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Review article

Traumatic Stress and Posttraumatic Stress Disorder in Youth: Recent Research Findings on Clinical Impact, Assessment, and Treatment

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 A B S T R A C T

Childhood trauma can have a profound effect on adolescent development, with a lifelong impact on physical and mental health and development. Through a review of current research on the impact of traumatic stress on adolescence, this article provides a framework for adolescent health professionals in pediatrics and primary care to understand and assess the sequelae of traumatic stress, as well as up-to-date recommendations for evidence-based treatment. We first review empirical evidence for critical windows of neurobiological impact of traumatic stress, and then we discuss the connection between these neurobiological effects and posttraumatic syndromes, including posttraumatic stress disorder, depression, aggressive behavior, and psychosis. This article concludes by considering the implications of this current research for clinical assessment and treatment in pediatric and primary care settings.

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**IMPLICATIONS AND
 CONTRIBUTION**

Childhood trauma has a profound impact on adolescent health and development. Adolescent medicine clinicians are critical to screening, assessment, and triage of traumatized youth. Clinicians should understand the diverse manifestations of traumatic stress, screen all adolescents for trauma, provide psychoeducation and risk assessment, and collaborate with families for treatment.

Childhood trauma has been called “the hidden epidemic” [1], as evidence mounts that early traumatic experiences can have both immediate and long-term consequences. Childhood trauma is common; 38.5% of American adults endorse having experienced a traumatic event before age 13 years [2], and 25.1% of youth report having undergone a significant trauma before age 16 years [3]. These traumas include a wide range of terrifying or life-threatening experiences, including child maltreatment (including physical and sexual abuse and neglect), medical traumas, accidents, natural disasters, war, terrorism, refugee trauma, traumatic loss, severe bullying, and exposure to domestic and community violence.

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The effects of such events can last long into adulthood, as traumatic experiences in childhood lead to a greater risk of psychiatric, cardiac, metabolic, immunological, and gastrointestinal illness later in life [1,4]. The immediate effects of traumatic stress on children and adolescents are also profound. Most youth who experience significant trauma display disturbances of mood, arousal, and behavior immediately, and although many recover, approximately one-third develop enduring symptoms of posttraumatic stress disorder (PTSD) [5]. The risk for PTSD for each child depends on the nature of the trauma; the child’s age and gender; and personal, family, and community factors [6].

Increasing evidence demonstrates that trauma, particularly repeated trauma and maltreatment, can have lifelong impact on multiple domains of functioning, including adaptive and interpersonal functioning, emotion regulation, cognition and memory, and neuroendocrine function [1]. Children and adolescents who have experienced trauma can manifest severe disturbances

in mood, behavior, attention, attachment, and impulse control [7–12], which may mimic other psychiatric disorders, such as bipolar disorder and ADHD. Adolescents with PTSD are at increased risk for major depression, aggression, and conduct disorder [13,14]. They manifest more frequent suicidal ideation and attempts even after controlling for depressive symptoms, gender, and treatment setting [15]. Youth exposed to violence or maltreatment perform less well academically and are more likely to drop out of school [16, 17]. Adolescents with a history of early trauma engage in more risk-taking behaviors, such as substance abuse (including binge drinking), multiple sex partners, and criminal involvement, and are at a greater risk for sexual assaults and relationship violence [15,18–23,24]. Girls who have experienced trauma, particularly sexual abuse, are at increased risk for precocious puberty and STDs [24]. Teens (of both genders) with a history of childhood trauma are at a greater risk of teen pregnancy, and pregnancies in girls with trauma exposure have a greater risk of fetal death and premature birth [24–26].

Adolescents who have experienced trauma are often reluctant to access mental health services [27]. Therefore, pediatricians and adolescent medicine practitioners are the first line of treatment for many traumatized youth. Although many clinicians specializing in adolescent medicine may not have the expertise to provide specialized treatment for symptoms of post-traumatic stress, it is useful for community practitioners to understand the potential manifestations of traumatic stress, assess for PTSD, and determine the need for intervention. Adolescents experiencing symptoms of traumatic stress often fear they are “going crazy,” and pediatricians and primary care providers can provide crucial education about the effects of traumatic stress to reduce their anxiety and normalize their experience. Clinicians can also help to advise their patients in a gentle informed way of the benefits of mental health treatment. In this review, we will synthesize recent research on traumatic stress and PTSD in adolescents, with a focus on the implications of such research on clinical assessment and treatment.

Methodology of Search

Research literature on the impact of traumatic stress in adolescents was reviewed after a systematic search of PubMed and PsycInfo. Articles included in the review were those published since 1995 and in English. Articles' reference lists were also reviewed manually to identify additional studies of importance.

Neurobiological Impact of Childhood Traumatic Stress

Childhood trauma can have a broad impact on mental health. Many traumatized children experience brief symptoms of depression, anxiety, or developmental regression but return to baseline quickly, whereas others suffer long-standing PTSD and other psychiatric syndromes, from internalizing symptoms such as depression and anxiety to externalizing symptoms such as behavioral problems. The cause of this diversity of outcomes is not fully understood. The growing field of developmental traumatology suggests that differential outcomes occur in part because of risk and resilience factors in the child (e.g., age, gender, genetic makeup, pretrauma functioning, experience of previous traumas) and environmental factors (e.g., parental psychopathology, attachment, social supports, socioeconomic status) that predate the trauma. These risk factors interact with trauma type, frequency, and severity to impact the developing brain.

There is growing evidence for “critical windows” of vulnerability to traumatic stress in brain development [28–32]. From infancy to adolescence, different brain regions undergo bursts of myelination, synapse formation, pruning, and neural networking. These periods of activity are sensitive to disruption by stress hormones such as cortisol that can suppress glial cell division, dendritic branching, and synaptogenesis, and lead to neuronal loss [30,33]. Epigenetic effects (silencing of genes by methylation) in crucial brain regions during these critical periods can also produce lasting changes in function and stress response [34]. Critical brain areas such as the hippocampus, amygdala, cerebellar vermis, corpus callosum, and cerebral cortex appear to be particularly vulnerable, with differential sensitivity over the course of development [30,35,36].

Adding further complexity, different brain areas are particularly susceptible to different types of trauma and can have different vulnerability depending on the gender of the child [30,37,38]. Genetic differences may impact stress sensitivity, with genes such as 5-HTTLPR (the serotonin transporter promoter polymorphism), the corticotropin-releasing hormone receptor FKBP5 (which modulates glucocorticoid receptors), and the brain-derived neurotrophic factor genes impacting gating of fear circuits that may influence trauma response [34,39]. Hormonal effects are also at play, as sex hormones can exacerbate or inhibit dysregulation in the limbic system and hypothalamic-pituitary-adrenal axis [30,34] and may contribute to the higher rates of PTSD seen in girls [5]. Ongoing irregularities of the hypothalamic-pituitary-adrenal axis and cortisol response, with hypercortisolemia in childhood evolving into hypocortisolemia later in life, can also have lasting effects on cognition, behavior, and learning, as well as on physical health [24,40].

The different neurologic effects that result produce the diverse outcomes of traumatic stress. Each affected brain area can lead to different symptoms. These include memory deficits, disinhibition of anxiety, and dissociation (hippocampus, cingulate, and prefrontal cortices); hyperarousal and aggressive behavior (amygdala); deficits in integration of language and emotion (corpus callosum); and poor modulation of attention and emotional dysregulation (cerebellar vermis) [1,30,35,36]. These effects can manifest immediately, or they may influence development in insidious ways that only present later in adolescence or young adulthood [32]. Alone or in combination, these effects and others appear to underlie the symptom profiles seen in PTSD and other psychiatric sequelae of childhood trauma.

Manifestations of Traumatic Stress in Adolescent Mental Health

Clinicians must be vigilant for different manifestations of traumatic stress in adolescents. Immediately after trauma, many adolescents will manifest transient symptoms of acute stress disorder. These self-limited (<4 weeks by definition) and often fluctuating symptoms include anxiety, insomnia, numbing, dissociation (altered consciousness including reduced awareness or amnesia), detachment, reexperiencing, and avoidance. Although many adolescents recover from these symptoms, in some, it persists for >1 month, at which point a PTSD diagnosis should be made. PTSD appears to be most common after experiencing abuse or maltreatment, violent crime, assault on or death of a parent (including domestic violence), and acute physical trauma (particularly with brain injury), but children who have undergone multiple or chronic traumas such as refugee trauma and

war trauma may be equally at risk [7,41]. Adolescents with PTSD present with prominent symptoms of nightmares, flashbacks, hyperarousal, avoidance of trauma reminders, and numbing. Irritability, anger outbursts, and poor concentration are also common in PTSD, although less specific to the disorder. Children and adolescents with PTSD may present to treatment complaining of sleep disturbances, which may be secondary to nightmares (with or without trauma-related content) or night terrors but may also manifest as nighttime enuresis or insomnia [42]. Other anxiety symptoms, such as panic attacks and somatic symptoms, are often comorbid with PTSD as well. Adolescents with PTSD, particularly those with histories of long-term maltreatment or repeated trauma, may also present with prominent symptoms of dissociation, depersonalization (feeling of unreality or disconnection from the body), and emotional numbing [24,43,44]. It is critical to assess for dissociation because this can impact treatment choice, as discussed later in the text. Dissociative symptoms are also predictive of psychosocial outcomes. In the short term, dissociative symptoms during or soon after a trauma may be a harbinger of greater risk for persistent PTSD [37]. In the longer term, dissociation and numbing in traumatized youth predict aggressive behavior, delinquency, and later harsh and neglectful parenting to the next generation [24,45].

Depression is also frequently comorbid with PTSD after trauma. As irritability and sleep disturbance related to PTSD can mimic depression, it is important to screen for neurovegetative symptoms and anhedonia to assess fully for comorbid depression. Many traumatized adolescents develop depression in the absence of PTSD [14,15,46]. Depression is much more likely to be refractory to treatment in adolescents with trauma histories [34], particularly if treated only with depression-focused cognitive-behavioral therapy (as opposed to trauma-focused therapy [47]). Treatment-refractory depression should be a red flag for clinicians to assess for suicidality. However, it is important to note that adolescents with histories of trauma are at increased risk for suicide, even in the absence of depression. Adolescents who have faced trauma experience more severe suicidal ideation, more suicide attempts, and more frequent self-injurious behaviors than their nontraumatized peers [15,48–50]. Youth with histories of sexual abuse and emotional neglect may be most at risk [15]. As suicide is one of the leading causes of death among adolescents and young adults, it is critical to screen for suicidality and self-harm in any adolescent with a history of trauma, even in the absence of depressive symptoms.

Youth who have experienced trauma are also at markedly increased risk for substance use, particularly early use. In a large study of middle and high school students, a history of physical or sexual abuse increased the odds of early (before age 10 years) marijuana use or regular drinking by >12-fold [51]. Multiple experiences of abuse compound the risk, and earlier abuse may have a particularly strong effect in girls [32,52]. Adolescents with PTSD are at elevated risk, with studies suggesting that up to 59% of youth with PTSD go on to develop substance use disorders [53]. Evidence supports the self-medication hypothesis, namely, that youth use substances to find symptom relief [54]. Trauma and PTSD can also follow onset of substance use, as risky behaviors associated with drug and alcohol use put youth at risk for assault and violence [53]. Youth with PTSD who use substances can be at even greater risk for retraumatization, as their PTSD symptoms (such as hyperarousal and dissociation) can impede their ability to perceive, react to, and cope with danger.

Even in the absence of substance use, traumatic experiences and PTSD put youth at increased risk for involvement in violence, aggressive behavior, and delinquency. Youth exposed to community violence manifest increased risk for both PTSD and aggressive/delinquent behaviors [55], as do those with histories of abuse and maltreatment [13,56,57]. Middle and high school students with histories of abuse, witnessed domestic violence, or parental substance abuse engage in more physical fighting, bullying, weapon carrying, and dating violence than their peers who have not experienced such adversity [49]. The etiology of this association between trauma and aggressive behavior is multifactorial. Youth with histories of trauma may be at an increased risk for reactive aggression owing to trauma's neurobiological effects, such as autonomic dysregulation and easy triggering of the fight or flight response dysregulation [58,59]. Learned behavior related to exposure to community or family violence may also play a role [60]. Furthermore, aggression may be secondary to PTSD symptoms, such as hyperarousal, numbing, attention problems, or dissociation [45,61]. In studies of delinquent youth, greater severity of PTSD is associated with a higher degree of delinquent behaviors [62,63]. Delinquent youth represent the far end of the spectrum of aggressive and antisocial behavior, but risk for these behaviors is increased in purely psychiatric populations with PTSD as well [55,57]. In one study of adolescent psychiatric inpatients, conduct disorder was comorbid with PTSD in 37.5% of subjects and oppositional defiant disorder in 62.5% [15].

There is increasing evidence as well that psychosis can be comorbid with PTSD and may be a result of trauma. Psychosis after childhood trauma can include both positive (hallucinations, delusions) and negative symptoms (affective flattening, withdrawal, amotivation). PTSD symptoms such as reexperiencing, flashbacks, and dissociation can also mimic psychotic symptoms, and it is important to distinguish them, as this will influence the course of treatment. That said, hallucinations and delusions are seen with greater frequency in adolescents who have experienced childhood sexual abuse, and treatment for trauma-related hallucinations with traditional antipsychotic medication may not be effective [15,64]. Adolescents with a history of trauma can also manifest thought disorder, loosening of associations, and illogical thinking [65]. This disrupted cognition can have significant effect on interpersonal interactions, educational attainment, and treatment outcome. Studies of sibling pairs and twins suggest the increased risk of psychosis after traumatic stress may represent a specific effect of trauma rather than purely a manifestation of genetic risk [66]. History of trauma is associated with greater rates of psychotic symptoms and increased risk of developing full-blown psychosis in those with genetic vulnerability [67,68]. Youth who have experienced intentional harm (such as abuse, particularly sexual abuse, and targeted violence) appear to be at great risk for psychosis than those who experience accidents [67,69].

Assessment of Traumatic Stress in Adolescents

Given the breadth of psychiatric and behavioral sequelae of trauma, it can feel daunting to clinicians. In reality, clinicians specializing in adolescent medicine already possess skills and tools for assessment of depression, substance use, suicidality, and psychosis. Specific questioning about trauma and PTSD symptoms is necessary, as traumatized adolescents are unlikely to volunteer this information, and evidence suggests that PTSD is

often missed in routine examinations [27,70,71]. Ascertainment of trauma histories and PTSD symptoms are crucial for effective risk assessment and treatment planning. Adding targeted assessment of trauma history and PTSD symptoms can be entirely manageable, even in the brief sessions often allotted for adolescent medical visits. Several well-validated screening tools for childhood trauma and adolescent PTSD are freely available online through the National Center for PTSD (<http://ptsd.va.gov>) and the National Child Traumatic Stress Network (<http://NCTSN.org>). The Traumatic Event Screening Instrument (for assessing traumatic experiences), the UCLA PTSD Reaction Index and Child PTSD Symptom scale (to screen for PTSD), and the Dissociative Experiences Scale for Adolescents are all straightforward, easy to use, and free online. These tools allow clinicians to perform a brief risk assessment and evaluation. The UCLA PTSD Reaction Index and Child PTSD Symptom Scale have also been translated into multiple languages, including Spanish, Armenian, Korean, Russian, and Bosnian, and so can be used effectively in youth who do not speak English. The use of these validated tools allows greater diagnostic accuracy, as traumatized adolescents may experience receptive language deficits as a result of trauma that complicate standard interviewing, and they may be more likely to report traumatic experiences when asked systematically [24]. Repeated evaluation over time is suggested, as symptoms may present months or years after the traumatic event.

Treatment of Traumatic Stress in Adolescents: Psychotherapy

The first step of any treatment for traumatic stress is to ensure that the teen is safe, including consulting and collaborating with safe family members, community resources, and child protective services when needed. Partnership with home-based services, either mandated by child protective services or independently contracted, may be necessary to ensure the child's safety [72]. In some situations, such as countries experiencing war or neighborhoods with intractable community violence, absolute safety cannot be attained. In these cases, skills-based resilience-focused therapies as those described later in the text may have some efficacy, but safety should remain a primary goal, as ongoing trauma will undermine the effectiveness of further treatment [73].

Once safety is achieved, treatment can begin. For adolescents with PTSD, the first-line treatment is psychotherapy. Trauma-centered therapies have been shown in randomized controlled trials to be effective compared with more general or unstructured therapies [5]. The best-studied and most widely used treatment for adolescent PTSD is trauma-focused cognitive behavioral therapy (TF-CBT). TF-CBT has been shown to be effective in treating symptoms of PTSD, as well as trauma-related depression and anxiety, in populations ranging from sexually abused youth, to youth affected by terrorism, to youth who have experienced domestic violence or traumatic loss [5,74]. TF-CBT builds on the exposure therapy model championed by Foa and others by adding skill-building modules. The manualized protocol follows the PRACTICE acronym: psychoeducation (for parents and teens), parenting skills (including how to manage oppositional behaviors), relaxation skills, affect regulation skills, cognitive coping (including modification of maladaptive beliefs about self and others), trauma narrative, in vivo mastery (exposure to trauma reminders), child–parent sessions (including sharing of the trauma narrative), and enhancing future safety and development [5]. TF-CBT is a flexible treatment in that different segments of

treatment can be emphasized and reinforced based on the adolescent's needs; for example, youth with prominent dissociation may require greater time spent on skills to affect regulation and relaxation before trauma processing is attempted [43]. For youth with substance use disorders, research on treatment remains preliminary, but evidence suggests that integrated treatment for PTSD and substance use is more effective than either treatment alone [5,75]. One example of such integrated treatment is the Seeking Safety protocol, which combines TF-CBT with risk-reduction strategies. Treatments for PTSD and psychotic symptoms have not been studied in adolescents, but studies from adults suggest that TF-CBT and other skills-based sequential treatments, such as skills training in affect and interpersonal regulation (STAIR), may be effective in this population [64].

Adolescents often resist the idea of family involvement in treatment, but research shows that involving parents in treatment is more effective than treating a child or adolescent alone [5]. Parents may not be aware of the trauma, and teens need support and guidance in disclosing their experiences to a parent or other trusted adult. Parents and other family members need psychoeducation, as they may feel guilty for not protecting the child, may themselves have PTSD, or may be inadvertently triggering the child's symptoms with questions about or reminders of the trauma [76]. Child and Family Traumatic Stress Intervention therapy, which may be effective in the immediate aftermath of trauma to prevent the development of PTSD, uses family sessions to provide psychoeducation and strengthen communication [77]. TF-CBT provides parenting support and education and involves parents in the trauma processing. For families with significant stress or multiple systems involvement, trauma systems therapy was developed to supplement individual CBT for trauma with family interventions and collaboration with other service providers to address environmental factors that exacerbate the child's symptoms [78].

For adolescents with significant aggressive or delinquent behaviors, such collaboration with families and service providers is particularly crucial. Clinicians will want to ascertain when aggression is reactive (in response to environmental or interpersonal triggers), related to psychiatric symptoms (such as dissociation or emotional reactivity), or more antisocial. Intensive family-directed treatments such as multisystemic therapy (MST) and family-focused therapy (FFT) are likely to be most effective to treat aggression. Like trauma systems therapy, these treatments try to understand the individual, family, and environmental factors contributing to symptoms and provide integrated wraparound care. Studies of MST and FFT demonstrate effectiveness in reducing aggression and delinquency, although it is important to note that studies of MST and FFT have not examined the rate of trauma or PTSD in the clients involved or the effect of trauma on outcome [79,80]. Given the high rate of trauma in juvenile justice populations [62], it is likely that a significant proportion of the youth in these studies had experienced trauma, but targeted research is needed to determine whether trauma history moderates effectiveness of these treatments. It is promising that a trauma-focused modification of MST has been shown to reduce PTSD symptoms, subsequent abuse, and out-of-home placements [81].

Clinicians caring for adolescents are often consulted by schools for help with anxiety, oppositionality, aggression, and other emotional and behavioral problems in traumatized youth. The National Child Traumatic Stress Network provides a free toolkit for schools on their Web site, with resources for teachers

and school administrators in their work with traumatized youth. Schools should work to identify and eliminate trauma reminders, to reinforce coping skills, and to provide necessary academic and emotional supports. When multiple students in a school have been affected by trauma, TF-CBT can be used in a group therapy format in schools to be delivered by mental health clinicians (Cognitive Behavioral Intervention for Trauma in Schools) or teachers (Support for Students Exposed to Trauma) [5].

Clinicians should also be prepared to advocate for their patients with PTSD in the school setting. Students with PTSD may exhibit hostile behavior when they misread social cues, and schools will often use suspensions as a consequence. However, suspensions will not change the student's behavior and may cause them to fall behind academically [82]. If PTSD symptoms are significantly impairing a student's functioning in school, clinicians should encourage families to request a Full Special Education Evaluation. They can also suggest specific school-based interventions, including social skills groups, school counseling, and alternative discipline strategies. They may wish to identify an adult in school (e.g., a nurse or counselor) whom the student is free to go to at any time, using a nonverbal signal [83].

Treatment of Traumatic Stress in Adolescents: Psychopharmacology

Although the efficacy of psychotherapy for child traumatic stress and PTSD has been well documented, there is little evidence for the effectiveness of pharmacotherapy for posttraumatic symptoms. Selective serotonin reuptake inhibitors (SSRIs) are first-line pharmacotherapy for adult PTSD, but evidence is lacking for their use in adolescents. Only sertraline and fluoxetine have been tested in randomized controlled trials for adolescent PTSD, and they were found to be no more effective than placebo [84–86]. Citalopram appeared effective in open-label trials but has not been tested in blinded randomized studies; other SSRIs have not been tested in adolescent PTSD, and other antidepressant medications have either not been studied (serotonin–norepinephrine reuptake inhibitors, bupropion) or have limited (nefazodone) or inconclusive (monoamine oxidase inhibitors) data [87]. Given this lack of evidence and the potential for medication-induced activation in patients already vulnerable to agitation and irritability, there is little to recommend antidepressants for treatment of PTSD in adolescents. The exception to this may be depressed adolescents with histories of traumatic stress, as fluoxetine has been shown to be effective in reducing depressive symptoms in this population (both alone and when combined with psychotherapy) [47]. However, further research is needed to determine the efficacy of other SSRIs in these patients, as well as the effect of SSRIs on comorbid depression and PTSD.

Given the prevalence of anxiety and panic symptoms after trauma, clinicians may be tempted to prescribe benzodiazepines to address these symptoms. However, the use of benzodiazepines is not recommended for adolescent PTSD, as they have not been studied and there is significant risk for disinhibition and addiction. Often used to target similar symptoms of anxiety and panic are the atypical antipsychotics. Atypicals are frequently prescribed to traumatized youth to treat anxiety, as well as emotional dysregulation, aggression, and psychotic symptoms. However, it is unclear from the research whether the benefits of antipsychotic use outweigh the risks. Like the SSRIs and antiadrenergic medications, the atypical antipsychotics have shown

promising results in randomized studies of adults, but only case studies and open-label trials have been reported of children and adolescents. Although these reports are positive, given the potential for significant side effects (including metabolic syndrome, extrapyramidal effects, hyperprolactinemia, QTc prolongation, and obesity), clinicians should be cautious. Even in traumatized youth with psychotic symptoms, studies suggest that antipsychotics alone may not be effective for trauma-related hallucinations and delusions and that medication should be combined with TF-CBT or other trauma-centered therapy [64,87].

Medications that target the noradrenergic system, which is often dysregulated after traumatic stress, are commonly used in adult patients to reduce anxiety and arousal. Like the antidepressants and antipsychotics, however, antiadrenergics have limited evidence in adolescents. In open studies, clonidine and propranolol decreased hyperarousal and reexperiencing symptoms and improved sleep, and a case study of prazosin suggests efficacy in reducing nightmares [5,87]. Again, blinded randomized controlled trials in children and adolescents are lacking. In small open trials, mood stabilizers such as carbamazepine, oxcarbazepine, and divalproex appear to decrease PTSD symptoms, anger, and irritability [87]. The one randomized trial of a mood stabilizer in pediatric PTSD examined the effects of divalproex in 12 adolescent male subjects [12]. This study found significant reductions in intrusion and avoidance symptoms and aggressive behavior in youth with therapeutic blood levels, but the generalizability of these findings is limited by the study's small sample size.

In sum, clinicians should be cautious with the use of psychopharmacology to address trauma sequelae in adolescents. When clear symptoms of depression, psychosis, or ADHD are present, clinicians should use medication to address these symptoms as clinically indicated; however, psychotherapy to address the trauma should be provided concomitantly for maximum benefit.

Discussion and Summary

The effects of traumatic stress in adolescents can be profound, and clinicians specializing in adolescent medicine are often at the front lines of recognizing affected youth. Once a traumatized teen is identified, clinicians should establish safety, educate the child and his caregivers about the impact of traumatic stress on emotional and physical health and behavior, and provide support and counseling. Clinicians should also discuss with families effective treatment options, acknowledge the limits of psychopharmacology for PTSD, and refer for trauma-focused psychotherapy when indicated. Effective treatment of PTSD and other trauma sequelae can have a profound impact on the patient and also on future generations [24].

Another crucial role for pediatricians and adolescent medicine specialists is identification and promotion of resilience factors, such as family and community support, in traumatized youth. Resilience is insufficiently understood in child traumatic stress. As described earlier in the text, our understanding of who will become ill in the face of traumatic stress is limited, and we know even less about those young people who survive trauma and develop into healthy adults. A critical area of research in coming years will be to identify modifiable resilience factors, such as family and social support, attachment, coping and self-regulation skills, and self-efficacy, that can improve outcome [88].

Research is also needed to clarify which treatments—both medical and psychiatric—are most effective in traumatized

youth. In addition to the aforementioned evidence that standard psychopharmacologic treatments for depressive and anxiety symptoms are less effective in trauma populations, there is also evidence that standard prevention and treatment modalities to address medical problems such as obesity and STDs are less effective in traumatized youth [24]. A crucial area of research will be to clarify the most effective individualized treatment for the different symptom profiles that follow traumatic stress in diverse populations. Finally, and perhaps most importantly, research is needed to identify tools to recognize youth at risk for traumatic stress and promote safety.

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