



## CLINICAL REVIEW

## Associations between childhood maltreatment and behavioral sleep disturbances across the lifespan: A systematic review

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## SUMMARY

Childhood maltreatment has a range of long-term developmental and health consequences. Emerging research suggests that sleep disturbances may be a key behavioral health risk factor implicated in the relationship between maltreatment and poor health across the lifespan. This systematic review examined the association between maltreatment and behavioral sleep disturbances in childhood and adulthood. Studies were identified through PsycINFO, PubMed, and alternative search strategies such as Google Scholar and reference list checks, with an end date of July 2021. Quantitative, peer-reviewed articles examining behavioral sleep outcomes and/or characteristics among maltreatment-exposed samples were included. We assessed the potential risk of bias by examining study design and sleep and maltreatment assessment methods. Across 73 studies included in this review, there was a robust association between childhood maltreatment and behavioral sleep disturbances. Findings suggest that linkages between maltreatment and sleep outcomes diverge with respect to maltreatment characteristics, type of behavioral sleep disturbance assessed, use of subjective versus objective measures, and study design. Given that behavioral sleep disturbances are modifiable, more research is needed that incorporates objective measures of sleep and longitudinal designs to identify specific points of intervention to mitigate the potential long-term impacts of childhood maltreatment on health across socio-demographically diverse populations.

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Early life adversity, especially child maltreatment, is a global problem affecting the lives of millions of children worldwide [1]. Indeed, childhood maltreatment (i.e., abuse and/or neglect experienced before age 18 y) can have lifelong, adverse physical and behavioral health consequences. Early maltreatment is associated with internalizing and externalizing concerns [2], posttraumatic stress disorder [3], somatic symptoms [4], and obesity [5], among other health problems. While the link between maltreatment and poor health outcomes is well established, emerging research (e.g., [6–11]) suggests a unique relationship between childhood maltreatment and sleep disturbances across the lifespan. Sufficient and high-quality sleep is essential for shaping optimal health outcomes [12,13], with differential impacts during critical periods of development [14]. Behavioral sleep disturbances may be a key

modifiable mechanism implicated in the association between maltreatment exposure and disparate health outcomes, and thus an important target of interventions to effectively ameliorate the consequences of child abuse and neglect.

Behavioral sleep disturbances, including curtailed or prolonged sleep duration, poor sleep quality, variable or irregular sleep times, and insomnia symptoms (problems initiating or maintaining sleep), negatively impact multiple domains of health and functioning [15,16]. For instance, shorter sleep duration has been linked to several leading causes of death in adulthood, including accidents, cardiovascular disease, and diabetes [17]. Behavioral sleep disturbances are also associated with increased stress reactivity, interpersonal conflict, risk-taking behaviors, mood disorders, and neurocognitive deficits in adults [18] and children [16].

Similar to behavioral sleep disturbances, childhood maltreatment is associated with the risk of poor outcomes across multiple domains of functioning. Because maltreatment can exacerbate

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psychological distress, alter neurobiological mechanisms implicated in healthy development, and place children in unsafe environments, these experiences may underlie or exacerbate behavioral sleep disturbances [19,20]. Fuligni and colleagues [21] propose that sleep disturbances and early adversity share similar neurobiological mechanisms, including brain development and functioning of the hypothalamic–pituitary–adrenal (HPA) axis and immune system. Thus, behavioral sleep disturbances, particularly during critical periods of development, may be a key pathway by which early adversity influences long-term health. Moreover, Noll and colleagues [22] suggest that maltreatment experiences can increase threats of harm or unpredictability, resulting in increased vigilance and hyperarousal that are not conducive to sleep and thus lead to significant sleep disturbances. Although an increasing number of studies suggest that childhood maltreatment is a prominent factor in the etiology of sleep disturbances and associated health outcomes, more comprehensive information is needed to clarify the role of childhood maltreatment in behavioral sleep disturbances across the lifespan and to identify key behavioral sleep targets of preventive interventions.

The purpose of this systematic review is to examine the direction and magnitude of associations between maltreatment and behavioral sleep disturbances across the lifespan, from early childhood through adulthood. Specifically, this review examines the methodologies used to assess childhood maltreatment and sleep disturbances as well as the sleep-related consequences of exposure to child abuse and neglect. The current state of knowledge is presented according to 1) exposure to child maltreatment and sleep disturbances emerging in childhood and 2) exposure to child maltreatment and later emergence of sleep disturbances in adulthood.

## Method

### Search strategy

Systematic searches were conducted in PsycINFO and PubMed. Searches contained combinations of keywords associated with our primary constructs of interest, which included child maltreatment and sleep outcomes: (maltreat\* OR abus\* OR violen\* OR stress\* OR neglect) AND sleep\* AND (child\* OR toddler\* OR infan\* OR perinat\* OR neonat\* OR pediatric OR newborn). Systematic searches were limited to studies with human samples written in English in peer-reviewed journals. Searches were not limited to a specified start date but ended in July 2021. Formal surveillance searches [23,24] for emerging evidence were also conducted using alternative strategies such as Google Scholar and reference list checks to identify additional articles that met inclusion criteria.

### Selection criteria

A total of 5765 articles were identified, which resulted in 3319 articles after duplicates were removed (Fig. 1). Records were then screened based on the title and abstract to determine if a study met inclusion criteria. For studies to be included in this review, the following criteria were used: 1) quantitative empirical study; 2) peer-reviewed article; 3) childhood maltreatment exposure in at least some study participants or in all participants (i.e., when part of study inclusion criteria); and 4) assessment of behavioral sleep disturbances as an outcome in childhood or adulthood or as a characteristic among maltreatment-exposed populations (e.g., children in foster care with alleged or substantiated maltreatment experiences). For this review, childhood maltreatment was conceptualized as abuse and/or neglect that was either measured separately or included as part of a childhood adversity index or

measure (i.e., child abuse and/or neglect was measured in addition to other adverse childhood experiences or traumatic events). Behavioral sleep disturbances were widely conceptualized as: a broadly defined self-, parent-, and/or case manager-reported sleep problem/disturbance; symptoms or a diagnosis of a sleep disorder (e.g., insomnia or parasomnias); nightmares; sleep paralysis; and aspects of poor sleep health [13], such as insufficient or shortened sleep duration, poor sleep quality, delayed or variable sleep timing, poor sleep efficiency, and daytime sleepiness. Initial searches yielded many articles with samples exposed to no childhood maltreatment and samples exposed to other forms of adversity and/or victimization, such as poverty, bullying, prenatal stress, or substance use. Some articles included specialized populations, such as those with a severe behavioral health diagnosis (e.g., schizophrenia), or assessed sleep only as a predictor of psychopathology and not as an outcome associated with maltreatment exposure. Several studies also focused on medical sleep disorders or symptoms, such as obstructive sleep apnea or snoring, or physiological sleep disturbances, including bedtime heart rate variability and other forms of sleep-related hyperarousal [25]. Other studies evaluated sleep interventions in adversity-exposed samples. These articles, as well as books, editorials, reviews, and unpublished sources (e.g., dissertations, conference presentations), were excluded.

After the screening process, full-text articles ( $n = 104$ ) were assessed by two authors for eligibility (Cohen's kappa = 0.91); discrepancies in eligibility decisions were discussed and resolved by group consensus. Of the 104 articles, 73 were included in the final review, with  $n = 30$  articles examining childhood maltreatment in relation to child sleep outcomes (i.e., in children 18 years of age and younger) and  $n = 43$  articles examining childhood maltreatment in relation to adult sleep outcomes (see the adapted PRISMA flowchart in Fig. 1; [26]). Information extracted from each article included the study location, participant characteristics, child maltreatment assessment methods, sleep assessment methods, and maltreatment and sleep associations. We assessed the potential risk of bias by examining study design (e.g., cross-sectional versus longitudinal), sleep assessment methods (e.g., objectively measured versus parent- or self-report), and maltreatment assessment methods (e.g., agency records versus parent- or self-report; retrospective versus current report). Extracted data were categorized according to study design, methodological characteristics, and key maltreatment-sleep findings.

## Results

### Child maltreatment and behavioral sleep disturbances emerging in childhood

Table 1 summarizes study characteristics and findings for the 30 articles examining maltreatment and sleep outcomes in children. Articles were published between 1994 and 2021, with the majority ( $n = 23$ ; 76.7%) published in the last decade (median year = 2017). Most studies were conducted in North America ( $n = 25$ ; 83.3%), followed by Asia ( $n = 4$ ; 13.4%) and Europe ( $n = 1$ ; 3.3%). Sixty-three percent ( $n = 19$ ) were cross-sectional, and assessed constructs at a single timepoint, with the remaining 37% of studies ( $n = 11$ ) being longitudinal. Few studies ( $n = 4$ ; 13.4%) specifically focused on early childhood populations (<5 years of age). The remaining studies focused on early and/or middle childhood (3–13 years of age;  $n = 8$ ; 26.7%), adolescents (>13 years of age;  $n = 11$ ; 36.6%), or a broad age range ( $n = 7$ ; 23.3%).

Most studies examined multiple forms of childhood maltreatment ( $n = 19$ ; 63.3%) or maltreatment exposure along with other adverse childhood experiences ( $n = 8$ ; 26.7%), while three studies

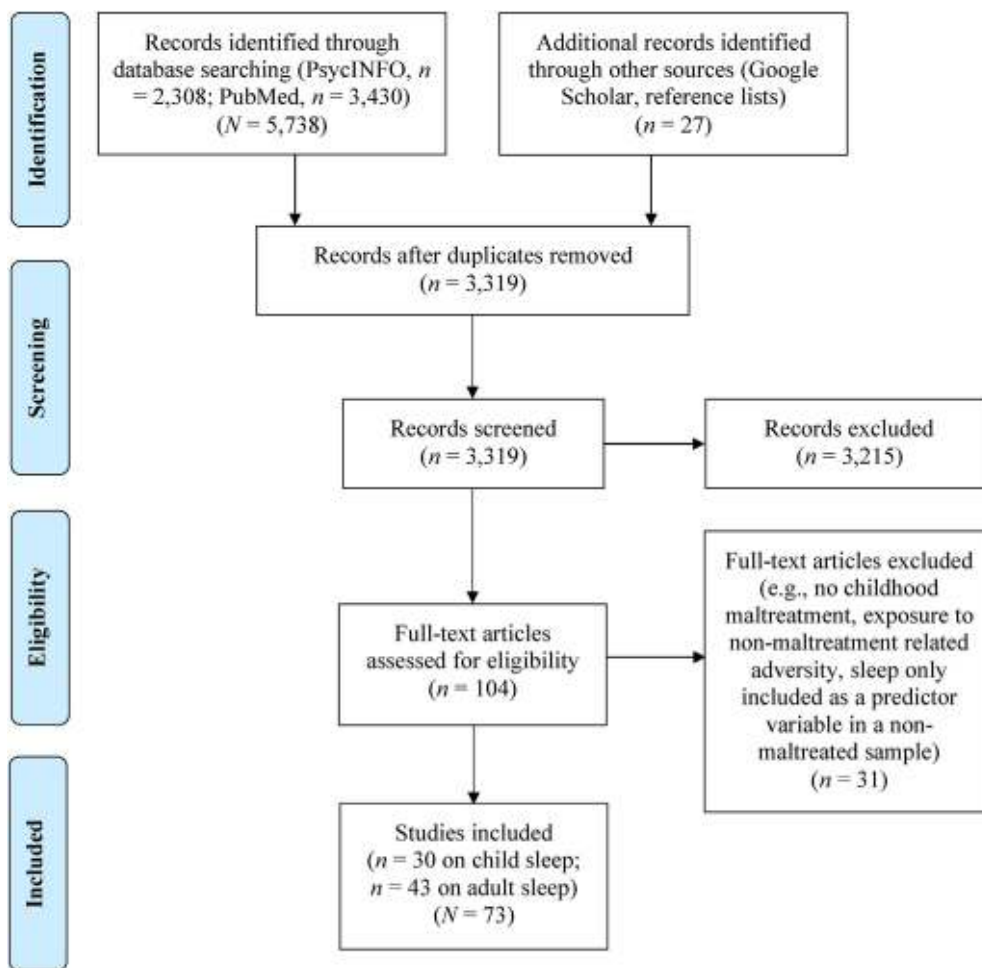


Fig. 1. Adapted PRISMA flowchart [26].

(10.0%) specifically examined sexual abuse exposure. The most common indicator of maltreatment was Child Protective Services (CPS) or medical records ( $n = 12$ ; 40.0%), followed by self-report ( $n = 8$ ; 26.7%) and case manager-report ( $n = 1$ ; 3.3%). Four studies used both self- and parent-report (13.4%), three studies used both self-report and CPS or medical records (10.0%), while one study each used parent-report and CPS records (3.3%) as well as self- and parent-report along with CPS records (3.3%). Of the 17 studies assessing maltreatment from CPS or medical records, seven studies (41.2%) used substantiated cases of maltreatment, nine studies (52.9%) used allegations of maltreatment or referrals to CPS, and one study (5.9%) did not specify the extent of CPS involvement. Child sleep was primarily assessed via self-report ( $n = 10$ ; 33.3%), followed by parent-report ( $n = 8$ ; 26.7%), case manager-report ( $n = 2$ ; 6.7%), and a combination of self- and parent-report ( $n = 3$ ; 10.0%). The Child Behavior Checklist (CBCL) was the most frequently used measure of sleep ( $n = 5$ ; 16.7%). Three studies (10.0%) measured sleep objectively using actigraphy, two studies (6.7%) measured sleep using actigraphy and sleep diaries, one study (3.3%) measured sleep using self- and parent-report along with actigraphy, and one study (3.3%) measured sleep using medical records. As shown in Table 2, a combination of sleep health indicators, such as sleep duration, efficiency, and timing, were the most frequently assessed sleep outcome ( $n = 16$ ; 53.3%), followed by broadly defined sleep problems/disturbances ( $n = 8$ ; 26.7%). Some outcomes included shortened or insufficient sleep duration ( $n = 2$ ; 6.7%) as well as sleep quality ( $n = 1$ ; 3.3%). Other sleep

outcomes included the presence of sleep disorders and symptoms, including insomnia symptoms or disruptive nocturnal behavior/parasomnias ( $n = 3$ ; 10.0%).

#### Cross-sectional studies

Most childhood studies ( $n = 19$ ; 63.3%) were cross-sectional. Five studies used actigraphy to assess sleep in relation to childhood maltreatment, with mixed findings. One study [27] found that children who had experienced physical abuse had poorer sleep efficiency compared to sexually- and non-abused children, whereas another study [28] found that children who experienced physical and/or sexual abuse had twice as much nocturnal activity, took three times longer to fall asleep, and had worse sleep efficiency compared to non-abused children. Two studies by Tininenko and colleagues showed that children in foster care had longer sleep latency and increased variability of sleep duration than community children [29] and that children in foster care were five times more likely to display shorter sleep duration, which was associated with increased inattention and hyperactivity [30]. A fifth study [31] found no main effects linking childhood maltreatment to sleep duration or sleep efficiency.

Some studies examined the prevalence of sleep disturbances, which ranged from approximately 10–45% [32–34], and dose–response associations between childhood maltreatment and other adverse childhood experiences and sleep problems. For example, adolescents exposed to five or more potentially traumatic events, including maltreatment, had three times the risk of

**Table 1**

Study characteristics and findings of n = 30 articles examining the associations between child maltreatment and behavioral sleep disturbances in childhood.

Authors/Year	Study location	Participants	CM and/or adversity assessment	Sleep assessment	Key maltreatment-sleep findings
<b>Cross-sectional studies</b>					
Cecil CAM et al. 2015 [43]	United States of America	4280 children (5–19 years of age)	Records from Child Protective Services	Case manager report (CANS)	<ul style="list-style-type: none"> <li>• Sleep problems were identified in 9.8% of children and youth entering state custody.</li> <li>• Children adjudicated delinquent had more sleep problems than children adjudicated dependent (i.e., neglect/unruly).</li> </ul>
Glod CA et al. 1997 [28]	United States of America	44 children (6–12 years of age)	Records from Child Protective Services	Actigraphy	<ul style="list-style-type: none"> <li>• Childhood physical and sexual abuse was associated with more nighttime activity, longer sleep onset latency, and lower sleep efficiency.</li> <li>• Childhood physical and sexual abuse was not associated with total sleep time or number of nighttime awakenings.</li> </ul>
Hambrick EP et al. 2018 [37]	United States of America	516 children (9–11 years of age)	Records from Child Protective Services, Self-report (study derived questions) <sup>a</sup>	Parent-report (CBCL)	<ul style="list-style-type: none"> <li>• Childhood adversity was associated with more sleep problems.</li> <li>• Sleep problems partially mediated the relationship between childhood adversity and delinquency.</li> </ul>
Hébert M et al. 2017 [39]	Canada	179 children (3–6 years of age)	Records from medical files (HVF)	Parent-report (CBCL)	<ul style="list-style-type: none"> <li>• Duration of childhood sexual abuse was not associated with sleep problems.</li> <li>• Sleep problems were associated with dissociative symptoms.</li> </ul>
Langevin R et al. 2019 [40]	Canada	315 adolescents (14–18 years of age)	Records from medical files, Self-report (study derived questions)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>• Childhood sexual abuse was associated with more sleep disturbances.</li> <li>• Girls had higher levels of sleep disturbances than boys.</li> </ul>
Okada M et al. 2018 [33]	Japan	273 children (4–15 years of age)	Records from medical files	Case manager report (BSQ)	<ul style="list-style-type: none"> <li>• Sleep-related symptoms at bedtime and waking were identified in 40% of the sample, sleep disorders were identified in 19% of the sample, and daytime sleepiness was identified in 10% of the sample.</li> <li>• Antisocial and depressive behaviors were correlates of suspected sleep disorders.</li> </ul>
Park E et al. 2020 [44]	Korea	737 adolescents (13–17 years of age)	Self-report (ETISR-SF, LTE-Q) <sup>a</sup>	Self-report (ISI, ESS, SSS)	<ul style="list-style-type: none"> <li>• Childhood adversity was associated with more sleep problems, insomnia symptoms, and daytime sleepiness.</li> <li>• Depression and anxiety partially mediated the relationship between childhood adversity and sleep problems.</li> </ul>
Sadeh A et al. 1994 [41]	United States of America	100 children (2.4–13.8 years of age)	Self- and parent-report (study derived questions)	Records from medical files	<ul style="list-style-type: none"> <li>• Sexually abused children had higher incidence of parasomnia compared to physically abused and non-abused children.</li> <li>• Sexual and physical abuse were not associated with sleep onset latency or nighttime awakenings.</li> </ul>
Sadeh A et al. 1995 [27]	United States of America	39 children (7–14 years of age)	Records from Child Protective Services, Self- and parent-report (study derived questions)	Actigraphy	<ul style="list-style-type: none"> <li>• Physically abused children had poor sleep efficiency compared to sexually abused or non-abused children.</li> <li>• Physical and sexual abuse was not associated with sleep onset time, total sleep period, or true sleep time.</li> </ul>
Tininenko JR et al. 2010a [29]	United States of America	79 children (3–7 years of age)	Records from Child Protective Services	Actigraphy, Sleep diary	<ul style="list-style-type: none"> <li>• Children in foster care had longer sleep duration, longer sleep onset latency, increased variability of sleep duration, and earlier bedtimes.</li> </ul>

Tininenko JR et al. 2010b [30]	United States of America	79 children (3–7 years of age)	Records from Child Protective Services	Actigraphy, Sleep diary	<ul style="list-style-type: none"> <li>• Children in foster care had shorter sleep duration.</li> <li>• Shorter sleep duration was associated with inattentive/hyperactive problem behavior.</li> </ul>
Turner S et al. 2020 [11]	Canada	2910 adolescents (14–17 years of age)	Self-report (CEVQ, study derived questions)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>• Childhood maltreatment was associated with longer sleep onset latency, more nighttime awakenings, and shorter sleep duration.</li> </ul>
Wamser-Nanney R & Chesher RE 2018a [34]	United States of America	342 children (3–18 years of age)	Self- and parent-report (study derived questions) <sup>a</sup>	Self-report (UPID), Parent-report (CBCL, TSCYC/TSCC)	<ul style="list-style-type: none"> <li>• Nightmares were identified in 13.8–30.5% of the sample, sleep disturbance was identified in 47% of the sample, and difficulty falling asleep was identified in 11.6–43.5% of the sample.</li> <li>• Sleep disturbances varied by reporter type and measurement.</li> </ul>
Wamser-Nanney R & Chesher RE 2018b [38]	United States of America	276 children (6–18 years of age)	Self- and parent-report (study derived questions) <sup>a</sup>	Self-report (UPID), Parent-report (CBCL, TSCYC/TSCC)	<ul style="list-style-type: none"> <li>• Childhood sexual and emotional abuse were not associated with sleep disturbances.</li> <li>• Childhood physical abuse was marginally associated with more nightmares.</li> </ul>
Wang Y et al. 2016 [35]	United States of America	9582 adolescents (13–18 years of age)	Self-report (CID1) <sup>a</sup>	Self-report (ICSD-II)	<ul style="list-style-type: none"> <li>• Childhood adversity was associated with insomnia symptoms.</li> <li>• Insomnia symptoms were more prevalent among girls and racial and ethnic minoritized adolescents.</li> </ul>
Xiao D et al. 2020 [36]	China	153,547 adolescents (mean 15 years of age)	Self-report (CTQ)	Self-report (PSQI)	<ul style="list-style-type: none"> <li>• Childhood maltreatment was associated with poor sleep quality.</li> <li>• Poor sleep quality was more prevalent in girls than boys.</li> </ul>
<b>Longitudinal studies</b>					
April-Sanders A et al. 2021 [50]	United States of America	2491 children (5–16 years of age)	Self- and parent-report (ACE) <sup>a</sup>	Self- and parent-report (DISC-4)	<ul style="list-style-type: none"> <li>• Childhood adversity was associated with trouble falling/staying asleep, daytime sleepiness, and nightmares.</li> </ul>
Chae W et al. 2021 [52]	Korea	1276 adolescents (13–15 years of age)	Self-report (study derived questions)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>• Childhood abuse was associated with poor sleep quality.</li> <li>• Childhood abuse was not associated with sleep duration.</li> </ul>
Hash JB et al. 2019 [45]	United States of America	247 infants and toddlers (10–24 months of age)	Records from Child Protective Services, Parent-report (CLE, CES-D, DLC, study derived questions) <sup>a</sup>	Parent-report (BISQ)	<ul style="list-style-type: none"> <li>• Childhood adversity was associated with more sleep problems.</li> </ul>
Hash JB et al. 2020a [7]	United States of America	123 infants and toddlers (10–24 months of age)	Records from Child Protective Services	Parent-report (BISQ)	<ul style="list-style-type: none"> <li>• Sleep problems were identified in 26% of children referred to child protective services.</li> <li>• Sleep problems were associated with higher internalizing and externalizing behaviors.</li> </ul>
Hash JB et al. 2020b [46]	United States of America	113 infants and toddlers (13–36 months of age)	Records from Child Protective Services	Parent-report (BISQ)	<ul style="list-style-type: none"> <li>• Child maltreatment was associated with longer nighttime sleep duration and shorter nap duration (compared to population data).</li> </ul>
Langevin R et al. 2017 [48]	Canada	307 children (3–7 years of age)	Records from medical files (HVF)	Parent-report (CBCL)	<ul style="list-style-type: none"> <li>• Childhood sexual abuse was associated with more sleep problems.</li> </ul>
McPhie ML et al. 2014 [51]	Canada	73 adolescents (14–18 years of age)	Self-report (CTQ)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>• More severe childhood maltreatment was associated with more sleep disturbances.</li> <li>• Psychological distress mediated the relationship between childhood maltreatment and sleep disturbances.</li> </ul>
Noll JG et al. 2006 [22]	United States of America	147 children (16–28 years of age)	Case manager report (CAHQ)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>• Sexually abused children had more sleep disturbances.</li> <li>• Children sexually abused by a single perpetrator had shorter sleep duration than children abused by multiple perpetrators.</li> <li>• Sleep disturbances were associated with revictimization.</li> </ul>

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**Table 1** (continued)

Authors/Year	Study location	Participants	CM and/or adversity assessment	Sleep assessment	Key maltreatment-sleep findings
Schneiderman JU et al. 2018 [53]	United States of America	385 children (mean 13.7 –18.2 years of age)	Records from Child Protective Services	Self-report (PSQI)	<ul style="list-style-type: none"> <li>Childhood maltreatment was associated with longer sleep duration.</li> <li>Childhood maltreatment was not associated with sleep disturbances.</li> <li>Childhood physical assault was associated with shorter sleep duration, lower sleep efficiency, longer wake after sleep onset, and later mean bedtime.</li> <li>Childhood physical assault was not associated with subjective sleep quality.</li> <li>Sleep duration decreased across time among children referred to child protective services.</li> <li>Sleep duration was inversely associated with externalizing and internalizing behaviors.</li> </ul>
Spilsbury JC et al. 2014 [49]	United States of America	46 children (8–16 years of age)	Records from violence program, Self-report (REVS) <sup>a</sup>	Self-report (SSR), Parent-report (CSHQ), Actigraphy	
Zajac L et al. 2020 [47]	United States of America	197 children (4 months–5 years of age)	Records from Child Protective Services	Sleep diary	

**Abbreviations:** ACE = Adverse Childhood Experiences Questionnaire, BISQ = Brief Infant Sleep Questionnaire, BSQ = Brief Sleep Questionnaire, CAHO = Caseworker Abuse History Questionnaire, CANS = Child and Adolescent Needs and Strengths Assessment, CBCL = Child Behavior Checklist, CES-D = Center for Epidemiologic Studies Depression Scale, CEVQ = Childhood Experiences of Violence Questionnaire, CIDI = Composite International Diagnostic Interview, CLE = Child Life Events Questionnaire, CM = Child maltreatment, CSHQ = Children's Sleep and Health Questionnaire, CTQ = Childhood Trauma Questionnaire, CTS-2 = Conflict Tactics Scale-2, DISC-4 = Diagnostic Interview Schedule for Children-4, DLC = Difficult Life Circumstances Questionnaire, ESS = Epworth Sleepiness Scale, ETISR-SF = Early Trauma Inventory Self Report-Short Form, HVF = History of Victimization Form, ICSID = International Classification of Sleep Disorders-II, ISI = Insomnia Severity Index, LTE-Q = List of Threatening Experiences Questionnaire, PSQI = Pittsburgh Sleep Quality Index, REVS = Recent Exposure to Violence Scale, SSR = Sleep Self Report, SSS = School Sleep Habits Survey, TSCYC/TSCC = Trauma Symptom Checklist for Young Children/Children, UPID = University of California Los Angeles Post-Traumatic Stress Disorder Index for DSM-IV Child Version, YCS = Your Child Sleep Questionnaire.  
 Note: Cecil CAM et al. 2015 [43] and Noll JC et al. 2006 [22] collected data from adolescents and young adults; <sup>a</sup>Assessment is an index that includes childhood maltreatment as well as other adverse childhood experiences or traumatic events.

insomnia symptoms than those with no exposure, and insomnia symptoms were more prevalent among girls and in racially and ethnically minoritized youth [35]. In other adolescent studies, increases in the number of maltreatment experiences were linked to poorer sleep efficiency [11] and quality [36]. In school-aged children in foster care, increased adverse childhood experiences, which included multiple types of maltreatment, were significantly associated with greater sleep problems which, in turn, mediated the link between childhood adversity and delinquency [37].

A subset of studies examined how childhood maltreatment characteristics differentially affected sleep disturbances and how these disturbances were implicated in other aspects of child functioning. In one study of 6-to-18-year-olds, physical abuse, but not sexual or emotional abuse, as well as the chronicity of previous trauma, were marginally associated with more frequent nightmares [38]. While one study found that the duration of sexual abuse experiences was not significantly correlated with parent-reported sleep problems in 3–6-year-olds [39], another study found that interpersonal violence, especially sexual abuse, was significantly associated with self-reported sleep disturbances in 14–18-year-olds [40]. Similarly, sexual abuse was linked to a higher incidence of parasomnias in one study that reviewed children's medical records [41]. Another study of young children living in foster care found that past experiences of sexual abuse were associated with poorer sleep quality [42]. In other studies, trauma-related psychopathology [43] and depression and anxiety [44] mediated the relationship between childhood adversity and sleep disturbances.

*Longitudinal studies*

Eleven childhood studies (36.6%) used longitudinal designs. Only four studies, three of which were conducted by Hash and colleagues [7,45,46], examined the influence of childhood maltreatment on sleep disturbances during infancy and toddlerhood. Samples in these three studies were recruited from CPS for maltreatment allegations. Broadly-defined, parent-reported early childhood sleep problems were identified in approximately 23–26% of these samples [7,46], with one of the studies [45] showing that the likelihood of having a sleep problem increased as adversity exposure increased. Although there were no differences in total (24-h) sleep among young children with a documented maltreatment history compared to a population-based sample, those with a maltreatment history showed longer nighttime and shorter daytime sleep duration [46]. Young children with sleep problems were also more likely to exhibit internalizing and externalizing behaviors over time [7]. In another sample of young children with maltreatment histories, shorter sleep duration was associated with more behavior problems longitudinally [47].

Research in older children examined associations between specific types of childhood maltreatment and behavioral sleep disturbances. Two studies [22,48] revealed that sexually abused youth had higher levels of broadly defined sleep problems, and in one of these studies, sleep problems were linked to later physical and sexual revictimization [22]. One longitudinal study conducted by Spilsbury and colleagues [49] found that physical assault was associated with poorer actigraphy-derived sleep outcomes, including shorter sleep duration, increased wake after sleep onset, and lower sleep efficiency than those who were not abused.

Other studies examined broadly defined childhood maltreatment and adversity exposures, which included child abuse and neglect in addition to parental factors such as parental loss, intimate partner violence, parental substance use, and parental mental health. One study found that exposure to childhood adversity was linked to more difficulty falling/staying asleep, greater daytime sleepiness, and more nightmares in 10–16-year-olds, but no

**Table 2**  
Child maltreatment and behavioral sleep disturbance associations in childhood (n = 30).

Authors/Year	Associations by sleep outcome						
	Broadly defined/reported sleep problem	Shorter duration	Delayed/variable timing	Poor quality	Poor efficiency	Daytime sleepiness	Other outcome
<b>Cross-sectional studies</b>							
Cecil CAM et al. 2015 [43]							↑
Dubois-Comtois K et al. 2016 [42]		∅		↑			∅
El-Sheikh M et al. 2014 [31]		∅			∅		
Epstein RA et al. 2011 [32]	↔						
Glod CA et al. 1997 [28]		∅			↑		
Hambrick EP et al. 2018 [37]	↑						
Hébert M et al. 2017 [39]	∅						
Langevin R et al. 2019 [40]	↑						
Okada M et al. 2018 [33]			+			+	+
Park E et al. 2020 [44]	↑					↑	↑
Sadeh A et al. 1994 [41]					∅		↔
Sadeh A et al. 1995 [27]		∅	∅	↔	↔		
Tininenko JR et al. 2010a [29]		↓	↔		↑		
Tininenko JR et al. 2010b [30]		↑			∅		
Turner S et al. 2020 [11]		↑			↑		
Wamser-Nanney R & Chesher RE 2018a [34]	+				+		+
Wamser-Nanney R & Chesher RE 2018b [38]	∅						↔
Wang Y et al. 2016 [35]							↑
Xiao D et al. 2020 [36]				↑			
<b>Longitudinal studies</b>							
April-Sanders A et al. 2021 [50]					↔	↔	↔
Chae W et al. 2021 [52]		∅		↑			
Hash JB et al. 2019 [45]	↑						
Hash JB et al. 2020a [7]	+						
Hash JB et al. 2020b [46]		↓					
Langevin R et al. 2017 [48]	↑						
McPhie ML et al. 2014 [51]	↑						
Noll JG et al. 2006 [22]	↑	↔					
Schneiderman JU et al. 2018 [53]	∅	↓					
Spilsbury JC et al. 2014 [49]		↑	↑	∅	↑		
Zajac L et al. 2020 [47]		↑					

Note. Sleep health outcomes defined according to Buysse [12] and Meltzer et al. [13]. Shorter sleep duration = total sleep minutes from sleep onset to offset or sufficient versus insufficient sleep duration; delayed/variable sleep timing = later bedtime or waketime, or variable sleep timing; poor sleep quality = subjective assessment of poor sleep; poor sleep efficiency = prolonged sleep onset latency, increased wake after sleep onset, and increased frequency/duration of night awakenings; Daytime sleepiness = poor alertness, feeling tired or sleepy; Other sleep outcome = the presence of a sleep disorder (e.g., insomnia, parasomnias), nightmares, sleep paralysis, and other sleep-related symptoms.

↑ indicates a positive association, with maltreatment exposure linked to worse sleep outcomes.

↓ indicates a negative association, with maltreatment exposure linked to better sleep outcomes.

∅ indicates no association between child maltreatment and sleep outcomes.

± indicates study limited to sleep outcome prevalence in maltreatment-exposed samples.

↔ indicates mixed findings on the basis of assessment type, age range, and/or comparisons within maltreated samples (e.g., sleep outcomes among individuals with a sexual or physical abuse history).

associations were observed in 5–9-year-olds [50]. Among adolescents, those who had experienced more severe or any childhood maltreatment showed more behavioral sleep disturbances [51] and poorer sleep quality [52] two years later. By contrast, there were no differences in later sleep disturbances in a 4.5-year period among youth with child welfare-documented maltreatment compared to non-maltreated youth [53].

*Child maltreatment and behavioral sleep disturbances emerging in adulthood*

Table 3 summarizes the 43 articles examining sleep outcomes in adults exposed to childhood maltreatment. Articles were published between 1998 and 2021, with the majority (n = 31; 72.1%) published in the last decade (median year = 2017). Most studies were conducted in North America (n = 30; 69.8%), followed by Europe (n = 7; 16.3%), Asia (n = 3; 7.0%), Australia (n = 1; 2.3%), New Zealand (n = 1; 2.3%), and South America (n = 1; 2.3%). As in the child studies, most adult studies were cross-sectional (n = 35; 81.4%), while eight studies (18.6%) assessed sleep longitudinally. Thirty-two studies (74.4%) examined a sample of adults across a

broad age range, while 10 studies (23.3%) focused on young adults (18–25 years of age), and one study (2.3%) exclusively focused on adults 60 years of age and older.

To assess childhood maltreatment, nearly all studies used self-report questionnaires (n = 41; 95.4%), with the most used measure being the Childhood Trauma Questionnaire (CTQ; n = 18; 41.9%). The remaining studies used CPS records (n = 1; 2.3%) or parent-report (n = 1; 2.3%). Most of this research examined multiple forms of childhood maltreatment (n = 23; 53.4%) or maltreatment exposure along with other adverse childhood experiences (n = 14; 32.6%), while six studies (14.0%) specifically examined sexual abuse exposure. Most studies used self-report to assess sleep (n = 35; 81.4%), and of these studies the majority used the Pittsburgh Sleep Quality Index (PSQI) (n = 16; 37.2%). Two studies (4.7%) measured sleep objectively using actigraphy and one study (2.3%) used both actigraphy and polysomnography. The remaining studies used actigraphy and self-report (n = 1; 2.3%), polysomnography and self-report (n = 1; 2.3%), sleep diaries (n = 1; 2.3%), and a combination of actigraphy, sleep diaries, and self-report (n = 2; 4.7%). Outcomes and associations across studies are summarized in Table 4. The most assessed sleep outcome was a

combination of sleep health indicators, such as shortened or insufficient sleep duration, sleep efficiency, and daytime sleepiness ( $n = 20$ ; 46.5%). Other outcomes included sleep quality ( $n = 7$ ; 16.3%); broadly defined sleep problems/disturbances ( $n = 5$ ; 11.6%); other sleep disorders or symptoms, including sleep paralysis, parasomnias, insomnia symptoms, and nightmares ( $n = 8$ ; 18.6%); shortened or insufficient sleep duration ( $n = 2$ ; 4.7%); and poor sleep efficiency ( $n = 1$ ; 2.3%).

#### Cross-sectional studies

As in the child studies, most adult studies were cross-sectional ( $n = 35$ ; 81.4%), examining retrospectively reported childhood maltreatment and current sleep disturbances. Six studies used actigraphy alone or a combination of actigraphy and polysomnography, sleep diaries, or self-report to assess sleep in relation to childhood maltreatment. Two studies conducted by Bader and colleagues [54,55] found that exposure to emotional abuse [54] and moderate to severe childhood adversity [55] were associated with worse actigraphy-derived sleep efficiency and more overnight body movements, while exposure to physical abuse was associated with less nighttime body movement [54]. One study of young adults [56] found that previous foster care placement was significantly related to fewer sleep hours, longer sleep onset latency, and more nighttime awakenings, measured via a FitBit. Some studies found that childhood maltreatment and trauma were associated with poor actigraphy-assessed sleep health, including sleep efficiency [57,58], while others found no associations between childhood maltreatment and actigraphy parameters. In a study using both actigraphy and self-reported sleep diaries, maltreatment was only significantly linked to the self-reported sleep outcome [59].

Like the childhood studies, some adult studies examined dose–response associations between childhood maltreatment and sleep disturbances. Greater childhood adversity experiences, which included maltreatment, were linked to insufficient sleep [60], shorter sleep duration [61], more frequent nightmares [62], poorer sleep quality [63], feeling less rested upon awakening [64], daytime sleepiness [65], and broad sleep disturbances [66]. Another study found that for each additional childhood adversity experienced, the odds of having troubled sleep increased by 10% [6]. Across studies, retrospectively reported childhood maltreatment was significantly associated with greater sleep disturbances in adulthood.

Several studies focused exclusively on women and generally found that childhood maltreatment was associated with poor sleep outcomes. In a clinical sample, Chu and colleagues [67] found that 13 female patients with child abuse histories reported more fear at sleep onset and upon waking overnight than 13 matched female patients without child abuse histories who had major depression. In other studies, traumatic childhood experiences, including sexual, physical, psychological, or emotional trauma, were associated with greater sleep onset latency, more nighttime awakenings, and shorter sleep duration in adulthood [68] as well as poorer sleep quality [69,70], especially among women from lower socioeconomic status (SES) backgrounds [71]. Moreover, SES moderated the relationship between childhood physical and emotional abuse and past-month sleep problems in women, such that higher SES buffered the negative impacts of childhood maltreatment on later adult sleep quality [72]. Pregnant women [73] and those in early postpartum [74] who experienced childhood physical or sexual abuse had increased odds of poor sleep quality, disturbances, and efficiency than women without abuse histories. Maltreatment severity was also implicated in poor sleep outcomes such that women with more severe childhood maltreatment reported more nighttime distress and nightmares [75].

Five additional studies focused exclusively on childhood sexual abuse, with female and male participants. Two of these studies found associations between childhood sexual abuse and sleep

paralysis [76,77], with adults experiencing repressed, recovered, or continuous memories of childhood sexual abuse having more frequent paralysis episodes [77]. Two other studies found that the number, sex or gender/gender identity,<sup>1</sup> and familial relation of perpetrators were significant predictors of the severity of poor sleep outcomes, including nightmare frequency and distress [78] and insomnia symptoms [9]. Finally, Higgs and colleagues [79] found that recent trauma, risky behaviors, and poor sleep hygiene each partially accounted for the relationship between childhood sexual abuse and increased sleep disturbances.

Lastly, a subset of studies examined how characteristics of childhood maltreatment differentially affected sleep outcomes and how sleep outcomes were implicated in other aspects of adult functioning in maltreatment-exposed samples. For example, a history of physical abuse was associated with sleepwalking, sleep terror, and nocturnal dissociations [80]. Studies found that emotional abuse was associated with more sleep disturbances [81] and perceived stress mediated this relationship [82]. Using daily sleep diaries, Hamilton and colleagues [83] found that young adults with a history of emotional neglect reported greater insomnia symptoms. Adults experiencing one or more types of maltreatment or adversity in childhood were more likely to report sleep disorders [84] and pre-sleep arousal, which was mediated by emotional regulation difficulties [85]. Petrov and colleagues [86] also found that individuals with higher levels of childhood abuse reported more sleep disturbances, which was associated with poorer physical health, including inflammation and hypertension.

#### Longitudinal studies

Eight studies (18.6%) used longitudinal designs to examine maltreatment that occurred in childhood in relation to adult sleep outcomes. Four of these studies included young adult samples, ranging in age from 18 to 22 years old, a developmental period wherein changes in sleep may occur due to the transition to adulthood. Indeed, studies demonstrated that childhood emotional neglect [87] and family conflict, including physical abuse [88], were associated with poor sleep quality, especially for men [89], and insomnia. In Black/African American men, Oshri and colleagues [8] found that childhood adversities were linked to difficulty falling asleep, poor sleep quality, and insufficient sleep.

Four longitudinal studies focused on adults across broad age ranges. Groups of adults with exposure to childhood physical and emotional maltreatment and adults with exposure to sexual maltreatment both reported poorer sleep quality compared to adults with no maltreatment exposure [90]. Another study of childhood sexual abuse survivors [91] found four distinct trajectories of insomnia symptoms over a 4-year period that varied in symptom severity and progression according to different abuse characteristics, such as the age of onset. Talvitie and colleagues [92] assessed childhood adversities, including maltreatment, in youth ages 3–18 y and found that greater exposure to adversity was associated with shorter sleep duration 27 y later. Tracy and colleagues [10] found that individuals who reported a higher level of childhood abuse also reported more anxiety and poorer sleep quality, which was linked to poor health status over time.

## Discussion

This systematic review of 73 studies in children and adults supports a robust association between experiences of childhood

<sup>1</sup> Because studies did not specify whether participants identified their biological sex or gender/gender identity, we have included both terms throughout the manuscript.



**Table 3**

Study characteristics and findings of n = 43 articles examining the associations between child maltreatment and behavioral sleep disturbances in adulthood.

Authors/Year	Study location	Participants	CM and/or adversity assessment	Sleep assessment	Key maltreatment-sleep findings
<b>Cross-sectional studies</b>					
Abrams MP et al. 2008 [76]	Canada	263 adults (18–52 years of age)	Self-report (study derived question)	Self-report (WUSEQ)	<ul style="list-style-type: none"> <li>Childhood sexual abuse was associated with more frequent and more distressing sleep paralysis episodes.</li> </ul>
Agargun MY et al. 2002 [80]	Turkey	382 young adults (18–22 years of age)	Self-report (study derived questions) <sup>a</sup>	Self-report (ICSD)	<ul style="list-style-type: none"> <li>Childhood physical abuse was associated with parasomnias (sleepwalking, sleep terrors) and nocturnal dissociations.</li> </ul>
Bader K et al. 2007a [54]	Switzerland	39 adults (20–55 years of age)	Self-report (CTQ)	Actigraphy	<ul style="list-style-type: none"> <li>Childhood emotional abuse was associated with poor sleep efficiency and more nighttime movement.</li> <li>Childhood physical abuse was associated with less nighttime movement.</li> </ul>
Bader K et al. 2007b [55]	Switzerland	59 adults (21–55 years of age)	Self-report (CTQ)	Polysomnography, Actigraphy	<ul style="list-style-type: none"> <li>Moderate to severe childhood maltreatment was associated with greater number of night awakenings and more nighttime movement.</li> <li>Childhood maltreatment was not associated with sleep onset latency or subjective sleep quality.</li> </ul>
Baiden P et al. 2015 [6]	Canada	19349 adults (20 years of age and older)	Self-report (study derived questions) <sup>a</sup>	Self-report (study-derived questions)	<ul style="list-style-type: none"> <li>Childhood adversity was associated with troubled sleep.</li> </ul>
Belleville G et al. 2019 [78]	Canada	44 adults (19–59 years of age)	Self-report (CAPS)	Self-report (PSQI, NDAQ)	<ul style="list-style-type: none"> <li>Characteristics of childhood sexual abuse (e.g., age at abuse, relationship to perpetrator, frequency of abuse) were associated with nightmare distress, nightmare frequency, and sleep quality.</li> </ul>
Brindle RC et al. 2018 [58]	United States of America	161 older adults (mean 60 years of age)	Self-report (THQ) <sup>a</sup>	Self-report (ESS), Sleep diary, Actigraphy	<ul style="list-style-type: none"> <li>Childhood trauma was associated with poor sleep health.</li> </ul>
Cardoso J et al. 2018 [82]	Portugal	987 adults (mean 41 years of age)	Self-report (CTQ short form)	Self-report (BaSIQs)	<ul style="list-style-type: none"> <li>Overall childhood maltreatment and emotional abuse were associated with more sleep disturbances.</li> <li>Perceived stress mediated the relationship between childhood maltreatment and sleep disturbances.</li> </ul>
Chambers E & Belicki K 1998 [84]	Canada	97 adults (18–44 years of age)	Self-report (CEQ) <sup>a</sup>	Self-report (BSIQ, NDAQ, SDQ)	<ul style="list-style-type: none"> <li>Childhood abuse and trauma were associated with more nightmares and sleep disorders.</li> <li>Childhood abuse and trauma were not associated with sleep disruption.</li> </ul>
Chapman DP et al. 2011 [65]	United States of America	17337 adults (19 years of age and older)	Self-report (study derived questions) <sup>a</sup>	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood adversity was associated with trouble falling/staying asleep and daytime sleepiness.</li> </ul>
Chapman DP et al. 2013 [60]	United States of America	25810 adults (18 years of age and older)	Self-report (study derived questions) <sup>a</sup>	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood adversity was associated with insufficient sleep.</li> </ul>
Chu JA et al. 2000 [67]	United States of America	26 adults (18–60 years of age)	Self-report (LEQ)	Self-report (MSQ)	<ul style="list-style-type: none"> <li>Childhood abuse was associated with greater fear of sleep onset and fear upon mid-sleep awakenings.</li> <li>Childhood abuse was not associated with sleep onset latency, difficulty staying asleep, and number of nighttime awakenings.</li> </ul>
Currie CL et al. 2021 [72]	Canada	185 adults (18–88 years of age)	Self-report (study derived questions)	Self-report (PSQI)	<ul style="list-style-type: none"> <li>Childhood physical and emotional abuse were associated with poor sleep quality.</li> <li>Childhood socioeconomic status moderated the relationship between childhood emotional abuse and sleep quality.</li> </ul>
Duval M et al. 2013 [75]	Canada	352 young adults (19–24 years of age)	Self-report (CTQ)	Self-report (Sleep and Dream Questionnaire, NDAQ)	<ul style="list-style-type: none"> <li>Childhood abuse and neglect were associated with more nightmares and nighttime distress.</li> </ul>
Fusco RA 2020 [56]	United States of America	185 young adults (18–24 years of age)	Self-report (CTQ)	Self-report (PSQI), Actigraphy (FitBit)	<ul style="list-style-type: none"> <li>Childhood maltreatment was associated with fewer sleep hours.</li> <li>Previous placement in foster care was associated with fewer sleep hours, longer sleep onset latency, more nighttime awakenings, and poor subjective sleep quality.</li> </ul>

(continued on next page)

Table 3 (continued)

Authors/Year	Study location	Participants	CM and/or adversity assessment	Sleep assessment	Key maltreatment-sleep findings
Gelaye B 2015 [73]	Peru	634 adults (18–49 years of age)	Self-report (CPSAQ)	Self-report (PSQI, FIRST)	<ul style="list-style-type: none"> <li>Childhood abuse was associated with poor sleep quality and stress-related sleep disturbances.</li> </ul>
Greenfield EA 2011 [66]	United States of America	835 adults (35–86 years of age)	Self-report (CTQ)	Self-report (PSQI)	<ul style="list-style-type: none"> <li>Childhood maltreatment was associated with increases in global sleep pathology, poor subjective sleep quality, more sleep disturbances, longer sleep onset latency, and more daytime dysfunction.</li> </ul>
Hamilton JL et al. 2018 [83]	United States of America	102 young adults (18–22 years of age)	Self-report (CTQ)	Self-report (ISI), Sleep diary	<ul style="list-style-type: none"> <li>Childhood neglect was associated with higher levels of insomnia symptoms but not sleep duration.</li> </ul>
Higgs E et al. 2020 [79]	United States of America	234 adults (21–71 years of age)	Self-report (CEQ, CTES, RTES) <sup>a</sup>	Self-report (PSQI, SLEEP-50, NDQ, WUSEQ)	<ul style="list-style-type: none"> <li>Childhood sexual and physical abuse were associated with poor sleep quality, poor sleep efficiency, sleep disturbances, daytime dysfunction, sleep terrors, shorter sleep duration, nightmares, sleep paralysis, insomnia, and sleep disorders.</li> </ul>
Hoag JR et al. 2015 [71]	United States of America	375 young adults (18–31 years of age)	Self-report (CTQ)	Self-report (PSQI)	<ul style="list-style-type: none"> <li>Childhood emotional, physical, and sexual abuse were associated with poor sleep quality, sleep disturbances, shorter sleep duration, longer sleep onset latency, and daytime dysfunction.</li> </ul>
Jung G & Oh J 2020 [69]	South Korea	279 adults (23–60 years of age)	Self-report (CTQ)	Self-report (PSQI)	<ul style="list-style-type: none"> <li>Childhood emotional abuse was associated with poor sleep quality.</li> </ul>
Kaubry M et al. 2021 [64]	United States of America	181 young adults (mean 21 years of age)	Self-report (CTQ)	Self-report (PSQI, CBT-I)	<ul style="list-style-type: none"> <li>Childhood maltreatment was associated with poor sleep quality and feeling less rested upon awakening.</li> <li>Childhood maltreatment was not associated with sleep duration, efficiency, or disturbances.</li> </ul>
Koskenvuo K et al. 2010 [63]	Finland	26605 adults (20–54 years of age)	Self-report (study derived questions) <sup>a</sup>	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood adversity was associated with poor sleep quality.</li> </ul>
Lind MJ et al. 2016 [9]	United States of America	8184 adults (mean 36.5 years of age)	Self-report (CSA)	Self-report (SCL-90)	<ul style="list-style-type: none"> <li>Childhood sexual abuse was associated with insomnia symptoms among women.</li> <li>Characteristics of childhood sexual abuse (e.g., number of perpetrators) were associated with insomnia symptoms.</li> </ul>
McNally RJ & Clancy SA 2005 [77]	United States of America	84 adults (mean 42.5 years of age)	Self-report (memory interview)	Self-report (SEQ)	<ul style="list-style-type: none"> <li>Childhood sexual abuse was associated with sleep paralysis, and differences were found among adults with repressed, recovered, or continuous memories of sexual abuse.</li> </ul>
McWhorter KL et al. 2019 [68]	United States of America	40082 adults (35–74 years of age)	Self-report (study derived questions) <sup>a</sup>	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood trauma was associated with shorter sleep duration, longer sleep onset latency, and frequent night awakenings among women.</li> </ul>
Nielsen T et al. 2019 [62]	Canada	140 adults (18–50 years of age)	Self-report (TAQ) <sup>a</sup>	Self-report (SDQ-A), Polysomnography	<ul style="list-style-type: none"> <li>Childhood adversity was associated with more nightmares.</li> </ul>
Peles E et al. 2017 [70]	Israel	54 adults (mean 41 years of age)	Self-report (CTQ)	Self-report (PSQI, ESS)	<ul style="list-style-type: none"> <li>Childhood sexual abuse was associated with poor sleep quality.</li> <li>Childhood sexual abuse was not associated with daytime sleepiness.</li> </ul>
Petrov ME et al. 2016 [86]	United States of America	589 adults (40–65 years of age)	Self-report (CTQ)	Self-report (PSQI, ISI)	<ul style="list-style-type: none"> <li>Childhood abuse was associated with more sleep disturbances.</li> <li>Sleep disturbances were associated with inflammation and hypertension.</li> </ul>
Pfaff A & Schlarb AA 2021 [59]	Germany	62 adults (mean 34 years of age)	Self-report (CTQ)	Self-report (PSQI), Sleep diary, Actigraphy	<ul style="list-style-type: none"> <li>Childhood maltreatment was associated with poor subjective sleep quality.</li> <li>Childhood maltreatment was not associated with sleep efficiency or sleep duration.</li> </ul>
Poon YM & Knight BG 2011 [81]	United States of America	877 older adults (60 years of age and older)	Self-report (study derived questions)	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood emotional abuse was associated with more sleep problems.</li> </ul>
Sullivan K et al. 2019 [61]	United States of America	22,403 adults (18–79 years of age)	Self-report (ACE) <sup>a</sup>	Self-report (study derived questions)	<ul style="list-style-type: none"> <li>Childhood adversity was associated with shorter sleep duration.</li> </ul>
Swanson LM et al. 2014 [74]			Self-report (CTQ)	Self-report (PDSS)	

	United States of America	173 adults (mean 28.26 years of age)				<ul style="list-style-type: none"> <li>• Childhood neglect, physical abuse, and sexual abuse were associated with trouble falling and staying asleep among women.</li> </ul>
Teicher MH et al. 2017 [57]	United States of America	37 young adults (18–19 years of age)	Self-report (MACE) <sup>a</sup>	Actigraphy		<ul style="list-style-type: none"> <li>• Childhood maltreatment was associated with reduced sleep efficiency, increased wake after sleep onset, and number and duration of night awakenings.</li> <li>• Childhood maltreatment was not associated with total sleep time.</li> </ul>
Tinajero R et al. 2020 [85]	United States of America	79 adults (20–45 years of age)	Self-report (CTQ)	Self-report (PSQI, PSAS), Sleep diary		<ul style="list-style-type: none"> <li>• Childhood abuse was associated with greater pre-sleep arousal and poor sleep quality.</li> <li>• Childhood neglect was associated with greater pre-sleep arousal.</li> </ul>
<b>Longitudinal studies</b>						
Abajobir AA et al. 2017 [89]	Australia	3778 young adults (19–22 years of age)	Records from Child Protective Services	Self-report (PSQI)		<ul style="list-style-type: none"> <li>• Childhood physical abuse was associated with poor sleep quality among men.</li> <li>• Number of maltreatment types were not related to poor sleep quality.</li> </ul>
Gregory AM et al. 2006 [88]	New Zealand	993 young adults (18 years of age)	Parent-report (MFES)	Self-report (Diagnostic Interview Schedule)		<ul style="list-style-type: none"> <li>• Family conflict in childhood was associated with insomnia at age 18 years.</li> </ul>
John-Henderson NA et al. 2018 [87]	United States of America	185 young adults (17–19 years of age)	Self-report (CTQ)	Self-report (PSQI)		<ul style="list-style-type: none"> <li>• Childhood emotional neglect and abuse were associated with poor sleep quality.</li> <li>• Psychological distress mediated the relationship between emotional neglect and sleep quality.</li> </ul>
Mishra AA et al. 2020 [90]	United States of America	1251 adults (mean 52.7 years of age)	Self-report (CTQ)	Self-report (PSQI)		<ul style="list-style-type: none"> <li>• Childhood physical, emotional, and sexual maltreatment were associated with poor sleep quality.</li> </ul>
Oshri A et al. 2017 [8]	United States of America	505 young adults (19–22 years of age)	Self-report (ACE) <sup>a</sup>	Self-report (MOS)		<ul style="list-style-type: none"> <li>• Childhood adversity was associated with poor sleep quality, difficulty falling asleep, and sleep inadequacy among men.</li> </ul>
Steine IM et al. 2019 [91]	Norway	533 adults (mean 39.2 years of age)	Self-report (study derived questions)	Self-report (BIS, NDQ)		<ul style="list-style-type: none"> <li>• Childhood sexual abuse was associated with differing trajectories of insomnia symptoms.</li> <li>• Characteristics of sexual abuse (e.g., age of abuse, type of abuse) were associated with more severe insomnia trajectories.</li> </ul>
Talvitie E et al. 2019 [92]	Finland	1038 adults (30–45 years of age)	Self-report (study derived questions) <sup>a</sup>	Self-report (study derived questions)		<ul style="list-style-type: none"> <li>• Childhood adversity was associated with shorter sleep duration.</li> <li>• Childhood adversity was not associated with sleep deficiency or sleep problems.</li> </ul>
Tracy EL et al. 2020 [10]	United States of America	281 adults (35–84 years of age)	Self-report (CTQ)	Sleep diary		<ul style="list-style-type: none"> <li>• Childhood abuse was associated with poor sleep quality via a higher level of trait anxiety.</li> </ul>

**Abbreviations.** ACE = Adverse Childhood Experiences Questionnaire, BaSIQs = Basic Scale on Insomnia and Quality of Sleep, BIS = Bergen Insomnia Scale, BSIQ = Brock Sleep Insomnia Questionnaire, CAPS = Clinician-Administered Post Traumatic Stress Disorder Scale, CBT-I = Cognitive Behavioral Insomnia Therapy Sleep Log, CEQ = Childhood Experiences Questionnaire, CM = Child maltreatment, CPSAQ = Child Physical and Sexual Abuse Questionnaire, CSA = Childhood Sexual Abuse Assessment, CTES = Childhood Traumatic Events Scale, CTQ = Childhood Trauma Questionnaire, ESS = Epworth Sleepiness Scale, FIRST = Ford Insomnia Response to Stress Test, ICSD = International Classification of Sleep Disorders interview, ISI = Insomnia Severity Index, LEQ = Life Experiences Questionnaire, MACE = Maltreatment and Abuse Chronology of Exposure Scale, MFES = Moos Family Environment Scale, MOS = Medical Outcomes Study Sleep Scale, MSQ = McLean Sleep Questionnaire, NDQ = Nightmare Distress Questionnaire, PDSS = Postpartum Depression Screening Scale, PSAS = Pre-Sleep Arousal Scale, PSQI = Pittsburgh Sleep Quality Index, RTES = Recent Traumatic Events Scale, SCL-90 = Symptom Checklist-90, SDQ = Sleep Disorders Questionnaire, SDQ-A = Sleep Disorders Questionnaire Abbreviated Version, SEQ = Sleep Experiences Questionnaire, TAQ = Traumatic Antecedents Questionnaire, THQ = Trauma History Questionnaire, WUSEQ = Waterloo Unusual Sleep Experiences Questionnaire.

**Note.** <sup>a</sup>Assessment is an index that includes childhood maltreatment as well as other adverse childhood experiences or traumatic events.

**Table 4**  
Child maltreatment and behavioral sleep disturbance associations in adulthood (n = 43).

Authors/Year	Associations by sleep outcome						
	Broadly defined/reported sleep problem	Shorter duration	Delayed/variable timing	Poor quality	Poor efficiency	Daytime sleepiness	Other outcome
<b>Cross-sectional studies</b>							
Abrams MP et al. 2008 [76]							↑
Agargun MY et al. 2002 [80]							↑
Bader K et al. 2007a [54]					↔		↔
Bader K et al. 2007b [55]				∅	↔		↑
Baiden P et al. 2015 [6]	↑						
Belleville G et al. 2019 [78]				↔			↔
Brindle RC et al. 2018 [58] <sup>a</sup>	↑						
Cardoso J et al. 2018 [82]	↔						
Chambers E & Belicki K 1998 [84]	∅						↑
Chapman DP et al. 2011 [65]					↑	↑	
Chapman DP et al. 2013 [60]		↑					
Chu JA et al. 2000 [67]					∅		↑
Currie CL et al. 2021 [72]				↑			
Duval M et al. 2013 [75]							↑
Fusco RA 2020 [56]		↑		↑	↑		
Gelaye B 2015 [73]	↑			↑			
Greenfield EA 2011 [66]	↑	↔		↑	↑		
Hamilton JL et al. 2018 [83]		∅					↔
Higgs E et al. 2020 [79]	↑	↑		↑	↔	↑	↑
Hoag JR et al. 2015 [71]	↔	↔		↑	↔	↔	
Jung G & Oh J 2020 [69]				↔			
Kaubrys M et al. 2021 [64]	∅	∅		↑	∅	↑	
Koskenvuo K et al. 2010 [63]				↑			
Lind M] et al. 2016 [9]							↑
McNally RJ & Clancy SA 2005 [77]							↑
McWhorter KL et al. 2019 [68]		↑			↑		
Nielsen T et al. 2019 [62]							↔
Peles E et al. 2017 [70]				↑		∅	
Petrov ME et al. 2016 [86]	↑						
Pfaff A & Schlarb AA 2021 [59]		∅		↔	∅		
Poon YM & Knight BG 2011 [81]	↔						
Sullivan K et al. 2019 [61]		↑					
Swanson LM et al. 2014 [74]					↑		
Teicher MH et al. 2017 [57]		∅			↑		
Tinajero R et al. 2020 [85]				↔			↑
<b>Longitudinal studies</b>							
Abajobir AA et al. 2017 [89]				↔			
Gregory AM et al. 2006 [88]							↑
John-Henderson NA et al. 2018 [87]				↔			
Mishra AA et al. 2020 [90]				↑			
Oshri A et al. 2017 [8]		↑		↑	↑		
Steine IM et al. 2019 [91]							↑
Talvitie E et al. 2019 [92]	∅	↑					
Tracy EL et al. 2020 [10]				↑			

Note. Sleep health outcomes defined according to Buysse [12] and Meltzer et al. [13]. Shorter sleep duration = total sleep minutes from sleep onset to offset or sufficient versus insufficient sleep duration; delayed/variable sleep timing = later bedtime or waketime, or variable sleep timing; poor sleep quality = subjective assessment of poor sleep; poor sleep efficiency = prolonged sleep onset latency, increased wake after sleep onset, and increased frequency/duration of night awakenings; Daytime sleepiness = poor alertness, feeling tired or sleepy; Other sleep outcome = the presence of a sleep disorder (e.g., insomnia, parasomnias), nightmares, sleep paralysis, and other sleep-related symptoms.

↑ indicates a positive association, with maltreatment exposure linked to worse sleep outcomes.

↓ indicates a negative association, with maltreatment exposure linked to better sleep outcomes.

∅ indicates no association between child maltreatment and sleep outcomes.

+ indicates study limited to sleep outcome prevalence in maltreatment-exposed samples.

↔ indicates mixed findings on the basis of assessment type, age range, and/or comparisons within maltreated samples (e.g., sleep outcomes among individuals with a sexual or physical abuse history).

<sup>a</sup> Broadly defined sleep problem included a sleep health index of actigraphy-based parameters derived from dichotomized measures of sleep duration, regularity, timing, and efficiency as well as self-reported sleep quality and daytime sleepiness.

maltreatment and increased behavioral sleep disturbances. The studies in this review span decades of research and are from multiple geographic areas, highlighting the global scale of maltreatment and its deleterious effects on sleep across the lifespan. Overall, this body of literature primarily comprises adult studies examining retrospective reports of maltreatment in childhood in relation to adult sleep disturbances. However, studies of child samples were generally consistent in identifying a link between

maltreatment and poor sleep outcomes emerging in childhood. Although fewer studies examined sleep as a mediator of associations between maltreatment and health outcomes, this review underscores the potential for sleep health promotion and the early treatment of sleep problems to mitigate the long-term adverse impacts of childhood maltreatment.

Studies in this review varied considerably with respect to methodology and design. For example, behavioral sleep

disturbances were heterogeneously measured, with studies often using several different indices to reflect sleep outcomes. Many studies examined broad reports of overall “sleep problems” or “sleep disturbances,” whereas other studies focused on specific diagnoses (e.g., insomnia) and/or constructs, including difficulty falling asleep, increased nighttime awakenings, and nightmares. Included studies also examined one or more aspects of sleep health, such as duration, timing, efficiency, and daytime sleepiness. The most common sleep disturbance emerging in childhood was broadly defined sleep problems, and the most common sleep disturbance emerging in adulthood was poor sleep quality. Although many studies measured indices of sleep health, including duration and efficiency, some studies showed mixed or null findings in relation to maltreatment exposures. Furthermore, no adult studies measured sleep timing. The heterogeneity of the measurement approaches in these studies may be partly due to the broad definition of sleep disturbances that we applied. At the same time, our broad definition ensured that a range of behavioral sleep problems was examined in this review.

Although the presence of subjective and/or parent-reported sleep problems are crucial for diagnosing behavioral sleep disturbances like insomnia disorder [93], few studies in this review used objective measures like actigraphy or polysomnography to index sleep. One study [55] used both actigraphy and polysomnography and found that adults who experienced more childhood adversities, including maltreatment, had more night awakenings and movement-related arousals compared to those with less or no adversity experiences. However, this study, like most of those reviewed in adulthood, was cross-sectional, limiting any causal inferences about long-term impacts. In addition, most studies examined retrospective self-reported childhood maltreatment or adversity, which may limit reliability and validity of findings, and used many different methods to measure childhood maltreatment and/or define maltreatment-exposed populations. For instance, studies diverged with respect to how CPS or medical record data were used, as some studies relied on substantiated cases of maltreatment while others relied on allegations or reports. This heterogeneity and limited information across studies about the extent and nature of maltreatment could have impacted the magnitude of associations between maltreatment experiences and behavioral sleep outcomes.

Compared to research on adults, studies of children were more likely to be longitudinal. In these longitudinal studies, experiencing childhood adversities, including maltreatment, predicted increased child sleep problems, with both stability across development and specific age-related differences. Indeed, despite the developmental timing of maltreatment (e.g., infancy through adolescence), poor sleep outcomes were generally found at follow-up, though outcomes varied with respect to specific indices of sleep disturbance. It is important to note that most of these longitudinal studies did not include contextual factors that could impact both maltreatment and sleep disturbances, such as characteristics of the home environment, presence of social support, or barriers to accessing behavioral health services. Although more longitudinal research using multiple assessment methods is needed to adequately assess causal associations between maltreatment and sleep outcomes and the sequence by which sleep outcomes emerge, findings do suggest that behavioral sleep disturbances warrant early intervention in children experiencing maltreatment.

Estimates of broad sleep disturbances in children who experienced maltreatment varied by the study population, maltreatment types, and sleep outcomes (e.g., sleep quality, difficulty falling asleep, disrupted sleep, or nightmares). Several studies also showed that sleep problems are linked to myriad health outcomes in maltreated samples, including trauma-related psychopathology [43],

psychological distress [51], cognitive functioning [31], and externalizing and internalizing behaviors [7,30,32,33,37,39,47]. Subjectively reported sleep disturbances such as nightmares, difficulty falling or staying asleep, and daytime sleepiness are often included in the diagnostic criteria for behavioral health conditions, including posttraumatic stress disorder, anxiety, and mood concerns. Thus, targeting sleep problems early in life and in the context of treatment for co-occurring behavioral health conditions among children who have experienced maltreatment may help to improve treatment outcomes and sustain lifelong benefits.

Results linking childhood maltreatment and sleep disturbances to poor health outcomes align with Fuligni and colleagues' model [21], suggesting that early adversity and sleep disturbances share similar neurobiological mechanisms associated with long-term physical and behavioral health outcomes. Indeed, fundamental regulatory processes such as the HPA axis and immune systems are central to adaptation to environmental stressors and are also linked to circadian rhythm and sleep health [94]. Consequently, early maltreatment experiences may become “biologically embedded” to impair brain development and compromise these regulatory processes [95]. Therefore, alterations in the HPA axis and immune systems due to maltreatment exposure may negatively affect circadian modulation during sleep and, in turn, affect later health and development. In a recent systematic review, aspects of sleep health, including sleep duration and efficiency, were associated with stress biomarkers, with the strongest evidence for neuroendocrine markers [96]. Brown and colleagues [97] also found that increased sleep variability is associated with physiological dysregulation among infants exposed to psychosocial risk. In addition, longitudinal research supports a developmental cascade model in which reciprocal relations exist between behavioral sleep problems and poor emotional and behavioral regulation [98]. Childhood problems with sleep and self-regulation, in turn, pose risks for later maladjustment [99–101]. Therefore, intervening early to prevent the consequences of maltreatment and promote early childhood sleep health could enhance child regulatory functioning, including physiological, emotional, and behavioral self-regulation, thereby mitigating the long-term health costs of childhood maltreatment.

Overall, this review indicates a consistent pattern across the lifespan in which childhood maltreatment is associated with poor sleep outcomes. The reviewed research suggests that these associations might vary by sociodemographic characteristics such as race, ethnicity, and age. Although most studies did not assess whether linkages between maltreatment and sleep varied according to racial and ethnic background, some studies demonstrate a high prevalence of sleep problems among racially and ethnically minoritized populations in both childhood and adulthood [8,35,102,103]. Indeed, in the United States, it is well-established that racially and ethnically minoritized populations are over-represented in child welfare systems, largely due to racism and/or other forms of oppression at multiple levels (e.g., systemic, institutionalized, personally-mediated) [104–106], which may in turn disparately affect sleep outcomes. More research that systematically evaluates these associations and the magnitude of effects by sociodemographic factors is needed.

With respect to age-related findings, in school-age children, adolescents, and adults, dose–response relationships were observed, in which more severe, more frequent, and more prolonged maltreatment and other adverse childhood experiences were associated with increased sleep disturbances. However, these relationships are poorly understood in infants and toddlers, as only four studies [7,45–47] examined maltreatment and sleep disturbances in very young children. Parental reports indicated that infants and toddlers who experienced abuse and/or neglect had more nighttime awakenings, difficulty falling asleep independently,

longer nightly sleep duration, and shorter daily nap duration [46]. Given that infants in their first year of life undergo rapid physical and mental growth and have the highest rate of maltreatment victimization in the United States [107], early maltreatment may have especially deleterious consequences on sleep and related developmental trajectories. There are also important shifts in sleep among typically developing young children (0–5 y), such as sleep consolidation (more sleep during the night than during the day) at about six months of age [108] and declines in napping between ages 2 and 5 y [109]. Parent-reported child sleep problems are also elevated in young children relative to other periods of development [110]. Given the rapid development and skill acquisition that occurs throughout early childhood, this may be an especially sensitive period in which the impact of maltreatment could have significant consequences for sleep and later health and development.

Most studies included samples that experienced multiple forms of maltreatment rather than a single maltreatment type. Several studies examined the cumulative impact of maltreatment and other early adversities, which were primarily measured through self-report questionnaires. This approach is in line with extensive literature documenting that forms of early adversity and traumatic experiences often co-occur [111], with some research showing dose–response impacts on outcomes [112]. However, a subset of studies reviewed exclusively examined sexual abuse [9,22,39,48,70,76–79,91], and all but one [39] found a significant association between sexual abuse experiences and greater sleep disturbances. Across these studies, women generally exhibited more problematic sleep patterns than men. While the childhood literature tends to include all children regardless of sex or gender, the adult literature had more studies specifically examining these effects in women. These findings likely reflect that women are more likely to be victims of sexual abuse. Still, it is challenging to disentangle any sex- or gender/gender identity-specific differences in the long-term effects of maltreatment on sleep. Sexual abuse may be particularly detrimental to sleep due in part to impairments in an individual's sense of safety and exacerbated feelings of threat, which may, in turn, inhibit sleep and contribute to a stressful sleep environment [113]. This is in line with Noll and colleagues' [22] work suggesting that sexual abuse that occurs in a place that is similar to an individual's sleep space may increase sleep-related hyperarousal and, as a result, cause behavioral sleep disturbances. Future research is needed to examine whether these individual factors, in addition to other moderators like age at onset, race, ethnicity, sex or gender/gender identity, and/or sexual minority status, or characteristics of perpetrators of abuse, moderate or mediate the relationship between maltreatment and sleep. This research can inform sleep interventions that promote safety or self-soothing during bedtime routines and at bedtime and cognitive-behavioral approaches to ameliorate the potential evening hyperarousal and negative sleep-related cognitions that could occur in the context of childhood sexual abuse.

#### *Limitations and future directions*

This systematic review highlights several limitations in research on childhood maltreatment and behavioral sleep disturbances in both child and adult samples. Most of the child and adult literature reviewed assessed sleep disturbances subjectively, through parent- and self-report, respectively, which could increase bias in over- or underreporting of sleep problems. Most adult studies also relied on self-report to assess maltreatment, although studies in childhood used both subjective measures and administrative records. Moreover, sleep and maltreatment measures varied considerably across studies. Beyond the use of the CBCL (childhood) and PSQI (adulthood) to measure sleep and the CTQ (adulthood) to measure

maltreatment, many studies used study-derived or unstandardized questionnaires to measure broad categories of sleep disturbances and cumulative maltreatment experiences. Few studies examined other important aspects of maltreatment, such as frequency and chronicity. Given that our search did not explicitly include terms such as “child protective services,” “child welfare,” or “foster care,” it is possible that additional articles with more nuanced maltreatment characteristics could have emerged, and future systematic searches would benefit from the inclusion of such terms. Sleep assessments were also limited to either broadly defined sleep disturbances or symptoms of sleep disorders, such as insomnia. Few studies examined aspects of sleep health beyond sleep duration and quality, such as variability and timing. Including indicators of both sleep disorders and clearly defined aspects of sleep health in future work will help elucidate the extent and nature of the association between childhood maltreatment and specific sleep outcomes across the lifespan [12,13]. Research is needed that employs objective sleep measurement, including actigraphy or polysomnography, as well as standardized questionnaires to increase validity and comparability of findings across studies and inform targets of intervention.

Studies were also limited with respect to methodology and design. Although longitudinal studies showed greater sleep disturbances in samples exposed to childhood maltreatment, much of the extant knowledge relies on retrospective and cross-sectional designs that limit causal inferences and cannot elucidate the onset and progression of sleep disturbances following maltreatment exposure. As such, more rigorous methods that include the measurement of neurobiological factors are needed to identify mechanisms linking maltreatment and subsequent sleep disturbances. This research can also help to reduce the risk of biased findings. Moreover, as noted above, only four studies have been conducted on sleep disturbance in infants or toddlers exposed to maltreatment, exposing a significant gap in the maltreatment-sleep literature at an important developmental period when early adversity may lead to serious and long-term health consequences. Other notable gaps in research include a limited focus on socio-demographic factors, with studies typically controlling for factors like race and ethnicity. Racially and ethnically minoritized individuals, as well as those marginalized due to socioeconomic disadvantage, may differentially experience adversity and sleep disturbances as a result of larger systemic inequities. As such, future research in this area should employ longitudinal designs and examine both socio-demographic characteristics and potential buffering factors, such as social supports and service availability, which would allow for testing of causal pathways among diverse populations and potential targets of preventive interventions.

#### **Conclusion**

The findings of this review suggest that exposure to childhood maltreatment, among other adversities, may impair sleep in childhood and adulthood. Although multiple studies found that sleep disturbances were associated with negative cognitive, health, and behavioral outcomes across the lifespan, children and adults who experienced maltreatment but experienced less sleep disruption demonstrated more adaptive outcomes. These findings highlight the importance of considering sleep as a modifiable factor, as growing evidence suggests that high quality and consistent sleep may be protective against the negative effects of childhood maltreatment on later health and development. Importantly, prevention and intervention programming that targets early maltreatment risk and promotes healthy sleep may be the most effective at ameliorating the adverse consequences of childhood maltreatment across the lifespan.

### Practice points

Sleep health promotion and early treatment of sleep problems may help to:

- 1) Mitigate the adverse health and developmental impacts of childhood maltreatment.
- 2) Support maltreated children's capacity to self-regulate and self-soothe.
- 3) Create avenues to address contextual factors that may be implicated in adverse home environments.

### Research agenda

Future research should focus on:

- 1) Understanding the onset of maltreatment and the course of sleep disturbance during sensitive periods of development.
- 2) Employing objective sleep measurement and standardized questionnaires.
- 3) Implementing longitudinal designs that allow for testing of causal pathways among diverse populations.

### Conflicts of interest

The authors declare no conflicts of interest.

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