

Subtypes of Childhood Maltreatment and Posttraumatic Stress Disorder Symptoms in an Adult Trauma Sample: The Mechanistic Role of Sleep

Farah Harb¹, Alexandra González-Van Wart², John Brzezinski¹,
Terri A. deRoos-Cassini^{3, 4}, and Christine L. Larson¹

¹Department of Psychology, University of Wisconsin-Milwaukee

²Department of Psychology, Marquette University

³Department of Surgery, Division of Trauma and Acute Care Surgery, Medical College of Wisconsin

⁴Comprehensive Injury Center, Medical College of Wisconsin

Objective: Childhood maltreatment is indisputably linked to adverse mental health outcomes, including an increased risk to develop posttraumatic stress disorder (PTSD) in adulthood. The role of childhood maltreatment in the context of recovery from a trauma later in adulthood is not well understood. A variable related to both childhood maltreatment and PTSD symptoms, and a potential link between the two, is sleep. The current study aimed to understand how sleep disturbances may play a mechanistic role in the effect of subtypes of childhood maltreatment on PTSD symptom severity in an adult trauma sample. **Method:** 160 adults (90 women; $M_{age} = 33.73$, $SD = 10.86$) were recruited from the emergency department at a Level-1 trauma center in southeastern Wisconsin after experiencing a traumatic injury. Experiences of childhood maltreatment and sleep were self-reported at 2-week and 3-month posttrauma, respectively. PTSD symptoms were clinically assessed 6 months later. **Results:** Sleep disturbances 3-month posttrauma mediated the effect of emotional abuse, physical neglect, and emotional neglect on PTSD symptom 6 months after the traumatic injury. The effect of sexual and physical abuse on PTSD symptoms was not significantly mediated by sleep disturbances. **Conclusions:** These findings highlight the differential impact of subtypes of childhood maltreatment on PTSD symptoms, the mechanistic role of sleep, and the need to consider early life adversity when assessing adult posttrauma experiences. These results also suggest that interventions aimed at improving sleep quality might improve PTSD symptoms in those who have experienced childhood maltreatment and a subsequent traumatic injury in adulthood.

Clinical Impact Statement

The current study highlights how early adversity in childhood, such as experiences of abuse and neglect, can be related to long-term recovery outcomes after a traumatic injury in adulthood. This, in part, can be explained by sleep disturbances that result from childhood experiences of maltreatment and impact later posttraumatic stress disorder symptom severity in adulthood. These findings emphasize the need for clinical interventions to assess for childhood maltreatment and sleep disturbances. This allows for a cumulative understanding of early life adversity and a target for intervention—sleep—to improve outcomes posttrauma in adulthood.

Keywords: childhood abuse, childhood neglect, sleep disturbances, PTSD symptoms, adulthood traumatic injury

Supplemental materials: <https://doi.org/10.1037/tra0001716.supp>

Childhood maltreatment refers to experiences of abuse and/or neglect that occur in childhood. The original adverse childhood experiences (ACEs) study was foundational to our understanding

of how experiences of abuse and household dysfunction (e.g., exposure to substance use) can have deleterious impacts on adult health such as an increased risk for heart disease or depression

This article was published Online First May 2, 2024.

Farah Harb  <https://orcid.org/0000-0002-1653-8767>

The current study is derived from a larger project, the Imaging Study on Trauma and Resilience (iSTAR) funded by the National Institute of Mental Health (R01MH106574; principal investigators: Christine L. Larson and Terri A. deRoos-Cassini).

Farah Harb served as lead for conceptualization, formal analysis, investigation, methodology, software, and writing—original draft. Alexandra González-Van Wart served in a supporting role for formal analysis, writing—original draft, and writing—review and editing. John Brzezinski contributed equally to

visualization and served in a supporting role for writing—original draft and writing—review and editing. Terri A. deRoos-Cassini contributed equally to funding acquisition and served in a supporting role for conceptualization, investigation, and writing—review and editing. Christine L. Larson served as lead for funding acquisition and supervision and contributed equally to conceptualization and investigation. Farah Harb and Christine L. Larson contributed equally to writing—review and editing.

Correspondence concerning this article should be addressed to Farah Harb, Department of Psychology, University of Wisconsin-Milwaukee, 2441 East Hartford Avenue, Milwaukee, WI 53211, United States. Email: fiharb@uwm.edu

(Felitti et al., 1998). Since this study, new approaches to measuring and understanding childhood adversity, specifically childhood maltreatment, have emerged, and it is now indisputable that such experiences are related to adverse emotional, cognitive, and behavioral outcomes (Angelakis et al., 2019; Cohen et al., 2001; Felitti et al., 1998; McLaughlin & Sheridan, 2016; McLaughlin et al., 2012, 2014; Rameckers et al., 2021). Youth who experience abuse and/or neglect are more likely to develop physical and mental health disorders, including chronic illnesses, depression, anxiety, suicidal ideation, and posttraumatic stress disorder (PTSD; McLaughlin & Sheridan, 2016). Mechanisms to explain this relationship have been proposed thus far, including aberrant threat processing (Liuzzi et al., 2024; McLaughlin & Sheridan, 2016), increased rumination and emotional reactivity (Dvir et al., 2014; McLaughlin & Lambert, 2017), emotion dysregulation (Messman-Moore & Bhuptani, 2017), and altered affective learning (McLaughlin & Lambert, 2017). Studies that utilize a retrospective account of childhood maltreatment (Edwards et al., 2003; Grassi-Oliveira & Stein, 2008) and prospective designs (Cohen et al., 2001; Jonson-Reid et al., 2012) both highlight that experiences of maltreatment in childhood can have longstanding consequences and are associated with negative adult mental health outcomes, including PTSD (Messman-Moore & Bhuptani, 2017). In fact, adults who experienced maltreatment in childhood have a much higher likelihood of receiving a PTSD diagnosis in their lifetime (30.9%) in comparison to age-matched controls without a history of maltreatment (20.4%), and almost twice as likely to be currently diagnosed with PTSD as adults (Messman-Moore & Bhuptani, 2017). Moreover, given the prevalence of traumatic events, it is likely that many individuals who experience childhood maltreatment experience additional traumatic events in adulthood (Kilpatrick et al., 2013). While the association between childhood maltreatment and adult PTSD has been substantiated (Edwards et al., 2003; Yehuda et al., 2001), the role that maltreatment plays in the context of recovery from later trauma in adulthood is not as well understood.

One variable that is related to both childhood maltreatment and posttraumatic mental health outcomes is sleep. There are two stages of sleep: rapid eye movement and nonrapid eye movement stages, the latter of which is further divided into three stages: N1, N2, and N3 (Pacheco, 2023; Patel et al., 2022). During a restful night's sleep, the body cycles through these stages between four and six times, and each stage is characterized by distinct variations in muscle tone, brain wave patterns, and eye movements (Patel et al., 2022). Sleep disturbances can occur at several stages of sleep, and studies show that a history of childhood maltreatment is associated with poor sleep quality (Pfaff et al., 2021), which may be explained by the Hyperarousal Model of Insomnia (Perlis et al., 2001). This model suggests that an elevated level of arousal that cannot be down-regulated at night contributes to difficulties falling and staying asleep (Perlis et al., 2001). Hyperarousal, based on this model, is driven by an interplay between psychological, behavioral, and physiological arousal factors that perpetuate chronic insomnia. Psychological factors include cognitive rumination on inability to sleep, while behavioral factors include prolongation of bedtime and napping during the day (Riemann et al., 2010). Autonomic facets of arousal contribute to insomnia through elevated heart rate, enhanced sympathetic nervous system activity, elevated body temperature, and increased metabolic rate (Riemann et al., 2010). Hyperarousal and overall hypervigilance are often present in those who experience childhood maltreatment (Kendall-Tackett, 2002), but these findings persist beyond childhood

into adulthood. Increased vigilance and arousal may be accounting for increased sleep disturbances, as posited by the Hyperarousal Model of Insomnia (Perlis et al., 2001). Regression analyses demonstrate that retrospective accounts of childhood trauma (including experiences beyond maltreatment, such as experiencing natural disasters) are associated with poorer sleep health in adulthood (measured via self-report and actigraphy), after covarying for stress, interpersonal support, and depression history (Brindle et al., 2018). Interestingly, in this study childhood trauma predicted poorer sleep health in adulthood, but adult trauma did not have the same effect. Posited mechanisms to explain these findings include dysregulated cortisol release, increased alcohol use, poor coping habits, and an upregulated sympathetic nervous system activity (Brindle et al., 2018). This is consistent with the Hyperarousal Model of Insomnia, and recent meta-analytic findings suggest that hyperarousal links childhood maltreatment and adult sleep difficulties (Pfaff et al., 2021).

Importantly, hyperarousal is also a symptom cluster of PTSD as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*; American Psychiatric Association, 2013), and difficulty sleeping is one of the criteria in this cluster. As relevant context, sleep disturbances were defined as symptoms of PTSD in the *DSM-III* in 1980. Then, in 1984 (in the *DSM-III* text revision) the hyperarousal cluster was introduced and sleep impairment was then included in that cluster (American Psychiatric Association, 1980, 1987). The majority of trauma survivors will report sleep difficulties, including nightmares, difficulty falling asleep or staying asleep, and overall insomnia (Harvey et al., 2003). Thus, many survivors of trauma experience sleep disturbances, and sleep difficulties are a hallmark symptom of PTSD. However, the relationship is not simple. While sleep disturbances are characteristic of PTSD, sleep disturbances present prior to a traumatic event are also related to later PTSD symptoms (Mellman et al., 2002). In fact, sleep disturbances have been proposed as a risk factor and an underlying mechanism of PTSD symptom development (Harvey et al., 2003; van der Heijden et al., 2022), though the role as a risk factor is not well understood. Thus, while it may be a natural interpretation to attribute sleep difficulties as a symptom of PTSD in those who experience childhood maltreatment, prior empirical work suggests that sleep difficulties may also play a causal role in the development of PTSD. In addition, previous research has demonstrated that youth who experienced physical abuse showed sleep difficulties, regardless of whether they met the criteria for PTSD symptoms (Glod et al., 1997). Therefore, sleep difficulties may not just be a symptom of PTSD, and rather, may also stand as their own separable outcome resulting from experiencing childhood maltreatment, as well as a factor predicting later PTSD symptoms.

Previous studies have found that those who experience severe or traumatic injuries, such as burn injuries, report sleep disturbances acutely and in the few months following injury that are likely due to pain and discomfort, which interrupts and limits sleep quality (Lerman et al., 2022). A study of motor vehicle crash victims found that sleep quality differed between those who did and did not develop PTSD, and this difference widened at 3 months and then stabilized over the next 9 months (Koren et al., 2002). Since sleep quality due to pain and other injury-related factors can continue for years after an injury (Norrbrink Budh et al., 2005), assessing sleep quality in the acute aftermath of experiencing a traumatic injury is important. This may also allow for the uncovering of its mechanistic role in predicting PTSD symptom severity.

The Current Study

Prior research has established a link between childhood maltreatment and adult PTSD symptoms (Messman-Moore & Bhuptani, 2017). However, it is not well understood how experiences of childhood maltreatment are related to outcomes after an additional traumatic event in adulthood and what mechanisms drive this relationship. Moreover, sleep disturbances are common among those who experience childhood maltreatment (Pfaff et al., 2021) and cannot be attributed to PTSD symptoms alone, even though sleep disturbances are common among those with PTSD (Harvey et al., 2003). Utilizing the Hyperarousal Model of Insomnia, childhood maltreatment is linked to increased arousal and sympathetic nervous system activity, leading to poorer sleep health (Riemann et al., 2010). Moreover, poor sleep has been posited as a risk factor for PTSD development (Harvey et al., 2003; van der Heijden et al., 2022). Thus, as it stands, the literature has established individual links between childhood maltreatment, sleep, and PTSD symptoms. However, the mechanistic role of sleep in the relationship between childhood maltreatment and PTSD following adult trauma is not as clear. This current study aimed to examine the longitudinal impact of childhood maltreatment on PTSD symptoms 6 months following an adult trauma via sleep difficulties as a mechanism (measured 3-month posttrauma).

Previous literature has suggested that subtypes of childhood maltreatment have differential impacts on adult functioning (McLaughlin & Lambert, 2017; Miller et al., 2018). Studies exploring the relationship between PTSD and maltreatment have typically focused on child sexual and physical abuse (Messman-Moore & Bhuptani, 2017). However, the literature varies in how subtypes of maltreatment are related to PTSD and symptom severity. For example, according to one study, while PTSD symptoms have been associated with several subtypes of maltreatment (child sexual abuse, physical abuse, emotional abuse, and physical neglect), emotional abuse was most strongly associated with symptom severity (Sullivan et al., 2006). In a different study, child sexual abuse was associated with more severe PTSD symptoms in comparison to physical abuse (Wilson & Scarpa, 2014). Since the literature has shown differential associations between subtypes of childhood maltreatment and PTSD, and remains mixed, this study aimed to examine the potential effect of different subtypes of childhood maltreatment.

Method

This study explored the relationship between experiences of childhood maltreatment, sleep, and PTSD symptom severity in an adult trauma injury sample, utilizing data from a prospective longitudinal study: the Imaging Study on Trauma and Resilience (Tomas et al., 2022), approved by the Institutional Review Board at the University of Wisconsin–Milwaukee. Participants were recruited from an emergency department (ED) at a Level-I trauma center in southeast Wisconsin. The inclusion criteria were required: (a) a score of three or higher on the predicting PTSD Questionnaire (Rothbaum et al., 2014) or express a perceived threat to their life during the traumatic event, (b) English language proficiency, (c) a score of 13 or above on the Glasgow Coma Scale (Teasdale & Jennett, 1974), (d) age 18–60 at time of consent, and (e) magnetic resonance imaging safety criteria. Patients were excluded under the criteria of having a Glasgow Coma Scale ≤ 13 , being admitted to the ED for a suicide attempt or self-harm, significant cognitive impairment, spinal

cord injury resulting in complete paralysis, pregnancy, claustrophobia, history of psychotic or manic symptoms, deafness or hearing loss, blindness, clear presence of substance abuse in the ED, or in police custody. Participants provided their informed consent.

Two hundred and fifteen participants were recruited (full characteristics in Table S1 in the online supplemental materials), 25% of participants were missing data at follow-up visits, and 160 had data at all time points: childhood maltreatment, sleep quality, and PTSD symptom severity at 2-week, 3-month, and 6-month post-injury, respectively. With this level of missingness at follow-up, we did not impute missing data and included the 160 with complete data for all reported analyses. There were no significant differences in childhood maltreatment reported at baseline (see Table S2 in the online supplemental materials). Additionally, race and gender distributions were compared using a chi-square goodness-of-fit test; no significant differences in distributions of race, $\chi^2(4) = 1.78, p = .78$, or gender, $\chi^2(1) = 0.67, p = .41$, were found between time points. Most participants (71.3%) experienced a motor vehicle crash. Full details about mechanisms of injury and other demographic information for the current sample ($N = 160$) can be found in Table 1.

Table 1
Sample Characteristics

Characteristic	$N = 160$
Age M (range)	33.73 (18.1–59.0)
Gender, N (% female)	90 (56.25)
Race, N (%)	
Black or African American	90 (56.3)
White	46 (28.75)
Asian or Asian American	2 (1.25)
More than one race	9 (5.625)
Unreported	13 (8.125)
Ethnicity (% not Hispanic or Latino)	88.75
Annual household income, N (%)	
Less than \$20,000	54 (33.8)
\$20,000–\$40,000	37 (23.1)
\$40,000–\$60,000	28 (17.5)
\$60,000–\$80,000	21 (13.1)
\$80,000–\$100,000	11 (6.9)
More than \$100,000	9 (5.6)
Mechanism of injury, N (%)	
Motor vehicle crash	114 (71.3)
Gunshot	1 (0.6)
Stab	1 (0.6)
Fall	3 (1.9)
Pedestrian struck	6 (3.8)
Motor cycle crash	5 (3.1)
Domestic violence	2 (1.3)
Assault/altercation	17 (10.6)
Other	11 (6.9)
Childhood maltreatment	
Emotional abuse, M (SD), % yes	9.24 (4.71), 43.8%
Physical abuse, M (SD), % yes	8.23 (4.12), 41.9%
Sexual abuse, M (SD), % yes	7.78 (5.44), 31.3%
Emotional neglect, M (SD), % yes	10.41 (5.28), 46.3%
Physical neglect, M (SD), % yes	7.93 (3.39), 45.0%
Multiple types of maltreatment, % yes	57.5%
Life Events Checklist-5, M (SD)	3.79 (2.29)
PTSD symptom severity (CAPS-5), M (SD)	13.38 (7.93)
Sleep disturbances (ISI), M (SD)	13.81 (11.75)

Note. CAPS-5 = Clinician-Administered PTSD Scale for DSM-5; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, fifth edition; PTSD = posttraumatic stress disorder; ISI = Insomnia Severity Index.

Measures

Childhood Maltreatment

At 2-week postinjury, participants in this study reported on their experiences of child maltreatment via the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003; Bernstein et al., 1994). The CTQ is a widely used 28-item self-reported retrospective measure of child maltreatment that uses a 5-point Likert scale (1 = *never true* to 5 = *very often true*). The items are grouped into five subscales: Emotional neglect (e.g., “my family was a source of strength and support”), physical neglect (e.g., “I didn’t have enough to eat”), emotional abuse (e.g., “people in my family said hurtful or insulting things to me”), physical abuse (e.g., “people in my family hit me so hard that it left me with bruises or marks”), and sexual abuse (e.g., “someone molested me”). After reverse scoring the necessary items, the range for total score in each subscale was 5–25, where higher scores indicate more exposure to that type of child maltreatment. The CTQ has high reliability (Cronbach’s $\alpha = .95$; interclass correlation coefficient = .88; Bernstein et al., 1994).

Sleep Quality

Self-reported sleep quality was assessed approximately 3-month postinjury using the Insomnia Severity Index (ISI), a seven-item self-reported measure of sleep quality and satisfaction (Bastien et al., 2001; Morin, 1993). The ISI asks respondents to use a 5-point Likert scale (0 = *none* to 4 = *very severe*) to report the current (previous 2 weeks) severity of three insomnia-related problems: “difficulty falling asleep,” “difficulty staying asleep,” and “problem waking up too early.” The ISI also asks participants about sleep satisfaction (0 = *very satisfied* to 4 = *very dissatisfied*), how noticeable to others their sleep problems are in terms of quality of life impairment (0 = *not at all noticeable* to 4 = *very much noticeable*), how worried/distressed they feel about their sleep problem (0 = *not at all worried* to 4 = *very much worried*), and to what extent they consider their sleep problems interferes with their daily functioning (0 = *not at all interfering* to 4 = *very much interfering*). The total score for the ISI can range from 0 to 28, where higher scores represent greater insomnia severity and poorer sleep quality. The ISI has strong internal consistency (Cronbach’s $\alpha = .90$; Morin et al., 2011).

PTSD Symptom Severity

Six-month postinjury, participants were assessed for PTSD symptom severity using the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013), a semistructured 30-item clinical interview used to outline current PTSD symptom frequency, intensity, and duration (Weathers et al., 2018). The assessment was administered by 14 interviewers, the majority female, who identified as White. Before conducting the CAPS-5 interviews, this study’s interviewers completed an online training offered by the U.S. Department of Veteran Affairs, observed two live interviews conducted by experienced interviewers, and administered two mock CAPS-5 interviews that postdoctoral clinical psychologists reviewed. CAPS-5 has strong psychometric properties (Cronbach’s $\alpha = .88$; Weathers et al., 2018). Interrater reliability was calculated for 20% of the total CAPS administered and yielded high reliability (0.96; 95% confidence interval [CI] [0.93, 0.98]). The intensity and

frequency of the four symptom clusters (reexperiencing, avoidance, hyperarousal, and negative mood symptoms) for the past month were merged into a PTSD symptom severity score (range: 0–57; Weathers et al., 2013).

Other Trauma Exposure

The Life Events Checklist (LEC; Gray et al., 2004) was utilized to capture lifetime trauma exposure, outside of childhood maltreatment and the index trauma. This self-reported, validated measure contains 17 items describing stressful, traumatic events (e.g., natural disasters, combat, and sexual assault) and was collected at the baseline visit. In the current study, the LEC was scored using a weighted approach in which experienced events were weighted more heavily than events reported as “learned about” or “witnessed” (Weis et al., 2022). Four items (Items 6–9) were excluded from the total calculation since they refer to experiences of physical or sexual assault and may confound with childhood maltreatment experiences (Liu et al., 2024).

Analytic Strategy

Primary bivariate correlations were conducted to examine the relationships between the variables. Then, we utilized the PROCESS macro in SPSS 28—a computational macro that uses bootstrapping to analyze direct, indirect, and conditional effects (Hayes, 2013; Hayes & Rockwood, 2017). Model 4 was utilized for the mediation analysis (Hayes & Rockwood, 2017). We examined whether sleep disturbances mediated the relationship between childhood maltreatment and PTSD symptom severity following adult trauma. Five separate mediation models were conducted to examine separately the effect of different types of childhood maltreatment (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect), correcting for multiple comparisons using the Bonferroni correction procedure. We covaried for lifetime trauma exposure, age, race, gender, and income. This was done to reduce the confounding effect of other trauma or related demographic variables. Mediation model can be seen in Figure 1.

Results

Childhood Maltreatment and PTSD Direct Effects

Emotional abuse ($B = 0.422$, $p = .031$) and physical neglect ($B = 0.56$, $p = .033$) significantly predicted PTSD symptom severity, as shown by the direct effects in each mediation model. The direct effect of emotional neglect ($B = 0.17$, $p = .322$), sexual abuse ($B = 0.29$, $p = .083$), and physical abuse ($B = 0.32$, $p = .139$) on PTSD symptom severity was not significant in the model. Correlations can be found in Table 2.

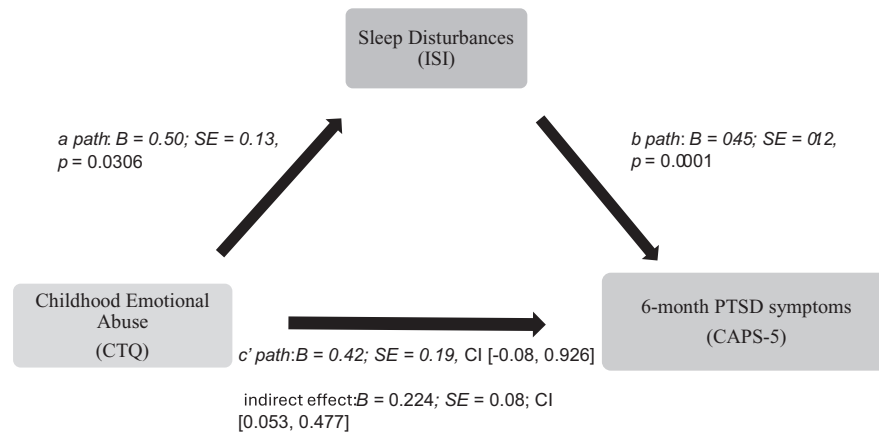
Mediations

Emotional Abuse

Sleep significantly mediated the effect of childhood emotional abuse on total PTSD symptom severity ($B = 0.224$, 95% CI [0.053, 0.477], $SE = 0.081$), correcting for multiple models and controlling for lifetime trauma exposure. Results can be found in Table 3. Results remained consistent when age, race, and income were added as covariates.

Figure 1

PROCESS Model 4 Mediation Analysis: The Indirect Effect of Emotional Abuse on PTSD Symptoms



Note. PTSD = posttraumatic stress disorder; CTQ = Childhood Trauma Questionnaire; CAPS-5 = Clinician-Administered PTSD Scale for *DSM-5*; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition; ISI = Insomnia Severity Index; CI = confidence interval.

Physical Abuse

Sleep did not mediate the effect of childhood physical abuse on PTSD symptom severity.

Sexual Abuse

Sleep did not mediate the effect of childhood sexual abuse on PTSD symptom severity.

Emotional Neglect

Sleep significantly mediated the effect of childhood emotional neglect on total PTSD symptom severity ($B = 0.172$, 95% CI [0.007, 0.419], $SE = 0.078$), correcting for multiple models and controlling for lifetime trauma exposure. Results can be found in Table 4. The model remained significant when age, race, and income were added as covariates.

Physical Neglect

As with emotional neglect, sleep also significantly mediated the effect of childhood physical neglect on total PTSD symptom severity ($B = 0.283$, 95% CI [0.045, 0.618], $SE = 0.110$), correcting for multiple models and controlling for lifetime trauma exposure. Results can be found in Table 5. The model was no longer significant when age, race, and income were added as covariates.

Discussion

The main goal of this study was to explore the relationships between child maltreatment, sleep quality, and PTSD symptom severity in the aftermath of adult trauma. Current findings show that sleep quality mediated the effects of childhood emotional abuse, physical neglect, and emotional neglect on PTSD symptom severity in adult trauma survivors, even when covarying for other lifetime trauma exposure. These results are largely consistent with

Table 2

Bivariate Correlations of Childhood Maltreatment, Sleep, and PTSD

Variables	Emotional abuse (CTQ)	Physical abuse (CTQ)	Sexual abuse (CTQ)	Physical neglect (CTQ)	Emotional neglect (CTQ)	3-month sleep disturbances (ISI)	6-month PTSD symptom severity (CAPS-5)	Age
Emotional abuse (CTQ)	—	0.624**	0.408**	0.445**	0.540*	0.329**	0.294**	0.059
Physical abuse (CTQ)	—	—	0.439**	0.388**	0.371**	0.192*	0.161*	0.160*
Sexual abuse (CTQ)	—	—	—	0.237**	0.260**	0.022	0.172*	0.125
Physical neglect (CTQ)	—	—	—	—	0.586**	0.237**	0.242**	0.007
Emotional neglect (CTQ)	—	—	—	—	—	0.259**	0.176*	0.021
3-month sleep disturbances (ISI)	—	—	—	—	—	—	0.389**	−0.062
6-month PTSD symptom severity (CAPS-5)	—	—	—	—	—	—	—	−0.083
Age	—	—	—	—	—	—	—	—

Note. PTSD = posttraumatic stress disorder; CTQ = Childhood Trauma Questionnaire; CAPS-5 = Clinician-Administered PTSD Scale for *DSM-5*; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition; ISI = Insomnia Severity Index.

* $p < .05$. ** $p < 0.01$.

Table 3*Model Summary of the Indirect Effect of Emotional Abuse on PTSD Symptom Severity*

Predictor	Outcome					
	M—sleep quality			Y—PTSD symptom severity		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Emotional abuse	0.496	0.129	.0002**	0.422	0.193	.031*
Sleep quality	—	—	—	0.452	0.116	.0001***
Constant	13.78	4.09	.001**	0.827	6.07	.892
	<i>R</i> ² = .143			<i>R</i> ² = .218		
	<i>F</i> (5, 153) = 5.11, <i>p</i> = .0002			<i>F</i> (6, 152) = 7.05, <i>p</i> < .0001***		
	95% CI					
Indirect effect	<i>B</i>		<i>SE</i>	Lower limit Upper limit		
Total indirect effect	0.224		0.081	0.053 0.477		

Note. PTSD = posttraumatic stress disorder; CI = confidence interval; M = mediator variable; Y = outcome variable.

* $p < .05$. ** $p < .01$. *** $p < .001$.

literature showing that adults who report experiences of childhood maltreatment are at heightened risk of poor sleep quality and PTSD (Greenfield et al., 2011; Messman-Moore & Bhuptani, 2017; Thompson et al., 2000). Other prospective research has also shown a mechanistic role between early experiences of childhood abuse and later-in-life anxiety and depression via sleep problems in young adulthood (Javakhishvili & Widom, 2021). This current study is novel in suggesting a potential mechanistic role of sleep in the development of PTSD symptoms following adult trauma. In particular, experiences of child maltreatment have a cascading effect adult on mental and physical health in a way that is consistent with the Hyperarousal Model of Insomnia (Perlis et al., 2001). Our findings suggest that experiencing maltreatment in childhood may keep individuals aroused and vigilant beyond the point that it is adaptive insofar as it interferes with the proper regulation of psychological and physiological arousal, leading to increased sleep disturbances and more severe PTSD symptoms.

An additional aim of the current study was to understand if the type of maltreatment had a differential effect on outcomes. Thus, the subscales of the CTQ were tested in separate mediation

models (correcting for multiple comparisons using the Bonferroni procedure). The current study found that sleep significantly mediated the relationship between physical neglect, emotional neglect, emotional abuse, and PTSD symptoms, but not the relationship between physical or sexual abuse and PTSD symptom severity. Experiences of physical neglect in childhood include a lack of proper shelter, leading to a lack of stability and a proper sleep environment, which may explain the long-term presence of sleep difficulties (Javakhishvili & Widom, 2021). However, previous research has found that neglect is related to sleep difficulties in childhood but not persistent into adulthood (Javakhishvili & Widom, 2021). The current study differs from previous research in some significant ways, though. Importantly, our sample consisted of recent trauma survivors, and thus the effect of early life physical neglect may be interacting with later adult trauma in ways that has not been previously explored. Additionally, many participants in our sample (56.9%) were socioeconomically disadvantaged, reporting a household income of \$40,000 or less. Thus, current socioeconomic stress may be compounding with early experiences of poverty that contributed to physical neglect; this may be happening in a way that

Table 4*Model Summary of the Indirect Effect of Emotional Neglect on PTSD Symptom Severity*

Predictor	Outcome					
	M—sleep quality			Y—PTSD symptom severity		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Emotional neglect	0.0.338	0.0.118	.005*	0.115	0.727	.507
Sleep quality	—	—	—	0.510	0.115	<.0001**
Constant	13.892	4.237	.001*	1.594	6.233	.799
	<i>R</i> ² = .108			<i>R</i> ² = .20		
	<i>F</i> (5, 153) = 3.694, <i>p</i> = .004			<i>F</i> (6, 152) = 6.16, <i>p</i> < .0001***		
	95% CI					
Indirect effect			<i>B</i>	<i>SE</i>	Lower limit	Upper limit
Total indirect effect			0.172	0.078	0.007	0.426

Note. PTSD = posttraumatic stress disorder; CI = confidence interval; M = mediator variable; Y = outcome variable.

* $p < .01$. ** $p < .001$. *** $p < .0001$.

Table 5
Model Summary of the Indirect Effect of Physical Neglect on PTSD Symptom Severity

Predictor	Outcome					
	M—sleep quality			Y—PTSD symptom severity		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Physical neglect	0.558	0.259	.002**	0.558	0.259	.033*
Sleep quality	—	—	—	0.509	0.112	<.0001***
Constant	7.373	0.180	.0001***	1.373	2.723	.615
	<i>R</i> ² = .071			<i>R</i> ² = .178		
	<i>F</i> (2, 157) = 5.978, <i>p</i> = .003**			<i>F</i> (3, 156) = 11.32, <i>p</i> < .0001***		
	95% CI					
Indirect effect	<i>B</i>		<i>SE</i>	Lower limit		Upper limit
Total indirect effect	0.283		0.110	0.0446		0.618

Note. PTSD = posttraumatic stress disorder; CI = confidence interval; M = mediator variable; Y = outcome variable.

* $p < .05$. ** $p < .01$. *** $p < .001$.

exacerbates the effect of physical neglect on adult PTSD symptoms in a way that previous studies have not fully explored.

There was also a significant mediation effect for sleep in the relationship between emotional abuse and emotional neglect and PTSD. The nature of emotional abuse (e.g., insulting or yelling at a child) and emotional neglect (e.g., failure to attend to a child's emotional needs) likely disrupt one's understanding, processing, and regulating of their own emotions (Kumari, 2020). Sleep plays an integral role in emotion regulation, including reducing the emotional intensity of memories (Koffel et al., 2016). When sleep is disturbed, there may be an over-consolidation of emotional and negative memories, increasing the risk for PTSD symptoms (Koffel et al., 2016). In line with the Hyperarousal Model of Insomnia (Perlis et al., 2001), the inability to regulate intense negative valence emotions may engender and maintain hyperarousal (Galbiati et al., 2020). These disruptions caused by emotional neglect and abuse likely interfere with the development of internal mechanisms that facilitate one's ability to regulate arousal and emotions after future stressful events (such as a future trauma). Individuals who are not able to recruit behavioral and cognitive strategies to modulate or manage negative emotions are more likely to ruminate and maintain greater cognitive and psychological arousal at night (Galbiati et al., 2020; Riemann et al., 2010), which has been related to fragmented sleep and overall poorer sleep health (Galbiati et al., 2020). Therefore, experiencing emotional abuse or neglect may reduce individuals' ability to regulate and reduce their emotional valence, maintaining a level of hyperarousal, increasing the risk for sleep disturbances, and further hindering proper emotion regulation. Subsequently, this results in a heightened risk for PTSD symptoms. Moreover, given that there are fewer (if any) physical signs related to emotional abuse and neglect, they may be less frequently noticed by other adults or caregivers in the child's life (Kumari, 2020). This may reduce the likelihood of intervention; thus, emotional abuse and neglect may be more chronic and long-lasting, heightening their negative impacts on sleep disturbances and PTSD severity.

We did not find a significant effect of childhood sexual abuse on PTSD symptom severity via sleep, which may be surprising but is consistent with previous research (Javakhishvili & Widom, 2021). The nature of our sample may partly explain the lack of significant

findings related to sexual abuse. As many as 68.7% of our sample reported never experiencing any sexual abuse; thus, we were likely underpowered to find significant results, which has been reported in prior research as well (Javakhishvili & Widom, 2021). In contrast, the lack of significant findings related to physical abuse is not in keeping with prior results. Research has consistently found a relationship between childhood physical abuse and sleep disturbances, with sleep disturbances mediating abuse and anxiety and depression in adulthood (Javakhishvili & Widom, 2021). Given that the sample in the current study had recently experienced a traumatic event, it may be that experiences of physical abuse are related to adult psychopathology (Javakhishvili & Widom, 2021), but that this impact is not directly related to posttraumatic symptoms due to later-in-life traumatic event, especially a nonrelational trauma (e.g., motor vehicle crash). Few studies have examined the role of childhood maltreatment on adult symptomatology in the context of adult trauma. Thus, this needs to be further explored in future work to better understand the effect of physical abuse in childhood on long-term outcomes. Moreover, while physical abuse certainly produces emotionally charged memories, it may not be in the same way that emotional neglect and abuse are specifically tied to a disruption of adequate emotional processing and regulation and arousal, increasing arousal and a subsequent risk for sleep disturbances (Koffel et al., 2016).

Notably, the models with emotional abuse and emotional neglect as predictors remained significant after covarying for race, age, and income. This could suggest that demographic factors such as race and income overlap with experiences of physical neglect. For example, those who grew up in low-income households might report experiencing forms of physical neglect, such as lacking proper food or housing. Research has shown that socioeconomic disadvantage is pervasive and intergenerational (Cheng et al., 2016), and thus, growing up in a lower-income household may increase the risk of experiencing socioeconomic disadvantage in adulthood. As measured by the current study, 56.9% of our sample reported an annual income of \$40,000 or below (see Table 1), which may be influencing current findings as previously discussed.

Additionally, race, age, and income might be partially responsible for reports of sleep quality; for example, Volpe et al. (2023) found that young adults of color who experienced more racial/ethnic

discrimination online were likelier to report poor sleep quality. Most of our sample (see Table 1) identifies as a racially minoritized group and likely experiences interpersonal and systemic experiences of racial discrimination, as conceptualized by the minority stress model (D. R. Williams, 2018; D. R. Williams et al., 1997). Those experiences likely compound with early maltreatment and recovery posttrauma and may account for significant variance in the model. Moreover, given that emotional abuse and neglect upheld after covarying for race, age, and income, it may further bolster the above argument relating to the dysregulating effect of emotional abuse/neglect on proper emotional processing and sleep disturbances.

This study had several strengths. First, examining the individual subscales of maltreatment rather than the cumulative experience of it increases the specificity of findings and understanding of the effect of type of childhood maltreatment on sleep and PTSD outcomes. Second, given the nature of the trauma sample, we were able to understand the role of childhood adversity on later-in-life outcomes and begin to unpack the impact of cumulative trauma. Finally, the longitudinal nature of the study allowed us to explore how child maltreatment affects sleep in the ensuing months following adult trauma exposure, with the temporal precedence of sleep disturbances 3-month posttrauma and PTSD symptoms 6 months later, suggesting that targeting sleep early after trauma could have a treatment effect for longer term distress.

The study also had several limitations. Primarily, most of our sample were survivors of motor vehicle crashes, and findings may not generalize to survivors of other traumatic events. Adults also retrospectively reported their maltreatment experiences in childhood, which is susceptible to bias of memory recall; thus, more prospective designs should be implemented to understand the true long-term impact of childhood maltreatment (Javakhishvili & Widom, 2021). Furthermore, we do not have information regarding the onset or duration of maltreatment, which research has shown is a significant moderator of long-term outcomes (Teicher & Khan, 2019). To control for previous trauma exposure, we used the LEC but excluded four times (Items 6–9) that ask about experiences of sexual or physical assault; however, this may have excluded experiences of assault that happened at a later time. Lastly, we do not have a measure of their sleep prior to the traumatic injury and are unable to confirm if sleep disturbances are a result of the childhood maltreatment or the traumatic injury. Also, we utilized a self-report measure of sleep disturbances, which provides limited insight into sleep quality; future work should consider other tools to measure sleep (e.g., heart rate monitors and smartwatches) that can supplement self-reported measures.

Future research should build on findings like this and work toward understanding protective factors, such as school engagement (Guibord et al., 2011; Hong et al., 2018; J. Williams & Nelson-Gardell, 2012). Since resilience factors can change over development (Meng et al., 2018), research can seek to identify such factors throughout the lifespan. Understanding how mechanisms, such as sleep disturbances, can lead to negative outcomes can allow us to turn drivers of adverse outcomes into resilience-promoting tools. Our findings also suggest that future research could use a developmental perspective to study how childhood maltreatment may disrupt internal mechanisms related to regulation.

The current study's findings suggest that experiences of early adversity should be assessed, even in adulthood, to understand the effect of cumulative trauma. Specifically, the type of maltreatment should be assessed, given the differential outcomes of subtypes of

maltreatment. Moreover, findings demonstrate that sleep disturbances play a mechanistic role in the relationship between childhood maltreatment and adult PTSD symptoms. This can inform clinical interventions so that they include tools to improve sleep, especially in high-risk populations that have experienced early adversity and subsequent trauma in adulthood.

References

- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.).
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). <https://doi.org/10.1176/appi.books.9780890420188.dsm-iii-r>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Angelakis, I., Gillespie, E. L., & Panagioti, M. (2019). Childhood maltreatment and adult suicidality: A comprehensive systematic review with meta-analysis. *Psychological Medicine*, 49(7), 1057–1078. <https://doi.org/10.1017/S0033291718003823>
- Bastien, C., Vallières, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine*, 2(4), 297–307. [https://doi.org/10.1016/S1389-9457\(00\)00065-4](https://doi.org/10.1016/S1389-9457(00)00065-4)
- Bernstein, D. P., Fink, L., Handelsman, L., & Foote, J. (1994). *Childhood Trauma Questionnaire (CTQ)* [database record]. APA PsycTests.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190. [https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)
- Brindle, R. C., Cribbet, M. R., Samuelsson, L. B., Gao, C., Frank, E., Krafty, R. T., Thayer, J. F., Buysse, D. J., & Hall, M. H. (2018). The relationship between childhood trauma and poor sleep health in adulthood. *Psychosomatic Medicine*, 80(2), 200–207. <https://doi.org/10.1097/PSY.0000000000000542>
- Cheng, T. L., Johnson, S. B., & Goodman, E. (2016). Breaking the intergenerational cycle of disadvantage: The three generation approach. *Pediatrics*, 137(6), Article e20152467. <https://doi.org/10.1542/peds.2015-2467>
- Cohen, P., Brown, J., & Smailes, E. (2001). Child abuse and neglect and the development of mental disorders in the general population. *Development and Psychopathology*, 13(4), 981–999. <https://doi.org/10.1017/S0954579401004126>
- Dvir, Y., Ford, J. D., Hill, M., & Frazier, J. A. (2014). Childhood maltreatment, emotional dysregulation, and psychiatric comorbidities. *Harvard Review of Psychiatry*, 22(3), 149–161. <https://doi.org/10.1097/HRP.0000000000000014>
- Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *The American Journal of Psychiatry*, 160(8), 1453–1460. <https://doi.org/10.1176/appi.ajp.160.8.1453>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *American Journal of Preventive Medicine*, 14(4), 245–258. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8)
- Galbiati, A., Sforza, M., Fasiello, E., Casoni, F., Marrella, N., Leitner, C., Zucconi, M., & Ferini-Strambi, L. (2020). The association between emotional dysregulation and REM sleep features in insomnia disorder. *Brain and Cognition*, 146, Article 105642. <https://doi.org/10.1016/j.bandc.2020.105642>
- Glod, C. A., Teicher, M. H., Hartman, C. R., & Harakal, T. (1997). Increased nocturnal activity and impaired sleep maintenance in abused children.

- Journal of the American Academy of Child & Adolescent Psychiatry*, 36(9), 1236–1243. <https://doi.org/10.1097/00004583-199709000-00016>
- Grassi-Oliveira, R., & Stein, L. M. (2008). Childhood maltreatment associated with PTSD and emotional distress in low-income adults: The burden of neglect. *Child Abuse & Neglect*, 32(12), 1089–1094. <https://doi.org/10.1016/j.chiabu.2008.05.008>
- Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the Life Events Checklist. *Assessment*, 11(4), 330–341. <https://doi.org/10.1177/1073191104269954>
- Greenfield, E. A., Lee, C., Friedman, E. L., & Springer, K. W. (2011). Childhood abuse as a risk factor for sleep problems in adulthood: Evidence from a U.S. national study. *Annals of Behavioral Medicine*, 42(2), 245–256. <https://doi.org/10.1007/s12160-011-9285-x>
- Guibord, M., Bell, T., Romano, E., & Rouillard, L. (2011). Risk and protective factors for depression and substance use in an adolescent child welfare sample. *Children and Youth Services Review*, 33(11), 2127–2137. <https://doi.org/10.1016/j.childyouth.2011.06.019>
- Harvey, A. G., Jones, C., & Schmidt, D. A. (2003). Sleep and posttraumatic stress disorder: A review. *Clinical Psychology Review*, 23(3), 377–407. [https://doi.org/10.1016/S0272-7358\(03\)00032-1](https://doi.org/10.1016/S0272-7358(03)00032-1)
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Hayes, A. F., & Rockwood, N. J. (2017). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behaviour Research and Therapy*, 98, 39–57. <https://doi.org/10.1016/j.brat.2016.11.001>
- Hong, F., Tarullo, A. R., Mercurio, A. E., Liu, S., Cai, Q., & Malley-Morrison, K. (2018). Childhood maltreatment and perceived stress in young adults: The role of emotion regulation strategies, self-efficacy, and resilience. *Child Abuse & Neglect*, 86, 136–146. <https://doi.org/10.1016/j.chiabu.2018.09.014>
- Javakhishvili, M., & Widom, C. S. (2021). Childhood maltreatment, sleep disturbances, and anxiety and depression: A prospective longitudinal investigation. *Journal of Applied Developmental Psychology*, 77, Article 101351. <https://doi.org/10.1016/j.appdev.2021.101351>
- Jonson-Reid, M., Kohl, P. L., & Drake, B. (2012). Child and adult outcomes of chronic child maltreatment. *Pediatrics*, 129(5), 839–845. <https://doi.org/10.1542/peds.2011-2529>
- Kendall-Tackett, K. (2002). The health effects of childhood abuse: Four pathways by which abuse can influence health. *Child Abuse & Neglect*, 26(6–7), 715–729. [https://doi.org/10.1016/S0145-2134\(02\)00343-5](https://doi.org/10.1016/S0145-2134(02)00343-5)
- Kilpatrick, D. G., Resnick, H. S., Milanak, M. E., Miller, M. W., Keyes, K. M., & Friedman, M. J. (2013). National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of Traumatic Stress*, 26(5), 537–547. <https://doi.org/10.1002/jts.21848>
- Koffel, E., Khawaja, I. S., & Germain, A. (2016). Sleep disturbances in post-traumatic stress disorder: Updated review and implications for treatment. *Psychiatric Annals*, 46(3), 173–176. <https://doi.org/10.3928/00485713-20160125-01>
- Koren, D., Arnon, I., Lavie, P., & Klein, E. (2002). Sleep complaints as early predictors of posttraumatic stress disorder: A 1-year prospective study of injured survivors of motor vehicle accidents. *American Journal of Psychiatry*, 159(5), 855–857. <https://doi.org/10.1176/appi.ajp.159.5.855>
- Kumari, V. (2020). Emotional abuse and neglect: Time to focus on prevention and mental health consequences. *The British Journal of Psychiatry*, 217(5), 597–599. <https://doi.org/10.1192/bjp.2020.154>
- Lerman, S. F., Owens, M. A., Liu, T., Puthumana, J., Hultman, C. S., Caffrey, J. A., & Smith, M. T. (2022). Sleep after burn injuries: A systematic review and meta-analysis. *Sleep Medicine Reviews*, 65, Article 101662. <https://doi.org/10.1016/j.smrv.2022.101662>
- Liuzzi, M. T., Harb, F., Petranu, K., Huggins, A. A., Webb, E. K., Fitzgerald, J. M., Krukowski, J. L., Miskovich, T. A., deRoos-Cassini, T. A., & Larson, C. L. (2024). The dichotomy of threat and deprivation as subtypes of childhood maltreatment: Differential functional connectivity patterns of threat and reward circuits in an adult trauma sample. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 9(2), 227–234. <https://doi.org/10.1016/j.bpsc.2023.10.001>
- McLaughlin, K. A., Greif Green, J., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2012). Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Archives of General Psychiatry*, 69(11), Article 1151. <https://doi.org/10.1001/archgenpsychiatry.2011.2277>
- McLaughlin, K. A., & Lambert, H. K. (2017). Child trauma exposure and psychopathology: Mechanisms of risk and resilience. *Current Opinion in Psychology*, 14, 29–34. <https://doi.org/10.1016/j.copsyc.2016.10.004>
- McLaughlin, K. A., & Sheridan, M. A. (2016). Beyond cumulative risk: A dimensional approach to childhood adversity. *Current Directions in Psychological Science*, 25(4), 239–245. <https://doi.org/10.1177/0963721416655883>
- McLaughlin, K. A., Sheridan, M. A., & Lambert, H. K. (2014). Childhood adversity and neural development: Deprivation and threat as distinct dimensions of early experience. *Neuroscience & Biobehavioral Reviews*, 47, 578–591. <https://doi.org/10.1016/j.neubiorev.2014.10.012>
- Mellman, T. A., Bustamante, V., Fins, A. I., Pigeon, W. R., & Nolan, B. (2002). REM sleep and the early development of posttraumatic stress disorder. *American Journal of Psychiatry*, 159(10), 1696–1701. <https://doi.org/10.1176/appi.ajp.159.10.1696>
- Meng, X., Fleury, M.-J., Xiang, Y.-T., Li, M., & D'Arcy, C. (2018). Resilience and protective factors among people with a history of child maltreatment: A systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 53(5), 453–475. <https://doi.org/10.1007/s00127-018-1485-2>
- Messman-Moore, T. L., & Bhuptani, P. H. (2017). A review of the long-term impact of child maltreatment on posttraumatic stress disorder and its comorbidities: An emotion dysregulation perspective. *Clinical Psychology: Science and Practice*, 24(2), 154–169. <https://doi.org/10.1111/cpsp.12193>
- Miller, A. B., Sheridan, M. A., Hanson, J. L., McLaughlin, K. A., Bates, J. E., Lansford, J. E., Pettit, G. S., & Dodge, K. A. (2018). Dimensions of deprivation and threat, psychopathology, and potential mediators: A multi-year longitudinal analysis. *Journal of Abnormal Psychology*, 127(2), 160–170. <https://doi.org/10.1037/abn0000331>
- Morin, C. M. (1993). *Insomnia: Psychological assessment and management*. Guilford Press.
- Morin, C. M., Belleville, G., Bélanger, L., & Ivers, H. (2011). The Insomnia Severity Index: Psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*, 34(5), 601–608. <https://doi.org/10.1093/sleep/34.5.601>
- Norbrink Budh, C., Hultling, C., & Lundeberg, T. (2005). Quality of sleep in individuals with spinal cord injury: A comparison between patients with and without pain. *Spinal Cord*, 43(2), 85–95. <https://doi.org/10.1038/sj.sc.3101680>
- Pacheco, D. (2023, February 14). *What happens during NREM sleep?* Sleep Foundation. <https://www.sleepfoundation.org/stages-of-sleep/nrem-sleep#:~:text=Stage%201%20and%20stage%202,neurons%20are%20firing%20more%20rapidly>
- Patel, A. K., Reddy, V., Shumway, K. R., & Araujo, J. F. (2022). Physiology, sleep stages. In *StatPearls* [Internet]. StatPearls Publishing.
- Perlis, M. L., Merica, H., Smith, M. T., & Giles, D. E. (2001). Beta EEG activity and insomnia. *Sleep Medicine Reviews*, 5(5), 365–376. <https://doi.org/10.1053/smrv.2001.0151>
- Pfaff, A., Jud, A., & Schlarb, A. (2021). Systematic review on the association between sleep-related hyperarousal and child maltreatment. *Sleep Medicine*, 84, 219–226. <https://doi.org/10.1016/j.sleep.2021.05.041>
- Rameckers, S. A., Van Emmerik, A. A. P., Bachrach, N., Lee, C. W., Morina, N., & Arntz, A. (2021). The impact of childhood maltreatment on the severity of childhood-related posttraumatic stress disorder in adults. *Child Abuse & Neglect*, 120, Article 105208. <https://doi.org/10.1016/j.chiabu.2021.105208>

- Riemann, D., Spiegelhalter, K., Feige, B., Voderholzer, U., Berger, M., Perlis, M., & Nissen, C. (2010). The Hyperarousal Model of Insomnia: A review of the concept and its evidence. *Sleep Medicine Reviews*, 14(1), 19–31. <https://doi.org/10.1016/j.smrv.2009.04.002>
- Rothbaum, B. O., Kearns, M. C., Reiser, E., Davis, J. S., Kerley, K. A., Rothbaum, A. O., Mercer, K. B., Price, M., Houry, D., & Ressler, K. J. (2014). Early intervention following trauma may mitigate genetic risk for PTSD in civilians: A pilot prospective emergency department study. *The Journal of Clinical Psychiatry*, 75(12), 1380–1387. <https://doi.org/10.4088/JCP.13m08715>
- Sullivan, T. P., Fehon, D. C., Andres-Hyman, R. C., Lipschitz, D. S., & Grilo, C. M. (2006). Differential relationships of childhood abuse and neglect subtypes to PTSD symptom clusters among adolescent inpatients. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, 19(2), 229–239. <https://doi.org/10.1002/jts.20092>
- Teasdale, G., & Jennett, B. (1974). Assessment of coma and impaired consciousness. A practical scale. *The Lancet*, 304(7872), 81–84. [https://doi.org/10.1016/S0140-6736\(74\)91639-0](https://doi.org/10.1016/S0140-6736(74)91639-0)
- Teicher, M. H., & Khan, A. (2019). Childhood maltreatment, cortical and amygdala morphometry, functional connectivity, laterality, and psychopathology. *Child Maltreatment*, 24(4), 458–465. <https://doi.org/10.1177/1077559519870845>
- Thompson, M. P., Kaslow, N. J., Lane, D. B., & Kingree, J. B. (2000). Childhood maltreatment, PTSD, and suicidal behavior among African American females. *Journal of Interpersonal Violence*, 15(1), 3–15. <https://doi.org/10.1177/088626000015001001>
- Tomas, C. W., Fitzgerald, J. M., Bergner, C., Hillard, C. J., Larson, C. L., & deRoos-Cassini, T. A. (2022). Machine learning prediction of PTSD trajectories following traumatic injury: Identification and validation in two independent samples. *Journal of Traumatic Stress*, 35(6), 1656–1671. <https://doi.org/10.1002/jts.22868>
- Van Der Heijden, A. C., Van Den Heuvel, O. A., Van Der Werf, Y. D., Talamini, L. M., & Van Marle, H. J. F. (2022). Sleep as a window to target traumatic memories. *Neuroscience & Biobehavioral Reviews*, 140, Article 104765. <https://doi.org/10.1016/j.neubiorev.2022.104765>
- Volpe, V. V., Benson, G. P., Czoty, L., & Daniel, C. (2023). Not just time on social media: Experiences of online racial/ethnic discrimination and worse sleep quality for Black, Latinx, Asian, and Multi-racial young adults. *Journal of Racial and Ethnic Health Disparities*, 10(5), 2312–2319. <https://doi.org/10.1007/s40615-022-01410-7>
- Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) [Assessment]*. <https://www.ptsd.va.gov/professional/assessment/adult-int/caps.asp>
- Weathers, F. W., Bovin, M. J., Lee, D. J., Sloan, D. M., Schnurr, P. P., Kaloupek, D. G., Keane, T. M., & Marx, B. P. (2018). The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5): Development and initial psychometric evaluation in military veterans. *Psychological Assessment*, 30(3), 383–395. <https://doi.org/10.1037/pas0000486>
- Weis, C. N., Webb, E. K., Stevens, S. K., Larson, C. L., & deRoos-Cassini, T. A. (2022). Scoring the Life Events Checklist: Comparison of three scoring methods. *Psychological Trauma: Theory, Research, Practice and Policy*, 14(4), 714–720. <https://doi.org/10.1037/tra0001049>
- Williams, D. R. (2018). Stress and the mental health of populations of color: Advancing our understanding of race-related stressors. *Journal of Health and Social Behavior*, 59(4), 466–485. <https://doi.org/10.1177/0022146518814251>
- Williams, D. R., Yu, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socio-economic status, stress and discrimination. *Journal of Health Psychology*, 2(3), 335–351. <https://doi.org/10.1177/135910539700200305>
- Williams, J., & Nelson-Gardell, D. (2012). Predicting resilience in sexually abused adolescents. *Child Abuse & Neglect*, 36(1), 53–63. <https://doi.org/10.1016/j.chiabu.2011.07.004>
- Wilson, L. C., & Scarpa, A. (2014). Childhood abuse, perceived social support, and posttraumatic stress symptoms: A moderation model. *Psychological Trauma: Theory, Research, Practice, and Policy*, 6(5), 512–518. <https://doi.org/10.1037/a0032635>
- Yehuda, A. R., Halligan, S., & Grossman, R. (2001). Childhood trauma and risk for PTSD: Relationship to intergenerational effects of trauma, parental PTSD, and cortisol excretion. *Development and Psychopathology*, 13(3), 733–753. <https://doi.org/10.1017/S0954579401003170>

Received December 19, 2023

Revision received March 5, 2024

Accepted March 13, 2024 ■