]	1–3 years	15	Severely traumatized, clinic referred	Mixed	20%	60%[a]	9.9
Levendosky et al.[26]	3–5 years	62	Recruited	Domestic violence	3%	26%[a]	
Ohmi et al.[25]	2–6 years	32	Recruited	Gas explosion in nursery school	0%	25%[a]	6.1
Scheeringa et al.[13]	1–6 years	62	Recruited	Mixed	0%	26%[b]	6.1
Egger et al.[19]	2–5 years	314	Community (pediatric clinic)	Mixed	0.1%	0.6%	
Meiser-Stedman et al.[8]	2–6 years	156	Recruited	MVA	1.7%	10.0%[b]	10.0
Scheeringa et al., submitted	3–6 years	284	Traumatized and recruited	MVA, DV, hurricane	12.7%	44.7%[b]	7.8

[a]Alternative algorithm required 1 B, 1 C, and 1 D symptom and 1 from an experimental E cluster.
[b]Alternative algorithm required 1 B, 1 C, and 2 D symptoms.

This approach used DSM-IV criteria as a starting point, but modified the criteria and studied the effects of those modifications in a series of studies on young children. This approach was refined empirically for more than several years[13,20,21] and critiqued and endorsed by a task force of experts on early childhood mental health.[22] In this review, this approach is referred to as the posttraumatic stress disorder—alternative algorithm (PTSD-AA). The specific modifications in the DSM-IV criteria are shown in Table 1 and the rationale for the changes is described below.

Cluster A modifications. There are serious doubts about the validity of the A2 criterion, shown in Table 1, in the adult literature.[23] In the PTSD-AA, the A2 criterion was eliminated because "fear, helplessness, or horror" at the time of a traumatic event are difficult to determine for young children who cannot accurately report on their experience and there were no adults present to witness their reactions. Further, it is not clear what "disorganized" or even "agitated" behavior refer to, nor what data supports their use as substitutes for "fear, helplessness or horror" in young children.

Additional data have recently become available on this issue. Scheeringa et al. (under review) studied 284 children aged 3–6 who had experienced a heterogeneous mixture of traumatic events (e.g. domestic violence, MVA, Hurricane Katrina exposure). Interviews probed young children's initial reactions of "fear" and "helplessness," but there was no assessment of "horror." In this sample, 92.1% ($n = 117$) of 127 children who met the diagnostic threshold using PTSD-AA (ignoring A2) had *either* fear or helplessness (whereas 82.4% of 153 subdisorder PTSD-AA had one or the other). Therefore, if A2 were included using fear *or* helplessness, 7.9% ($n = 10$) of preschool children who otherwise met PTSD-AA criteria for the diagnosis would be missed.

DSM-IV specifically notes that children may display "disorganized or agitated" behavior instead of "fear, helplessness or horror." Scheeringa et al. (under review) found that when children were reported to be "agitated" *instead of* experiencing fear, helplessness or horror, the number of children meeting the A2 criterion actually decreased. If, however, agitated was *added to* the "fear, helplessness or horror" criterion, this captured an additional 3 of the 10 children from among the 127 who were missed by the inclusion of A2 "fear or helplessness" but met PTSD-AA criteria. With "fear," "helplessness" or "physically agitated" used 94.5% of the children who otherwise met criteria would be correctly identified.

Of those remaining 7 out of 10 who did not show either fear, helplessness, or agitated behavior, 5 showed sadness, 4 showed anger, 4 showed confusion, 3 showed surprise, 2 showed crying, 1 showed numbing, and 1 was quiet. Overall, in the 127 children with the PTSD-AA diagnosis, 86.6% showed sadness, 70.1% showed confusion, 67.7% showed crying, 64.6% showed surprise, 48.8% were quiet, 46.5% showed anger, and 20.5% showed numbing. These data indicate that the range of acute reactions shown by young children who meet PTSD-AA disorder status is broader than DSM-IV options allow.

Cluster B modifications. The B1 symptom is phrased as "recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions." Thus, all three conditions—recurrent, intrusive, and distressing—are necessary. In the PTSD-AA, a note qualifying B1 indicates that preschool children do not always manifest distress, even when they report intrusive thoughts or at least seemed preoccupied by traumatic reminders. This change was based on small samples of severely traumatized clinic-referred children who showed considerable variability in their reactions from distress to "overbright" positive emotional displays.[20,21]

In Scheeringa et al. (under review), parents were asked to report on their children's emotions when the children were recounting their traumatic experiences verbally. Parents were asked to endorse the two most prominent feelings from a menu of eight options, plus a category for "other." Among those with higher severity (PTSD-AA diagnosis) who displayed the symptom of intrusive thoughts, some "distressing" emotions were common—anxiety (39.6%), sadness (39.6%), fear (32.1%). Other distressing emotions were rare—anger (9.4%) or absent—guilt (0%). Yet, three other reactions that were not obviously distressing were also present—excitement (22.6%), no affect (11.3%), and enjoyment (3.8%). In this sample, there was no difference in the number of total PTSD symptoms for those with a distressing emotion (8.1 symptoms) versus those without (7.0 symptoms) ($P = .13$).

Cluster C modifications. The largest number of modifications in the PTSD-AA approach involves Cluster C. Qualifiers about the wording in specific criteria represent age-related modifications and were made originally based on clinical observations. In the PTSD-AA, a qualifying note for C4 indicates that, in young children, diminished interest in significant activities may manifest as constricted play. In the PTSD-AA, Criterion C5 adds a note that feelings of detachment or estrangement "may be manifest in young children as social withdrawal." This anchors the item in an observable behavior apparent to caregivers, with the implication that it is the behavioral manifestation of detachment and estrangement in young children. This is important because young children cannot report subjective feeling states to others.[24]

The most important difference for the PTSD-AA is a change in the threshold of Cluster C for preschool children. Young children have emerging verbal and abstract cognitive capacities. Many of the cluster C symptoms are highly internalized phenomena that seem to be either developmentally impractical (e.g. sense of a foreshortened future) or difficult to detect

even if they were present (e.g. avoidance of thoughts or feelings related to the traumatic event and inability to recall an important aspect of the event). As a result, where the DSM-IV required three out of a possible seven symptoms, three symptoms are already not available to young children, making the algorithm more difficult for younger age groups.

Two early studies indicated that the requirement of three Criterion C signs/symptoms was largely responsible for the much lower prevalence of PTSD using the DSM-IV rather than the PTSD-AA.[20,21] Relevant to this consideration is that C3 (inability to recall an important aspect of the trauma) and C7 (foreshortened future) are virtually never endorsed for preschool children, meaning that the maximum total number of potential C criteria that can be endorsed drops from seven to five. Six subsequent studies have compared the threshold of three Cluster C signs/symptoms when using the DSM-IV to the one Cluster C threshold of PTSD-AA,[8,13,14,25,26] (Scheeringa et al., under review) allowing for a head-to-head comparison. The rates of children meeting the DSM-IV criteria that require three Cluster C signs/symptoms are exceedingly low (ranging between 13 and 20% in clinical samples). These low rates occur among children who show many other signs of psychopathology, including high levels of anxiety and emotional perturbations. This demonstrates that the current Cluster C requirement in DSM-IV prevents young children from meeting PTSD diagnostic threshold where the overall clinical picture suggests that this would be appropriate.

In addition, these studies reported rates of the B, C, and D Clusters. These show that even when the threshold for Cluster C was lowered from 3 in DSM-IV to 1 in PTSD-AA, the frequencies of Cluster C are usually lower than the frequencies of Cluster B and D, suggesting that the threshold for Cluster C has not been lowered too far.[8,13,14,25,26]

Cluster D modifications. Criterion D2 requires "Irritability or outbursts of anger." The PTSD-AA modifies this criterion with the addition of "extreme temper tantrums." The behavior being described has to be new onset or worsening of prior tantrum intensity or frequency following a traumatic event for it to be counted as endorsed. This modification is made based on how young children most frequently express irritability and angry outbursts.

VALIDITY OF PTSD ALGORITHMS

The validities of the PTSD-AA and DSM-IV algorithms have been examined in several different ways. Next, we consider what has been demonstrated regarding the criterion, discriminant, and predictive validity of each.

Criterion validity. Table 2 includes five studies that reported the mean number of PTSD symptoms in the group diagnosed by a PTSD-AA algorithm. These were 6.1, 6.1, 7.8, 9.1, and 10.0 symptoms, indicating that, even when the algorithm threshold was lowered for cluster C, highly symptomatic children were being diagnosed.

Besides showing symptom severity, PTSD-AA diagnoses included functional impairment as part of the diagnostic algorithms. However, even with this lowered algorithm threshold, more children are symptomatic and impaired but do not meet the diagnosis that are able to qualify for the PTSD-AA diagnosis. When preschool children who were victims of heterogeneous types of traumas were reassessed one year after their first assessment, significantly more were functionally impaired in at least one domain (48.9%) than had the diagnosis of PTSD-AA (23.4%); the gap was even greater after 2 years (74.3% functionally impaired compared to 22.9% diagnosed).[7] This makes explicit not only the presence of functional impairment in the PTSD-AA diagnosis but also that the diagnosis actually undershoots the population of those who are symptomatic and impaired with PTSD symptoms.

That more young children are diagnosed with PTSD, using the PTSD-AA rather than DSM-IV criteria, does not mean they are more valid, of course. A significant concern about the DSM-IV algorithm is that highly symptomatic children do not meet the diagnostic threshold. Two studies of criterion validity of the DSM-IV and PTSD-AA in severely traumatized preschool children demonstrated the better fit of PTSD-AA.[13,20] First, using best estimate diagnosis of PTSD as a reference, children who met criteria for that diagnosis had the most PTSD-AA symptoms; children who were traumatized but had subthreshold PTSD had intermediate levels of PTSD-AA symptoms; and unexposed control children had the lowest levels of PTSD-AA symptoms. This dimensional correlation was not evident in the DSM-IV symptom counts in either study. Second, in the PTSD-AA method, the mean number of signs/symptoms in the children diagnosed with PTSD-AA was significantly higher than the number of signs/symptoms in the children who were traumatized but not diagnosed with PTSD-AA, whereas this was not true using the DSM-IV approach.

Convergent and discriminant validity. Several studies have examined convergent validity of the PTSD-AA and found reasonable convergence between parent-reported symptomatology and diagnosis of PTSD using the PTSD-AA.[8,13,25,27] In addition, Scheeringa et al. found that young children with PTSD (using the PTSD-AA method), as expected, exhibited increased heart rate when traumatic, as opposed to pleasant, memories were recalled.[28]

The validity of the PTSD-AA criteria has also been studied with regard to their ability to discriminate traumatized and control children. Three studies have included nontraumatized comparison children, and in each study trauma-exposed preschool children had more signs/symptoms than unexposed control children in B, C, and D clusters.[13,20,26] What is lacking is a

comparison of children with PTSD to children with other disorders on concomitant variables that should discriminate between disorders.

Predictive validity. Two studies have followed children prospectively after exposure to trauma using the PTSD-AA categorical diagnosis. Meiser-Stedman et al.[8] studied 62 preschool children 2–4 weeks (Time 1) and then 6 months (Time 2) after they had experienced MVA. Of the exposed children, 6.5% met PTSD-AA criteria at Time 1 and 10% at Time 2. The diagnosis was stable from Time 1 to Time 2, whereas diagnosis of DSM-IV Acute Stress Disorder (ASD) at Time 1 was not predictive of DSM-IV PTSD at Time 2—in fact, no cases of ASD at Time 1 were diagnosed with PTSD at Time 2. Thus, PTSD-AA criteria had more evidence of predictive validity than DSM-IV criteria.

Scheeringa et al.[7] studied 62 children with mixed traumatic experiences at Time 1, and again approximately 12 months (Time 2) and 24 months (Time 3) later. They found significant stability of symptoms over the 2 years. At Time 1, the group diagnosed with PTSD-AA had an estimated mean of 6.1 PTSD symptoms and the group of traumatized children who did not meet criteria for PTSD-AA had a mean of 2.7 PTSD symptoms. This number of symptoms did not diminish by even as much as one symptom for more than 2 years for either group. PTSD diagnosis at Time 1 significantly predicted degree of functional impairment 1 and 2 years later and predicted PTSD diagnosis 2 years later but not 1 year later. The lack of 1-year diagnostic continuity between baseline and T1 was explained by children with new traumas after the baseline assessment. There was no report of the predictive validity of the DSM-IV criteria in this study.

Ohmi et al.[25] also contributed to showing longitudinal stability of PTSD-AA symptoms in preschool children. Multiple symptoms, prospectively measured 10 days, 6 months, and 1 year following a gas explosion in a nursery school, stayed stable or increased. PTSD-AA diagnoses were made only at 6 months, and the frequency was 25%.

RECOMMENDATIONS FOR DSM-V FOR PRESCHOOL CHILDREN

1. Criterion A2 should be dropped for preschool children. If retained, it should include a broader range of reactions including worry, sadness, crying, numbness, and confusion.
2. Criterion B1 should be broadened to include other emotional reactions during recollections other than distress.
3. Criteria C4, C5, and D2 should be qualified slightly to illustrate their behavioral manifestations in preschool children.
4. The threshold for C symptoms should be dropped from 3 to 1.

PROPOSED DSM-V CRITERIA IN PRESCHOOL CHILDREN

The proposed criteria for the DSM-V, as of this writing, contain substantial changes from DSM-IV (see Friedman et al., this issue).[23] No studies with preschool children have empirically analyzed these proposed criteria; so, informed judgments about whether these criteria are an improvement are not yet possible. From initial inspection, the proposed criteria seem to recreate the same problems for young children of earlier iterations of PTSD criteria. The threshold problem of Cluster C for young children that had been noted for the DSM-IV criteria may have been exacerbated. Instead of requiring 3 symptoms from the DSM-IV cluster C (out of 7 possible), this cluster C has been split into new clusters C and D and 4 symptoms total are now required (out of 10 possible). No known factor analysis studies have been conducted with datasets of young children, so it is not known if the factor solutions that have suggested splitting the avoidance/numbing cluster into two clusters[23] holds in this age group.

Several Cluster C symptoms are highly internalized and abstract phenomena which limits their applicability in preschool children. Even if young children possessed these symptoms, their limited verbal capacities to express or self-report the symptoms made them difficult to detect. This problem has not been addressed in the proposed criteria, because the two new symptoms that have been added to the new cluster D are both highly internalized (self-blame and a negative emotional state of fear, horror, anger, guilt, or shame) and require sophisticated verbal capacities to express them. Furthermore, one symptom has been added to the increased arousal cluster (reckless or self-destructive behavior), the new cluster E, which recreates the same problem of many of the DSM-IV symptoms of being difficult to detect reliably in children with absent or emerging verbal capacities. Young children may do many things that place them in danger, but it is difficult to reliably determine if these are self-destructive acts without access to their cognitions through their verbal capacities. Increasing the threshold from two symptoms to three will most likely limit the applicability of these criteria to young children.

PTSD IN SCHOOL AGE CHILDREN AND YOUNG ADOLESCENTS

As noted, studies that informed the DSM-IV process did not include school age children or young adolescents, raising many of the same questions regarding

them as about preschool children. Relative to the above-noted studies in preschoolers, a more limited number of studies have been conducted in school age children and young adolescents, including few studies that conducted factor analyses of instruments that assess PTSD symptoms. The following discussion examines DSM-IV criteria for school age children and younger adolescents in light of the existing empirical evidence.

CRITERION A

PTSD begins with an initial moment of panic or sense of being suddenly overwhelmed by an uncontrollable, desperate situation. Consistent with this, epidemiologic research on risk factors for PTSD has shown that perceived threat to life and fear at the time of the traumatic events are two of the most consistent predictors of who develops PTSD.[29] The challenge with children oftentimes is determining what was frightening, because their perceptions of experiences may differ from adults due to their relative dependence and smaller physical size. For example, although it seems straightforward to determine the moment of most perceived life threat for children who experience traumas, such as child abuse, domestic violence, auto accidents, accidental injuries, animal bites, or disasters, many children say that their "worst" or most frightening moment was not when these traumas occurred, but at a trauma-related event, such as initial disclosure of abuse, removal from a domestic violence-perpetrating parent, or seeing their parent cry after another trauma. Like preschool children, school age children and many young adolescents are dependent on parents or other primary caregivers physically and emotionally, and more importantly, for safety. Parents provide children's primary protection from real or perceived danger, and thus, children's and young adolescent's perceptions of danger and how to stay safe are often influenced by the needs of the parent–child relationship.

When a child suddenly loses a parent, whether through death, abandonment, the child's placement in foster care, or other reasons, these events do not in themselves meet the life-threatening criterion. Nevertheless, there may be discrete events within those larger traumas in which children perceived serious threats to safety and possibly to psychological or physical survival. Traumatic death of a parent or other close relative has been shown to lead to significant PTSD symptoms in several studies of children aged 6–17,[30–32] even if the parent was abusive or neglectful. A study of children in foster care found that the most common trauma identified by children aged 6–12 to their therapists was "placement in foster care."[33] In a representative community sample, Costello et al. found that so-called "low magnitude" events (which included deaths or losses) were both more common and more likely to lead to PTSD in children than "high magnitude" events, such as child abuse or accidents.[34]

The issues of multiple trauma exposure and/or early chronic trauma exposure are not addressed in DSM-IV. Approximately half of trauma-exposed children experience more than one type of trauma.[2] DSM-IV requires that symptoms be yoked to "the trauma." Asking children to yoke current DSM symptoms (Criteria C and D) to a specific trauma may pose challenges in conditions of chronic or repeated traumas. The text description in DSM-IV could be revised to heighten awareness of this common feature.

Many chronic events begin in the earliest months of life, such as child abuse, domestic violence, or community violence.[35] For a child to specify that symptoms were not present before the trauma may not be feasible if the traumatic events have occurred for many years or for as long as the child can remember. Instead, children may perceive certain symptoms to be "just the way I am." To accommodate cases of lifelong trauma, some revision could be made in the criteria to the requirement that symptoms "not be present before the trauma" when such a time frame does not make conceptual sense.

Also similar to preschool children, it is common for children and young adolescents to report a variety of feelings other than fear, helplessness, or horror, for example, "confused," "sad," or "frozen." As with preschoolers, some children and young teens may not only describe enjoyment or excitement during some traumas but they also report having felt shame, guilt, or disgust.[36] Traumatized children and young adolescents may not be willing or able to describe how they felt during the traumatic event during an initial assessment. Reluctance may derive from how extreme the trauma was or from lack of interpersonal trust in the interviewer; the latter has been strongly correlated with PTSD symptoms in abused children and adolescents.[37] Finally, as discussed above, children and youth who have experienced chronic and/or multiple traumas may report that they are "numb" during traumatic events. In light of these findings and those in preschoolers, it may be optimal to either expand the A2 criteria to encompass the primary types of feelings expressed by traumatized children during their traumatic experiences or to omit this criterion.

CLUSTERS B, C, AND D

Table 3 lists studies that reported frequencies of B, C, and D criteria in school age children and adolescents.[2,8,38–46] The only epidemiologic study of school age children in the United States (9–13 years) reported a 3-month prevalence rate of 0.03% of PTSD and a lifetime prevalence of only 0.1%, both using DSM-IV criteria.[2] Cross-cultural epidemiologic studies of children show similar low frequencies: 1.3% in Germany,[47] 0.8% in Puerto Rico,[48] 0.1% in the UK,[49] 0.2% in Finland,[50] and 1.3% in Bangladesh.[51] Given the adult lifetime prevalence of about 8%,[52] and even in consideration of increased trauma exposure with aging,

TABLE 3. PTSD in school-age children and adolescents

Citation	Ages	*N*	Traumatic events	1 Cluster B symptom	3 Cluster C symptoms	1 Cluster C symptom	2 Cluster D symptoms	DSM-IV diagnosis	PTSD-AA diagnosis
Schwarz and Kowalski[46]	5–14 years	64	School shooting	90%	58%	NR	53%	41%	NR
Landolt et al.[42]	5–16 years	23	High-risk MVA, burn, cancer	91%	70%	NR	52%	52%	NR
		11	Low-risk minor surgery	64%	36%		18%	18%	
Aaron et al.[38]	8–17 years	40	Brain injury	68%	25%	NR	50%	23%	NR
McDermott and Cvitanovich[44]	8–13 years	26	MVA	40%	8%	NR	28%	8%	NR
Herskovits et al.[40]	4–19 years	94	Closed head injury	44%	13%	NR	59%	10%	NR
Keppel-Benson et al.[41]	7–16 years	50	MVA	56%	16%	NR	24%	14%	NR
Carrion et al.[39]	7–14 years	59	Mixed	76%	51%	NR	46%	24%	NR
Mertin and Mohr[43]	8–16 years	56	Maltreatment	91%	20%	NR	89%	20%	NR
Copeland et al.[2]	9–13 years	1,420	Mixed	2% (painful recall)	NR	NR	NR	0.03 (3 months) 0.1 (lifetime)	NR
Scheeringa et al.[45]	7–11 years	11	Acute injury	55%	9%	46%	36%	9%	18%
	12–18 years	29		41%	17%	62%	41%	3%	21%
Meiser-Stedman et al.[8]	6–10 years	51	MVA	65%	21%	67%	56%	19%	40%
Iselin et al.[61]	6–14 years	184	Traumatic brain injury	NR	NR	NR	NR	4.3%	12.5%

NR, not reported.

this contrasts remarkably with the low frequencies in children and raises serious questions about whether the DSM-IV criteria are developmentally appropriate for children and younger adolescents.

AN ALTERNATIVE ALGORITHM

Although there are multiple studies that have examined DSM criteria in various ways in older youth, fewer studies have examined alternative algorithms relative to the number in the preschool population.

VALIDITY OF PTSD ALGORITHMS

Criterion validity. Twelve studies examined the frequencies of the DSM clusters (Table 3). In 8 out of these 12 studies, the frequency of Cluster C is lower than the frequencies for criteria B and D, consistent with adult literature that often indicates Cluster C is less frequent and acts as the threshold cluster for making the diagnosis.[53] Although most of these studies did not explore alternative algorithms, they provide additional evidence that the DSM-IV Cluster C may be inappropriately low in this age group as it seems to be in preschool children.

A few studies have included children who were symptomatic but who did not meet full criteria for the diagnosis of PTSD. For example, Copeland et al. examined the impact of including children with "subclinical PTSD" (at least one symptom each of painful recall, hyperarousal, and avoidance symptoms) or meeting full PTSD criteria among children (9–13 years) and adolescents (14–16 years).[2] Children and adolescents had equivalent rates of trauma exposure in this cohort (0.7%). At 3 months, painful recall frequencies were also equivalent for children and adolescents (0.4% for both groups). Half as many children as adolescents met criteria for subclinical PTSD (0.1% versus 0.2%, respectively). However, only one fifth as many children as adolescents met full PTSD criteria (0.02% versus 0.1%). These findings in older children are similar to findings in preschool children, suggesting that the current DSM criteria are developmentally insensitive to the diagnosis of PTSD in children in whom it is present.

A treatment study for children aged 7–14, who experienced sexual abuse, combined the use of subthreshold PTSD criteria for study admission with developmentally adapted wording for current DSM-IV criteria (Cohen et al., 2009). The Schedule for Affective Disorders and Schizophrenia for School Age Children—Present and Lifetime Version (K-SADS-PL) PTSD module[54] was used to assess PTSD symptoms at the initial intake. This version of the K-SADS does not include the A2 criteria. Subthreshold PTSD admission criteria for these studies were that the child must meet at least one PTSD criteria in each cluster (B, C, and D) and at least two additional symptoms (five total PTSD symptoms) in any of these clusters. Developmentally adapted wording is used in the

K-SADS-PL. For example, for decreased interest, the child is asked if she/he is "bored a lot" or "are things not as much fun as before?" For feelings of detachment, wording includes "Is it hard for you to trust other people?" or "Do you feel like being alone more often?" To inquire about restricted affect, children are asked whether they ever feel "blah" or "like you don't feel anything at all."[54] Use of these procedures indicated that 89% of the children met full PTSD criteria. The point is not just about how we measure PTSD symptoms; it also suggests that DSM-V may need to better describe developmental manifestations of criteria for different ages.

Factor structure of DSM-IV symptom clusters in school age children. A recent analysis of sexually abused children highlighted the central role of Cluster C in making diagnoses.[55] A total of 439 children were combined from two studies ($n = 210$, 4–11 years old[56] and $n = 229$, 7–14 years old[30]), most of whom had histories of multiple trauma exposure (Judith Cohen, personal communication). They were assessed for PTSD symptoms using the K-SADS and including their parents or primary caregivers as respondents. There were 306 girls and a sufficient number of boys ($n = 133$) to conduct analyses by gender. Separate analyses were conducted for the children who were 7–14 years old but, because these did not reveal significant differences from the remainder of the cohort, the entire sample was retained in order to optimize power.

Because the K-SADS used developmentally adapted wording for each DSM criterion, these data were used to conduct factor analysis of the current DSM-IV criteria structure. Results indicated the following: (1) a three-factor solution seemed to provide the best fit for both genders, with somewhat different factor loading by gender. A three-factor solution has been the most common solution found in studies of youth.[57–59] The three-factor solution within each gender correlated $r = .30$ with each other.[55] A smaller proportion of Cluster C (avoidance/numbing) symptoms contributed to the final factors than Cluster B (reexperiencing) or Cluster D (hyperarousal) symptoms (B = 33%; C = 26%; D = 43%), despite having more available symptoms in the initial pool. Restricted range of affect (criterion C6) and inability to recall an important aspect of the trauma (criterion C3) did not contribute to any factor for girls, whereas diminished interest (criterion C4) did not contribute to any factor for boys. Conversely, Cluster C symptoms contributed uniquely to PTSD diagnosis. One particular item in boys, feelings of detachment (criterion C5), contributed uniquely to diagnosis of PTSD (OR = 14.73). In girls, six significant symptoms contributed unique odds ratios to the prediction of PTSD diagnosis, of which five were C Cluster symptoms: avoid activities (criterion C2, OR = 33.99), inability to recall important aspect (criterion C3, OR = 14.26), diminished interest (criterion C4, OR = 80.23), feelings of detachment (criterion C5, OR = 16.33), restricted affect (criterion C6, OR = 13.96), and hypervigilance (criterion D4, OR = 12.57). The respective sensitivity and specificity for these six symptoms in predicting PTSD diagnosis were good at 96 and 81%.

The fact that Cluster C symptoms so uniquely predict the current DSM-IV diagnosis among these children might be interpreted as confirming that these criteria are the "core" problem in PTSD in this age group. Nevertheless, if this were the case, these symptoms would be expected to most strongly load onto the factor analysis. In fact, the opposite was the case. This suggests that, in school age children and young adolescents, Cluster C uniquely predicts PTSD diagnosis because the current DSM diagnostic criteria for PTSD requires three Cluster C symptoms, and therefore it is impossible to attain the diagnostic threshold for PTSD without having several of these symptoms. In other words, these findings are consistent with those in preschool children, which suggest that the current diagnostic criteria requiring three Cluster C symptoms may be too stringent in this age group.

Only three studies have examined the PTSD-AA head-to-head with DSM-IV criteria in older youth. First, in a study of victims of acute injury, Scheeringa et al.[45] interviewed parents 2 months later. In the group aged 7–11, 9.1% had the DSM-IV diagnosis and 18.2% had the PTSD-AA diagnosis, but this was based on only one and two children with diagnoses. In the group aged 12–18, the frequencies were 3.4 and 6.9%, respectively, but again were based on one and two subjects with diagnoses. Changes are more evident when looking at cluster C alone. They showed that when the C threshold was lowered from three symptoms to one in the group aged 7–11, the frequency of positive Cluster C went from 9.1 to 45.5%. Similarly, when the C threshold was lowered in the group aged 12–18, the frequencies of Cluster C went from 17 to 62%. In contrast, the prevalence of Cluster C did not increase substantially when the threshold was lowered from three to two symptoms for the group aged 7–11 (9.1%) or for the 12–18 (20.7%). This study did not report on the relationship between the numbers of PTSD signs/symptoms and diagnosis with PTSD-AA and DSM-IV criteria so that criterion validity could not be further evaluated.

However, Meiser-Stedman et al. in a second study did make that comparison in their study of 7–10 year olds.[8] When parent–child combined reports were used, there was no difference between the mean number of symptoms in those diagnosed with DSM-IV criteria ($M = 11.6$, $SD = 1.6$) compared to those diagnosed by PTSD-AA ($M = 11.0$, $SD = 3.7$). When parent-only reports were used, those with the PTSD-AA diagnosis actually had significantly more PTSD symptoms ($M = 11.0$, $SD = 4.6$) than those diagnosed by DSM-IV ($M = 7.0$), but there was only one subject with the DSM-IV diagnosis limiting the power of this finding. The frequencies of diagnosis by

the DSM-IV and PTSD-AA were 18.8 ($n = 9$) and 40.0% ($n = 18$), respectively, when using combined parent–child reports.

Third, Iselin et al. (in press) examined five different PTSD classification algorithms among 184, 6- to 14-year-old youth: (1) DSM-IV (4.3%), (2) severity score of 45 or higher on the Clinician-Administered PTSD Scale for Children and Adolescents (6.0%),[60] (3) PTSD-AA (12.5%), (4) met criteria for two out of three DSM-IV clusters (13.0%), and (5) one symptom from each of the three clusters (15.2%).[61] Only the PTSD-AA and the two out of three method significantly associated with a measure of psychosocial functioning (Child Health Questionnaire). Based on these and other data in the study, the authors recommended the PTSD-AA algorithm for pediatric samples following traumatic brain injury.

Taken together, all these results suggest that the DSM-IV requirements of three Cluster C symptoms may be too stringent for children, though not necessarily for adolescents. That is, school age children may be more like preschool children than adolescents with regard to diagnostic thresholds.

Convergent and discriminant validity. Children aged 7–10, who were assessed for PTSD-AA in the Meiser-Stedman et al.[8] study, were concurrently rated by their parents with the Pediatric Emotional Distress Scale (PEDS).[62] The PEDS is a 21-item checklist that was created to screen quickly 2- to 10-year-old children for PTSD. The items overlap but do not map precisely on either the PTSD-AA or DSM-IV and include some symptoms that are not in the criteria for either diagnosis. The correlation between concurrently administered PEDS and PTSD-AA diagnoses per parent report at 2–4 weeks posttrauma was .52 ($P<.001$) and at 6 months posttrauma was .30 ($P<.02$). This suggests medium-to-large agreement with a validated and independent measure for PTSD.

Functional impairment is one way to assess discriminant validity of the DSM-IV PTSD criteria. Carrion et al. evaluated 59 children 7- to 14-years-old using the CAPS-CA, a structured interview that assesses both severity and frequency of DSM-IV PTSD symptoms in children.[39] They found that children meeting diagnostic criteria for two symptom clusters did not differ significantly from children meeting diagnostic criteria for all three clusters with regard to either impairment or distress. Although not a direct test of PTSD-AA, these results raise questions about the diagnostic threshold of the DSM-IV criteria in children.

Predictive validity. Meiser-Stedman et al.[8] compared PTSD-AA at 2–4 weeks posttrauma as a predictor of PTSD-AA 6 months after the trauma in children aged 7–10. They found that 56.5% of the PTSD-AA cases diagnosed at 2–4 weeks posttrauma were still present after 6 months when using parent and child report combined. When parent-report only was used, 66.7% of the 2–4 week cases were still present at 6 months. When child-reports only were used, 31.3% of the 2–4 week cases were still present at 6 months. This suggests that, not surprisingly, when relying on child-report only, the reliability of diagnoses suffers. But the important point is that the PTSD-AA diagnoses were quite stable for more than 6 months when parent reports were available. They did not test the stability of DSM-IV diagnoses between 2–4 weeks and 6 months.

RECOMMENDATIONS FOR DSM-V IN SCHOOL AGE CHILDREN AND ADOLESCENTS

1. Regarding A1, consider including loss (including placement in foster care), injury, or death of parent, or significant other as potentially traumatic events. This could be noted in the text in the Specific Culture and Age Features section or a Note added to A1. For children who experienced multiple traumas (thus making it difficult to yoke PTSD symptoms to a single trauma), this could also be noted in the text to heighten awareness of this as an age issue.
2. The A2 criterion should be dropped for school age children and adolescents. If retained, it should be broadened to include additional emotional reactions.
3. Regarding B, C, and D criteria, allow that children who have experienced nearly lifelong trauma may not be able to report onsets of symptoms. A symptom accompanying such traumas can be considered meeting that criterion.
4. There is need for empirical testing of more developmentally sensitive symptoms to reflect age-appropriate manifestations in school age children and adolescents. This represents a future area of study which may lead to more accurate ways for interviewers to elicit information about children aged 7–18.
5. Consider reducing the Cluster C threshold from three to one symptom. The supporting data to date are suggestive, but not as yet as compelling as in preschool children.

PROPOSED DSM-V CRITERIA IN SCHOOL AGED CHILDREN AND ADOLESCENTS

As noted earlier, the currently proposed criteria for the DSM-V contain several proposed substantial changes (see Friedman et al., this issue),[23] but no studies with older children or adolescents have examined these proposed criteria. For children and adolescents, the proposed criteria show some changes that might improve their applicability, but other changes may limit their applicability.

For example, a concern that had been noted in the DSM-IV criteria from the three existing studies in

older children was that too many symptoms were required in the numbing and avoidance cluster. Preliminary recommendations for DSM-V are to split this cluster into two new clusters and add two new symptoms to the new cluster D. These two novel symptoms (e.g. maladaptive cognitions and persistent negative emotional states) have been detected in children, but requiring three symptoms in this cluster is probably too high a threshold for children and adolescents. The new proposed symptoms are internalized and abstract phenomena. Although clinical experience suggests it is questionable whether prepubertal children express these new symptoms (self-blame and a negative emotional state of fear, horror, anger, guilt, or shame) reliably, it is relatively more likely that adolescents could express them with their more advanced cognitive and verbal capacities. Fewer factor analytic studies have been conducted with youth relative to adults, so there is less clarity about whether four clusters makes sense in children. As in the adult literature, there is some support for splitting the numbing and avoidance cluster into two new clusters for children,[57,63,64] but there is other evidence that is not supportive.[65]

A new symptom that has been proposed for the increased arousal cluster (reckless or self-destructive behavior) has been empirically documented in traumatized children with PTSD symptoms. However, it is unclear whether the change in the required number of symptoms for this cluster (which has been raised from two to three symptoms) is warranted; this change will be empirically tested before the criteria are finalized for DSM-V.

Although no final conclusions can be made, as with younger children, the proposed changes in PTSD criteria do not seem likely to be applicable across the lifespan without modification. This is not surprising, of course, and in our view reflects the need for the DSM to continue to incorporate developmental differences into PTSD and other diagnoses as data about developmental differences in the manifestation of psychopathology are demonstrated.

SUMMARY

The PTSD-AA, which is how developmental modifications have been studied, has preliminary convergent, discriminant, criterion, and predictive validity in preschool children. It has been studied head-to-head against DSM-IV criteria in seven published studies of traumatized children and in one community study of children attending a pediatric clinic. Using DSM-IV criteria, frequencies of PTSD are much lower in preschool children than in older individuals.

To consider first the question of age-related manifestations, the PTSD-AA suggest changes in the wording of several criteria (B1, C4, C5, and D1, as noted above). These changes could be handled as age-related manifestations of PTSD in DSM-V. In addition, eight studies assessing criterion validity of the PTSD-AA and the DSM-IV criteria have favored the PTSD-AA approach.

Beyond these age-related manifestations, the PTSD-AA also represents what would be an age-related subtype of PTSD for preschool children in DSM-V. This age-related subtype would lower the threshold for Cluster C from three signs/symptoms to one. The evidence favoring changing the threshold for Cluster C derives primarily from the studies of criterion and predictive validity of PTSD-AA, cited above. The evidence supports eliminating the A2 criterion, as has been done in the PTSD-AA.

The data regarding application of PTSD-AA in school age children are more limited and less consistent. In particular, more data on predictive, criterion, and discriminant validity are needed in school age children to inform decisions about developmental manifestations of specific criteria and the question of the algorithm threshold for Cluster C. These data could indicate whether the changes that seem indicated for preschool children should be extended to school age children, as well.

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