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Trauma exposure and sleep disturbance in a sample of youth from the National Child Traumatic Stress Network Core Data Set☆

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ABSTRACT

Objective: Adverse childhood experiences are prevalent and have been associated with sleep disturbance. However, there are limited data examining factors that influence this relationship. The purpose of this study was to extend the current literature by characterizing the relationship between adverse childhood experiences and sleep disturbance in a sample of trauma-exposed youth and to identify factors that may influence this relationship.
Study design: Data were collected from 56 mental health centers across the National Child Traumatic Stress Network. For the current study, secondary data analysis was conducted using de-identified data from the National Child Traumatic Stress Network Core Data Set. The present study included 4043 children and adolescents who met eligibility criteria.
Results: Sixteen percent of the sample (n = 634) met criteria for a sleep disturbance as determined through clinician assessment and collateral report. Posttraumatic stress disorder (PTSD) symptom severity influenced the risk of disturbed sleep (ages 7-12: $t = -4.33$, ages 13-18: $t = -7.12$, $P \leq .001$ for both analyses), with those meeting full criteria for PTSD at greatest risk (age 7-12: odds ratio [OR] = 1.95; 95% confidence interval [CI], 1.17-3.24; age 13-18: OR = 3.18; 95% CI, 1.87-5.43). Exposure to sexual assault and community violence also contributed independently to the risk of disturbed sleep (age 7-12, sexual assault: OR = 1.76; 95% CI, 1.21-2.57; age 13-18, community violence: OR = 1.61; 95% CI, 1.19-2.18).
Conclusions: Comprehensive treatment strategies should include assessment of disturbed sleep in youth exposed to trauma, particularly those with elevated PTSD symptoms and exposure to sexual trauma or community violence.

Introduction

Exposure to adverse childhood experiences (ACEs) and other potentially traumatic events are prevalent and have been associated with a host of mental health and behavioral outcomes. Over one-fifth of US children and approximately 60% of US teens have been exposed to a potentially traumatic event.[1] Children frequently have multiple ACEs during childhood and adolescence. A recent epidemiological study using data from the Longitudinal Studies of Child Abuse and Neglect dataset reported that in a sample of children assessed at 14 years of age, 91.3% of the 933 youths had at least 1 adverse experience before the age of 14, with the majority of respondents indicating 3 or more experiences in that same time frame.[2] In 2014, more than 700,000 children were victims of child maltreatment.[3] Of the children who experienced maltreatment, the largest percentage (75%) experienced neglect, followed by physical abuse (17%).[3]

Exposure to ACEs is associated with the development of posttraumatic stress disorder (PTSD) as well as a host of other adverse outcomes often linked to poor physical health.[4-9] A large cohort study that sampled individuals who experienced sustained childhood sexual abuse revealed that 39% of females and 29% of males developed

Abbreviations: ACEs, adverse childhood experiences; CDS, Core Data Set; NCTSN, National Child Traumatic Stress Network; PTSD, posttraumatic stress disorder; UCLA PTSD-RI, UCLA Posttraumatic Stress Disorder Reaction Index.

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PTSD in adulthood.[7] Moreover, Cloitre and colleagues[4] found that childhood trauma was associated with a "complex symptom expression" that includes not only posttraumatic stress symptoms but problems with affective and self-regulatory processes in childhood as well as in adulthood. ACEs are also associated with inflammatory processes that may lead to problematic health outcomes in adulthood. A recent study found an association between childhood adversity before 8 years of age and elevated interleukin-6 and C-reactive protein at ages 10 and 15.[10] The authors suggest that these results provide evidence of the existence of a biological mechanism by which early experiences impact long-term health.

More recently, researchers have begun to examine the impact of ACEs on sleep. A recent review of the literature[10] suggests that sleep disturbance is greater in children exposed to ACEs compared with those who were never exposed. For example, Noll and colleagues[11] found that after controlling for PTSD and depression, children and adolescents who were sexually abused endorsed greater rates of sleep disturbance (ie, trouble getting to bed on time, trouble falling asleep, waking during the night, etc) compared with their non–trauma-exposed peers. In addition, in preschoolers exposed to the 9/11 attacks, exposure to "high intensity events" (eg, seeing people jumping out of the towers, seeing dead bodies, seeing injured people or witnessing the towers collapsing) was associated with greater sleep disturbance in a dose-response pattern, with greater "high-intensity event" exposure associated with greater sleep disturbance.[12] ACEs have also been shown to have long-term detrimental effects on sleep. Bader and colleagues[13] used a clinical sample of adults and found that 46% of patients with primary insomnia reported moderate to severe ACEs. Furthermore, individuals with moderate to severe ACEs exhibited greater number of awakenings and more nocturnal movements during polysomnographic and actigraphic assessments than those with low or no reports of ACEs. However, additional studies are needed to further elucidate the prevalence of sleep disturbance in youth exposed to ACEs and to identify various risk factors associated with this relationship. Specifically, understanding the role of PTSD symptom severity and specific trauma types in the risk of sleep disturbance may lead to the creation of more comprehensive assessment and treatment strategies that are developmentally appropriate for trauma-exposed youths.

The purpose of this study is to characterize the link between exposures to trauma in childhood and sleep disturbance in a large sample of trauma-exposed youth. We will accomplish this by addressing 2 main aims. The first aim is to determine the prevalence of sleep disturbance in a racially and ethnically diverse sample of children and adolescents exposed to ACEs and other traumatic events and to determine whether differences exist based upon demographic characteristics. The second aim is to investigate the contributions of PTSD symptom severity and exposure to specific types of trauma to the risk of sleep disturbance in the same population. We hypothesize that the prevalence of sleep disturbance in trauma-exposed youth will be greater than published prevalence rates of their nonexposed peers and that differences in the rate of sleep disturbance will differ by age. We also hypothesize that PTSD symptom severity and exposure to high impact traumas (eg, interpersonal traumas) will be associated with greater risk of sleep disturbance in both children and adolescents.

Methods

The National Child Traumatic Stress Network (NCTSN) is comprised of mental health centers located throughout the United States that provide trauma-informed mental health services. Centers are located in diverse areas of the United States, coming from: urban, rural, and frontier areas; large and small states; the 4 Census Regions; and the 9 Census Divisions. A consistent and systematic approach to data collection from each of these centers has allowed for the development of a common Core Data Set (CDS; N = 14,088) that integrates these data in 1 location.[14]

For the current study, secondary data analysis was conducted using de-identified data from the CDS. The CDS subsample selected for the present study included 4559 trauma-exposed youths between the ages of 7 and 18 years. To be eligible for this study, participants must have completed the UCLA Posttraumatic Stress Disorder Reaction Index Reaction Index (UCLA PTSD-RI) as well as a clinician evaluation of sleep disturbance. The final study sample included 4043 youths who met the eligibility requirements: 2197 between the ages of 7 and 12 years and 1846 between the ages of 13 and 18 years. All study procedures complied with the Institutional Review Board of Duke University Health System and all federal regulations for human subject protection.

Measures

Demographic information was obtained from multiple informants, including the child or adolescent, parents/caregivers, family members, other relatives, and relevant collaterals. Demographic variables used for this study included sex, age, race/ethnicity, and a proxy for income—eligibility for public insurance (eg, Medicaid, State Health Insurance).

The Trauma History Profile (THP) was derived from the trauma history component of the UCLA PTSD-RI.[14] The THP is completed by the clinical provider at intake or early in the course of services using information gathered from multiple informants. The THP assesses lifetime trauma exposure and includes a comprehensive list of 20 different ACEs. These trauma types have been described in previous publications,[15] and only those significantly associated with the outcome variable will be used in final analyses.

The UCLA PTSD-RI[16] is a questionnaire to screen both for exposure to traumatic events and for PTSD symptoms in school-aged children and adolescents. It assesses the frequency of occurrence of PTSD symptoms during the past month, rated from 0 (none of the time) to 4 (most of the time). The items map directly onto the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*), criterion B (reexperiencing), criterion C (avoidance/numbing), and criterion D (arousal) for PTSD.[17] Twenty of the items directly assess PTSD symptoms, whereas 2 additional items assess associated features: fear of recurrence and trauma-related guilt. Scoring algorithms permit tabulation of total PTSD-RI score, and B, C, and D symptom subscale scores. Psychometric properties are fairly robust and have been previously described.[18,19] For this study, we used the total score with a clinical cutoff of 38 or higher to indicate a probable PTSD diagnosis. This cutoff score showed acceptable sensitivity and specificity for detecting PTSD.[16] When appropriate, points associated with the endorsement of the sleep item were omitted from analyses.

Sleep disturbance was derived from comprehensive clinical assessment and the evaluation of collateral information from multiple sources. Clinical assessments were conducted on each child by licensed clinicians (eg, LCSWs, MDs, PhDs) or clinicians/trainees working under the supervision of a licensed clinician (eg, provisionally licensed clinicians, psychology interns, residents, postdoctoral fellows). Specifically, clinicians were asked to determine the presence of sleep disturbance and other mental health conditions that align with the *DSM-IV, Text Revision*, through clinical assessment, reports from other providers, reports from other caregivers who knew the child well, and medical/mental health records. Data from these sources were combined and used to generate global ratings indicating the degree to which general sleep problems and specific symptoms of sleep disorders, as described in *DSM-IV, Text Revision*, were displayed by the child or adolescent. Final ratings of sleep disturbance were made on a 3-point scale consisting of 0 (not present), 1 (probably present), and 2 (definitely present). For purposes of this study,