Sexual abuse and sleep in children and adolescents: a systematic review

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Title: Sexual abuse and sleep in children and adolescents: a systematic review

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Summary

Childhood sexual abuse has pervasive effects on well-being and psychosocial functioning in children and adolescents, including negative impacts on sleep. This study aimed to systematically review and assess the literature documenting associations between childhood sexual abuse and sleep in minors (0-18 years old) and provide recommendations for future studies and clinical practice. A systematic search was conducted independently by two researchers in six databases. Inclusion criteria included English or French published articles and dissertations/theses/abstracts reporting original quantitative data examining at least a bivariate association between childhood sexual abuse and sleep. A total of 5031 titles and abstracts and 70 full articles were screened. The final sample included 26 studies. Most studies (88%) reported a significant association between childhood sexual abuse and several sleep dimensions (such as difficulty falling asleep, complaints of poor sleep, nightmares). Studies' quality, as rated using the National heart, lung, and blood institute's quality assessment tool, varied greatly: 23% were rated as good, 38.5% as fair, and 38.5% as poor. Childhood sexual abuse negatively impacts sleep in childhood and adolescence. These results inform future research, ideally with strong prospective/longitudinal designs and using more specific sleep measures, aiming to promote optimal sleep in sexually abused minors.

Keywords: Child sexual abuse (CSA); trauma; sleep; sleep disturbance; children; adolescents

Glossary of terms

CBCL: Child behavior checklist

CPS: Child protective services

CSA: Childhood sexual abuse

PSQI: Pittsburgh sleep quality index

PTSD: Post-traumatic stress disorder

Childhood sexual abuse (CSA) is a widespread problem with global prevalence rates of 20% for girls and 8% for boys [1]. CSA can be defined as an act that is both abusive and sexual in nature, to which a child under 18 years of age cannot consent [2]. CSA is associated with a myriad of deleterious outcomes, including mental, behavioural, and physical health problems, as well as psychosocial difficulties [3-9]. Compared to victims of other maltreatment types (e.g., physical abuse, neglect), sexually abused children seem to be more vulnerable to these negative outcomes [5]. Indeed, the unique nature of CSA often includes a combination of traumatic sexualization, coercion into keeping the abuse a secret, stigmatization, betrayal, powerlessness, as well as self-attributions of responsibility, guilt, and shame [10]. Individually, most of these dynamics are not specific to CSA. However, the conjunction of all these factors can have profound and unique negative effects on psychosocial development, which may differ from other types of abuse [5].

Among the numerous domains affected by changes in one's environment, sleep is particularly sensitive [11-13]. Thus, following a traumatic event, sleep is often disrupted [14-17]. Rumination, worry, and stress related to potential threats in the sleep environment can lead to a heightened state of arousal, and consequently, may negatively interfere with sleep [16,18]. As such, CSA has been shown to negatively influence sleep patterns and quality [19-21].

The first decade of a child's life is spent more asleep than awake [22] and sleep plays a critical role in several important areas of development including brain maturation [23], learning and memory [24], physical health [25,26], mental health [27], and academic functioning [28,29]. Furthermore, sleep-deprived children and adolescents have greater difficulty with emotion regulation, and consequently display more anger, irritability, and impatience [30]. In turn, these characteristics can negatively impact psychosocial interactions [8,30].

A previous review (published in 2012; *N*=32 studies) described sleep disturbances in adult and child victims of CSA (6-32 years old) [31]. Findings revealed that CSA was associated with increased sleep disturbances including greater nocturnal awakenings, nightmare-related distress, and restless sleep [31]. Only one study included in this review used an objective measure to describe sleep patterns (actigraphy), and showed longer sleep onset latency and reduced sleep efficiency (time asleep/time in bed) in child and adolescent victims of CSA, compared to a non-abused group [32]. Although half of the studies included in this review focused on child and youth, the documentation of this relationship has vastly expanded over the past decade, with at least 15 new studies published. In addition, a recent scoping review of 9 studies published in 2021 examined the role of childhood maltreatment on sleep ecology and sleep characteristics in children aged one to five [33]. Authors described two studies examining CSA and found that it was associated with general sleep problems as well as dyssomnias and parasomnias [33]. Nevertheless, examining sleep in both children and youth specifically is essential given the major changes that occur in sleep patterns throughout development [23]. Childhood is a highly vulnerable developmental period when sleep disturbances could interfere with a healthy developmental trajectory.

In 2014, Buysse published a novel definition of sleep health, emphasizing that sleep health is not simply the absence of sleep disorders; five dimensions were identified with the acronym SATED: Satisfaction, Alertness, Timing, Efficiency, and Duration [34]. Recently, Meltzer et al. adapted this model to pediatric populations and added a sixth dimension - Behaviors (sleep-related behaviors that can influence pediatric sleep) [35]. Therefore, the B-SATED model will be used as a framework in the present review, except for studies documenting associations between CSA and sleep disorders or characteristics that were not

clearly delineated in the B-SATED model (e.g. nocturnal enuresis, parasomnia, nocturnal activity).

This systematic review focuses on the associations between CSA and sleep in children and adolescents. Specifically, the aims are to: a) synthesize the available research on CSA and sleep in children and adolescents; b) assess and critique the quality of the current knowledge; and c) provide recommendations to orient future studies and clinical practice. A current review will provide a necessary overview of the up-to-date knowledge. Considering the major age-related changes in sleep, cognitive, physical, and social maturity, and in the reliance on caregivers [36], findings are organized by age group.

Methods

This systematic review was registered with the International Prospective Register of Systematic Reviews (CRD42020157684).

Article Search and Selection

The search strategy was developed by research librarian Emily Kingsland in collaboration with the research team, and was peer-reviewed by Dr. Monica Ordway, Associate Professor at Yale School of Nursing. Databases including PsycINFO (1806 to Present) and Medline (1946 to Present) on the Ovid platform, Social Work Abstracts, Scopus, ProQuest Dissertations and Theses Global, and Web of Science Core Collection were searched on February 14, 2020. The search strategy (see supplementary material) was initially developed for PsycINFO and adapted to the remaining databases. Results from all databases were imported into EndNote and duplicate records were removed using the method developed by Bramer and colleagues [37]. Updated searches were done on March 24, 2021 and October 26, 2021 and yielded no additional studies fitting our inclusion criteria.

Inclusion and Exclusion Criteria

PsycINFO, Medline, Social Work Abstracts, and Scopus were searched from their inception to the date of the search (February 14, 2020). The search in ProQuest Dissertations and Theses Global was limited to articles published in the last five years. Web of Science Core Collection was limited to conference proceedings, and also limited to the last five years. Articles published in English and French were reviewed. Published studies, dissertations and theses, and conference proceedings (published abstracts) were included.

The initial search yielded 6,544 results, with an additional one record identified through other sources. After deduplication, 5,031 results remained. Four raters screened each abstract until inter-rater reliability reached 100%. Then, two raters screened each abstract independently. Discrepancies were discussed and resolved. Abstracts were included for full-text screening if they were of quantitative design and seemed to report a relationship between CSA and sleep. An initial screening of records using Rayyan excluded 4,983 records. Following a full-text assessment of the remaining 71 articles, an additional 45 were removed. Studies were excluded if 1) the sample age was greater than 18 years old or 2) it did not examine statistically the association between CSA and sleep. Studies were screened in duplicate, and discrepancies were discussed and resolved. The final sample included 26 articles. See Figure 1 for the PRISMA flow diagram.

Data Extraction and Analysis

Data were recorded independently on a researcher-constructed data extraction sheet and verified by a second researcher. Extracted data included study aims, the sample and setting (included sampling procedure, sample size, participant characteristics including age, sex/gender,

ethnicity, socioeconomic status), country where the study was conducted, measures and variables, main results relevant to review objectives, confounding variables, and limitations.

Risk of bias was assessed using the National Heart, Lung, and Blood Institute's quality assessment tool for observational cohort and cross-sectional studies (https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools). This flexible assessment tool for quantitative designs contains 14 items (Yes, No, and Not Applicable options) that examine sampling procedure, study design, psychometric properties, and the measurement of presence of covariates used in the analysis. The responses informed the overall quality rating given to the article (label of good, fair, or poor). Two researchers conducted the quality assessment for each article independently, discussed their discrepancies, and then combined their ratings.

Results

Table 1 provides the extracted data from all included studies (N = 26). Five studies (19%) examined the association between CSA and sleep in childhood (0-12 years old); 13 studies (50%) included adolescent samples (12-18 years old); eight studies (31%) recruited samples of children and adolescents without examining them separately. While only three (11%) adopted a longitudinal design, most of them, twenty-three (88%), had a cross-sectional design. Most studies were conducted in North America: seven (27%) in Canada and 11 (42%) in the United States. Studies had a wide range of sample sizes, eight of them (31%) had small samples of less than 100 participants, seven (27%) had medium samples of 100 to 500 participants, and 11 (42%) had samples of more than 500 participants. While most studies examined the association between CSA and sleep difficulties, a few of them described sleep patterns (using subjective reports or actigraphy). However, studies examined a variety of B-SATED sleep health

dimensions and sleep variables, often with composite scores, that were not directly comparable with one another.

Studies with Child Samples (*n* = 5)

Five studies investigated sleep in sexually abused children aged 0-12 years old. Dubois-Comtois et al. documented the association between CSA and sleep in foster children; maltreatment history was retrieved from Child Protective Services (CPS) records [38]. Controlling for age, CSA was associated with poorer sleep (reported by foster mothers with a composite score derived from a non-validated questionnaire), but not with sleep duration [38]. Wells et al. computed bivariate associations between CSA and caregivers' sleep reports in sexually abused females from CPS [39]. While sexually abused females had more difficulty falling asleep than non-abused females, there were no significant differences for bedwetting, nightmares, or sleeping more than usual. Hébert et al. found no correlation between the duration of the CSA and sleep problems (composite score including multiple sleep health dimensions (e.g., alertness, duration, efficiency) as well as nightmares and parasomnia) in preschool-aged children, using the Child behavior checklist (CBCL) [40]. However, in a follow-up study using a larger overlapping sample of preschoolers (original sample from Hébert et al. [40] plus additional participants), Langevin et al. compared the sleep problems of abused and non-abused children using a longitudinal design over a year, using the CBCL [41]. While the CSA x time interaction was not significant, abused preschoolers had higher scores of sleep problems than non-abused preschoolers at both time points, when controlling for several covariates. Finally, only one study, Glod et al. [32], documented sleep patterns in children using actigraphy in two clinical subsamples (sexually and physically abused children vs. non-abused children with depression), and a control group from the community. Their results indicated that over three

consecutive nights, CSA was objectively associated with measures of sleep efficiency (including longer sleep latency and lower sleep efficiency), and a higher percentage of nocturnal activity when several covariates were considered.

To summarize, most studies reported significant associations between CSA and caregiver-reported sleep health dimensions in children, including satisfaction (poorer sleep), efficiency (difficulties falling asleep) or composite scores including several dimensions of the B-SATED model. Furthermore, when sleep patterns were measured with actigraphy, CSA was found to be associated with measures of efficiency (longer sleep latency and decreased sleep efficiency), as well as increased nocturnal activity. However, not all studies found an association between CSA and sleep, especially when no covariates or control group were used, or in small samples. When available and for significant findings, effect sizes (correlation coefficients or η^2) showed a medium to large effect of CSA on sleep (Table 1).

Studies with Adolescents Samples (*n* = 13)

Most studies included in this review described the association between CSA and sleep in adolescent samples (12-18 years old). In two studies (published in three different papers; 42-44), sleep - measured through sleep logs - was used as a control variable in the context of salivatory cortisol protocols. In a first study, Bicanic et al., documented self-reported later wake time and shorter nocturnal sleep duration the night before the study in a clinical sample of rape survivors compared to adolescents from the community; no difference was observed between groups for bedtime and no covariates were included [42]. Keeshin and colleagues conducted a study using a similar protocol, leading to two papers [43,44]. During a three-day saliva collection protocol, participants were asked to document their sleep duration and difficulties on the nights prior to saliva collection. In their first paper, abused girls reported more sleep problems (unspecified)

during the first night of saliva collection than non-abused girls, but a similar sleep duration during the three nights [43]. In their second paper, authors presented secondary analyses using the mean of the three study nights [44]. When compared to non-abused girls, abused girls were more likely to report at least one difficulty: diminished sleep efficiency (being unable to fall asleep or waking up during the night), having nightmares, or constantly going to the bathroom.

Two studies found an association between CSA and sleep disturbances in adolescents using clinical interviews [21,45]. In a populational study of Israeli adolescents, Mansbach-Kleinfeld found that adolescents with CSA reported more difficulty falling asleep after controlling for gender, learning disability, and depression [45]. In another study with youth admitted to CPS residential facilities in Quebec (CA), Langevin et al. found that contrary to other forms of interpersonal violence and maltreatment, CSA was associated with more sleep disturbances (composite score including measures of sleep satisfaction, sleep efficiency and nightmares), above and beyond the effects of the many predictors (e.g., gender, anxiety, mood, extrafamilial/intrafamilial physical abuse) [21].

Most of the studies assessing the association between CSA and sleep problems in adolescents used questionnaires (n = 9). In a large community sample of American children, Hibbard et al. did not find an association between CSA and trouble sleeping, based on a one-item self-report [46]. However, Fontes et al. did find that in a large community sample of adolescents from Brazil, 26.4% of sexually abused adolescents reported having trouble sleeping because of worries, as opposed to only 10.9% in the non-abused group [47]. A sex difference was also observed in a large sample of adolescents, where CSA was associated with increased self-reported sleep disturbances in females, but not in males [48]. Relative to the overall sample, a higher proportion of sleeping trouble was reported in abused females (33.3%).

In a study conducted in France, Mignot et al. found that CSA was associated with several self-reported sleep health dimensions, including satisfaction (less satisfactory sleep), sleep efficiency (more difficulty falling asleep, nocturnal awakenings, awakenings too early in the morning), and nightmares [49]. Similar results were found in Turner et al. where CSA was associated with poorer self-reported sleep efficiency (increased sleep latency, more nocturnal awakenings), and decreased sleep duration on weekdays and weekends, when controlling for several covariates (e.g., age, sex, single parent status) [50]. Xiao et al. documented a positive association between CSA and sleep disturbances in a Chinese sample using the Pittsburgh sleep quality index (PSQI; measuring several sleep health dimensions such as satisfaction, efficiency, duration, and sleep disturbances) and controlling for several factors [20]. In a longitudinal Canadian study using a CPS sample, McPhie et al.found that CSA significantly predicted sleep disturbances two years later, using a self-report questionnaire adapted form the Short insomnia questionnaire documenting several sleep health dimensions (e.g. satisfaction, alertness, efficiency, nightmares, other sleep disturbances) [51]. Finally, Hébert-Ratté et al. published an abstract documenting that sexually abused adolescents reported a higher frequency of nightmares than non-victims matched for age and gender from a Quebec sample after controlling for important covariates [52].

To summarize, all but one study with adolescent samples found associations between CSA and a variety of sleep health dimensions such as efficiency (difficulty falling asleep, nocturnal awakenings), satisfaction (complaints of poor sleep), duration, and timing. Studies also found associations between CSA and nightmares or composite scores including nightmares. The only study that did not find any association was Hibbard et al. in their community sample using a single unvalidated question for both CSA and trouble sleeping [46]. Studies with adolescents

were conducted in a variety of countries (Brazil, Israel, Netherlands, Canada, France, or the United States). Effect sizes, when reported, vary greatly among studies. Correlations between CSA and sleep appear small-to-medium; odds ratios, ranging from 1.16 to 8.36, indicate trivial to large effect sizes (Table 1).

Studies with Mixed Child and Adolescent Samples (*n* = 8)

In their clinical sample of individuals aged 10-19, Harrison et al. found that CSA was associated with greater self-reports of sleeplessness in boys and girls [53]. In another clinical sample of children aged 2-13, Sadeh et al. found a higher frequency of parasomnias prior to hospital admission in children with CSA compared to children with physical abuse or no history of abuse, based on both children and parental reports [54]. However, this difference was no longer present once admitted to hospital (covariate: age). No associations were found between CSA and indicators of sleep efficiency (e.g., difficulty falling asleep, nocturnal awakenings) before or after hospital admission. Sadeh et al., using actigraphy, reported that in their clinical sample of children (7-14 years old), sexually and physically abused children spent less of their time in bed in quiet, motionless sleep than non-abused children [55]. However, CSA alone was not significantly associated with any sleep measures (covariate: age). In a clinical sample of Lebanese youths (8-17 years old), Usta & Farver found positive associations between CSA and several sleep health dimensions (e.g., satisfaction, efficiency, nightmares) before, during, and after the war [56]. They also reported more sleep disturbances in sexually abused girls compared to boys.

Wells et al. documented the associations between CSA and caregiver-reported sleep problems in boys (3-15 years old): sexually abused boys from CPS with and without perpetrator confession, and a control group [57]. Bivariate associations indicated that boys in the CSA with

perpetrator confession group, as compared to boys in the other groups, had more difficulty getting to sleep (related to efficiency), but all groups reported similar nightmare frequencies. When compared to the alleged CSA group, boys in the CSA with perpetrator confession group were more likely to experience bedwetting. No difference emerged for sleep duration (sleeping more than usual). When compared to non-abused boys, those with perpetrator confession were more likely to sleep more than usual, but equally likely to experience bedwetting.

In their longitudinal study comparing a clinical subsample of sexually abused Turkish youth (10-18 years old) to a community subsample, Demirci found that victims of CSA reported poorer sleep than non-victims as measured with the PSQI six months after the abuse [19]. Moreover, using another validated questionnaire (Insomnia severity index; ISI), they found that 41% of CSA victims with PTSD reported subthreshold insomnia, compared to 20% of victims without PTSD. No participant in the control group reached that subthreshold. Brown et al. documented an association between CSA and unspecified sleep disturbances in a clinical sample of youth aged 7-18 [58]. While the bivariate associations were significant in both age groups (7-12; 13-18), when controlling for covariates (e.g., child sex, PTSD, recruitment site), child victims of CSA, but not adolescents, had greater risks of sleep disturbances than non-abused children. The final study, with a sample of CPS-involved children and adolescents (6-18 years old), is Wamser-Nanney & Chesher [59]. In this highly traumatized sample (75.4% reporting CSA) seeking trauma-informed treatment, CSA was not associated with nightmares, sleep quality, difficulties falling asleep (efficiency), overtiredness (alertness) or sleepwalking, when controlling for covariates.

To summarize, all but one study found associations between CSA and B-SATED sleep health dimensions (satisfaction, efficiency, duration), nightmares, parasomnia, and bedwetting.

However, some nuances emerged in this section. Sadeh et al. found associations only prior to hospital admissions [54], while Brown et al. only found an association in the children subsample when controlling for important covariates [58]. Wells et al. also found subtleties related to the type of sleep dimension or disorder and the substantiated status of the CSA in their sample of boys [57]. In their highly traumatized CPS sample, Wamser-Nanney & Chesher, contrary to Langevin et al. [21], did not find a unique effect of CSA on sleep [59]. Effect sizes, available through correlations or odds ratios for only 3/8 studies, mostly indicate small effects of CSA on sleep (Table 1).

Summary of the Risk of Bias Appraisals

Six of the 26 studies (23%) included in this review were rated overall as having good methodological quality, 10 were rated as fair (38%), and 10 were rated as poor (38%). In terms of strengths, most studies had clear research questions and objectives (87%) and clearly defined study populations (73%). Further, most studies recruited their participants from the same or similar populations; with only seven studies not reaching or partly reaching this criterion. Most studies (69%) measured the exposure to CSA prior to measuring sleep problems.

Rates of participation of eligible persons was not reported by more than half of the studies, reported as reaching the 50% target or higher in 36% of the cases, and explicitly not reaching 50% for three studies. Many studies (62%) did not use validated and clearly defined measures of CSA and/or sleep. Many studies (46%) did not provide a sample size justification despite relatively small samples. Only four studies (15%) considered the level of exposure to CSA by considering factors such as the chronicity or the severity as they related to sleep. Only one study (4%) had assessors of sleep blinded to the abuse status of the participants [40].

Finally, half of included studies documented the association between CSA and sleep using bivariate analyses, therefore not accounting for potentially confounding factors such as PTSD, other forms of adversity, and age. About 19% of the studies controlled for a sufficient number of confounders, and 31% of studies only controlled for some confounding factors, generally sociodemographic factors.

Discussion

This systematic review aimed to synthesize and appraise the available research examining the association between CSA and sleep in child and adolescent samples. While most studies reviewed (88%) found significant associations between CSA and a variety of sleep health dimensions and other sleep-related variables, nuances emerged, and methodological quality varied greatly among them. Sleep was operationalized very differently in the different studies, including for instance B-SATED dimensions of satisfaction (complaints of poor sleep), efficiency (longer sleep latency), duration (decreased sleep duration), or presence of nightmares, parasomnia, or bedwetting. The inclusion of such a varied number of variables, representing distinct conceptual dimensions, makes comparisons between studies or strong conclusions about specific sleep health dimensions quite challenging.

Not only are there differences between sleep variables across studies, but often, different B-SATED dimensions and other sleep difficulties were aggregated in a composite score even in a specific study. Therefore, identifying a specific sleep variable associated with or impacted by CSA remains difficult at the moment. This diversity in sleep measure also prevented us from performing a meta-analysis or even from providing a reliable approximation of the strength of the association between CSA and sleep. Therefore, given the current state of evidence, we are unable to indicate how much or how strongly CSA impacts sleep in children and adolescents.

Nevertheless, this systematic review clearly shows an association between CSA and sleep in this population.

As sleep is a developmental process showing marked differences across development, the impact of CSA on sleep probably changes throughout development. Unfortunately, the overall small number of studies available in the current literature and the lack of longitudinal studies spanning several developmental periods does not allow any clear differential examination of the impact of CSA on sleep as a function of age. Future studies are needed to further explore this developmental perspective. However, results clearly show that the presence of CSA, no matter the age of onset, justifies a clinical investigation of sleep as all age groups appeared affected in most studies.

The conclusions of this systematic review are consistent with the notion that threats to one's safety can disturb sleep [14,16,17,60]. As sexual violence often takes place in sleeping environments, these instances can increase the child's feeling of vulnerability [16]. Fear of nighttime, of the dark, and of sleep might play an important role in sleep disturbances following the abuse [61]. Hence, several studies included described an association between CSA and difficulty falling asleep. Trauma can lead to increased vigilance and a state of hyperarousal (physiological, cognitive, and emotional) and induce short-term sleep disturbances [62] but long-term effects are also documented [63]. Further, sleep problems are often integral to mental health difficulties affecting CSA victims such as depression and PTSD [4,64-68]. Thus, CSA survivors' mental health status, especially PTSD, could partly contribute to their troubled sleep. Overall, the compounding effects of safety threats, arousal, and psychopathology, could predispose child victims of sexual abuse to sleep problems and poorer sleep health.

Regarding the second objective to appraise the quality of the current evidence and identify gaps, great variability was uncovered. Only a quarter of reviewed studies were rated as high quality, while over a third were rated as poor. The two most concerning methodological weaknesses were: 1) the use of poor-quality measures for both CSA and sleep, and 2) the lack of control for major confounders. In terms of assessment modalities for CSA, more than half of the studies used unvalidated tools, while none used the gold standard of a multi-modal strategy (e.g., self-report and official records) [69]. Regarding the sleep measures, most studies used questionnaires, many of which were not validated. Only two studies included an objective measure of sleep (actigraphy), while no study used polysomnography. As mentioned above, these diverse tools yielded a great range of sleep variables, which complicates study comparison.

Another uncovered gap is that several studies included in the present review did not describe the association between CSA and sleep as a main objective. In such cases, preliminary bivariate analyses were retrieved. Consequently, the second main methodological concern is the insufficient control for potential confounders. An illustration of the importance of including meaningful covariates is Brown et al. [58]. They found that CSA was associated with sleep in children and adolescents in bivariate analyses, but the association became non-significant in adolescents after accounting for sex, PTSD, and number of trauma types experienced. Thus, these confounding factors might be more salient in explaining the association between CSA and sleep in adolescence. To determine the unique effect of CSA on sleep, future research should consider including several covariates such as demographic (e.g., age and sex [70]) and environmental (e.g., sleep environment or electronic use [71]) factors, as well as polyvictimization [72] and familial instability [73]. Potential mechanisms through which CSA impact sleep need to be considered such as PTSD, anxiety, depression [41,63], dysregulated

stress response [74], and classical conditioning [16]. Finally, most studies used parental reports of sleep, where factors related to parental mental health or perception could influence the findings [75].

Future studies would also benefit from integrating the theoretical framework proposed by Meltzer et al. [35] and operationalizing more clearly their sleep constructs into the B-SATED sleep health domains. It is possible that some sleep health dimensions (satisfaction, duration, efficiency) are more clearly impacted by CSA, or that CSA results in the development of specific sleep disorders. Moreover, asking questions on sleep patterns without verifying their impact on alertness and daytime functioning, or documenting self-reported poor sleep without a thorough assessment of its association with clinically significant distress, greatly limits the clinical meaning of documented associations which represents another major gap in the literature. As suggested by Meltzer, measuring sleep-related behaviors that can support or undermine optimal sleep in children and adolescents would also be beneficial (e.g. schedule, routine, parent-child interactions at bedtime, usage of electronic devices) [35]. Finally, future studies should take into consideration measures of changes (e.g., sleep variables before CSA, or following a treatment).

Limitations

While the rigorous methodology of the systematic review used is a major strength, some limitations should be mentioned. A search of the unpublished literature was not conducted, which could have resulted in an overestimation of the association between CSA and sleep. Also, it is possible that some relevant studies were not identified using the search strategy or were excluded due to human mistake. Finally, the diverse sleep measures/variables precluded the research team from conducting a quantitative synthesis of the literature.

Conclusions

The current study offers many implications for future research. The surprisingly small number of studies documenting the associations between CSA and sleep as their primary objective highlights the importance of a continued exploration using strong prospective/ longitudinal designs, validated and multi-modal measurement strategies, and the recruitment of representative samples. Importantly, a better definition of sleep health dimensions and sleep disorders) would facilitate our understanding of which sleep characteristics are truly affected by CSA. Finally, although it could pose technical challenges, polysomnography would be a useful tool to measure the potentially hyperaroused state of CSA victims.

More studies are required to be able to offer precise recommendations for health practitioners. However, most studies documented a significant association between CSA and sleep difficulties in children and adolescents, highlighting the relevance of screening for sleep difficulties when assessing CSA victims. A multi-modal, multi-informant perspective is recommended when assessing both CSA and sleep in practice settings. Given the great importance of sleep quality in fostering healthy development, practitioners should offer appropriate services as needed to CSA victims, which may include a combined trauma and sleep treatment. Helping these children attain better sleep could contribute to cultivating their resilience and maximizing their chances of successfully overcoming their trauma.

Practice Points

1. Practitioners working with sexually abused children and adolescents should screen for sleep difficulties.
2. A combined trauma and sleep treatment might be appropriate for some childhood sexual abuse victims and might enhance their recovery.
3. A multi-modal, multi-informant perspective is beneficial for assessing sleep and childhood sexual abuse.

Research Agenda

In the future, more studies are required to be able to offer precise recommendations for health practitioners. In particular:
1. There is a need for studies with strong methodological designs to clearly delineate the impacts of CSA on sleep in childhood and adolescence and the mechanisms involved.
2. Clear and specific definitions of sleep health dimensions with optimal operationalization are warranted.
3. Studies should include both objective and subjective measures of sleep.
4. Multi-modal, multi-informant approaches to the measure of child sexual abuse are required.

References

1. Stoltenborgh M, Van Ijzendoorn MH, Euser EM, Bakermans-Kranenburg MJ. A global perspective on child sexual abuse: Meta-analysis of prevalence around the world. *Child Maltreatment.* 2011; 16(2):79-101. https://doi.org/10.1177/1077559511403920
2. Mathews B, & Collin-Vézina D. Child sexual abuse: Toward a conceptual model and definition. *Trauma Violence Abuse*. 2019; 20(2):131-148. https://doi.org/10.1177/1524838017738726
3. Daigneault I, Vézina-Gagnon P, Bourgeois C, Esposito T, Hébert M. Physical and mental health of children with substantiated sexual abuse: Gender comparisons from a matched-control cohort study. *Child Abuse Negl.* 2017;66:155-165. https://doi.org/10.1016/j.chiabu.2017.02.038
4. Hébert M, Amédée LM, Blais M, Gauthier-Duchesne A. Child sexual abuse among a representative sample of Quebec high school students: prevalence and association with mental health problems and health-risk behaviors. *Can J Psychiatry.* 2019;64(12):846-854. https://doi.org/10.1177/0706743719861387
5. Lewis T, McElroy E, Harlaar N, Runyan D. Does the impact of child sexual abuse differ from maltreated but non-sexually abused children? A prospective examination of the impact of child sexual abuse on internalizing and externalizing behavior problems. *Child Abuse Negl.* 2016;51:31-40. https://doi.org/10.1016/j.chiabu.2015.11.016
6. Vaillancourt-Morel MP, Bergeron S, Blais M, Hébert M. Longitudinal associations between childhood sexual abuse, silencing the self, and sexual self-efficacy in adolescents. *Arch. Sex. Behav.* 2019;48(7):2125-2135. https://doi.org/10.1007/s10508-019-01494-z

7. Charest F, Hébert M, Bernier A, Langevin R, Miljkovitch R. Behavior problems in sexually abused preschoolers over a 1-year period: The mediating role of attachment representations. *Dev. Psychopathol.* 2019;31(2):471-481. https://doi.org/10.1017/S0954579418000226
8. Langevin R, Hébert M, Cossette L. Emotion regulation as a mediator of the relation between sexual abuse and behavior problems in preschoolers. *Child Abuse Negl.* 2015;*46*:16-26. https://doi.org/10.1016/j.chiabu.2015.02.001
9. Maniglio R. Significance, nature, and direction of the association between child sexual abuse and conduct disorder: A systematic review. *Trauma Violence Abuse.* 2015;*16*(3):241-257. https://doi.org/10.1177/1524838014526068
10. Finkelhor D, Browne A. The traumatic impact of child sexual abuse: A conceptualization. *Am J Orthopsychiatry.* 1985;*55*(4):530-541.
11. Bagley EJ, Kelly RJ, Buckhalt JA, El-Sheikh M. What keeps low-SES children from sleeping well: the role of presleep worries and sleep environment. *Sleep Med.* 2015;*16*(4):496-502.
12. Williamson AA, Mindell JA, Hiscock H, Quach J. Sleep problem trajectories and cumulative socio-ecological risks: birth to school-age. *J Pediatr.* 2019; 215: 229-237.
13. El-Sheikh M, Bagley EJ, Keiley, M, Elmore-Staton L, Chen E, Buckhalt JA.Economic adversity and children's sleep problems: multiple indicators and moderation of effects. *Health Psychol*. 2013; *32*(8):849-859
14. Caldwell BA, Redeker N. Sleep and trauma: An overview. *Issues Ment. Health Nurs.* 2005;*26*(7):721-738. https://doi.org/10.1080/01612840591008294
15. Gupta MA, Sheridan AD. Fear of sleep may be a core symptom of sympathetic activation and the drive for vigilance in posttraumatic stress disorder. *J Clin. Sleep Med.* 2018;*14*(12):2093-2093. https://doi.org/10.5664/jcsm.7550
16. Noll JG, Trickett PK, Susman EJ, Putnam FW. Sleep disturbances and childhood sexual abuse. *J Pediatr Psychol.* 2006;*31*(5):469-480. https://doi.org/10.1093/jpepsy/jsj040
17. Sadeh A. Stress, trauma, and sleep in children. *Child Adolesc Psychiatr Clin.* 1996;*5*(3):685-700.
18. Lee SY, Ju YJ, Lee JE, Kim YT, Hong SC, Choi YJ, Song, MK, Kim HY. Factors associated with poor sleep quality in the Korean general population: providing information from the Korean version of the Pittsburgh Sleep Quality Index. *J Affect. Disord.* 2020;*271*:49-58. https://doi.org/10.1016/j.jad.2020.03.069
19. Demirci E. Non suicidal self-injury, emotional eating and insomnia after child sexual abuse: Are those symptoms related to emotion regulation? *J Forensic Leg. Med.* 2018;*53*:17-21. https://doi.org/10.1016/j.jflm.2017.10.012
20. *Xiao, D., Wang, T., Huang, et al. Gender differences in the associations between types of childhood maltreatment and sleep disturbance among Chinese adolescents. *J Affect Disord*, 2020;265:595-602. https://doi.org/10.1016/j.jad.2019.11.099
21. Langevin R, Hébert M, Bergeron SJ, Duchesne M, Lambert Y, Chartrand R, Frappier JY. Sleep problems and interpersonal violence in youth in care under the Quebec Child Welfare Society. *Sleep Med.* 2019;*56*:52-56. https://doi.org/10.1016/j.sleep.2018.11.003
22. Galland BC, Taylor BJ, Elder DE, Herbison P. Normal sleep patterns in infants and children: a systematic review of observational studies. *Sleep Med. Rev*. 2012;*16*(3):213-222. https://doi.org/10.1016/j.smrv.2011.06.001

23. Feinberg I, Campbell IG. Sleep EEG changes during adolescence: an index of a fundamental brain reorganization. *Brain and Cogn.* 2010;*72*(1):56-65.
24. Astill RG, Van der Heijden KB, Van IJzendoorn MH, Van Someren EJ. Sleep, cognition, and behavioral problems in school-age children: A century of research meta-analyzed. *Psychol. Bull*. 2012;*138*(6):1109. https://doi.org/10.1037/a0028204
25. Chaput JP, Gray CE, Poitras VJ, et al. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Appl Physiol Nutri Metab*. 2016;41(6):S266-S282.
26. Knutson KL. Does inadequate sleep play a role in vulnerability to obesity? *Am J Hum Biol*. 2012;*24*(3):361-371. https://doi.org/10.1002/ajhb.22219
27. Touchette É, Petit D, Tremblay RE, Montplaisir JY. Risk factors and consequences of early childhood dyssomnias: New perspectives. *Sleep Med Rev*. 2009;13(5):355-361.
28. Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bögels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Med Rev*. 2010;14(3):179-189. https://doi.org/10.1016/j.smrv.2009.10.004
29. Gruber R, Somerville G, Santisteban, JA. Using parental report to identify children at risk for poor sleep and daytime problems. *Behav Sleep Med*. 2020;18(4)460-476.
30. Baglioni C, Spiegelhalder K, Lombardo C, Riemann D. Sleep and emotions: a focus on insomnia. *Sleep Med Rev*. 2010;14(4):227-238. https://doi.org/10.1016/j.smrv.2009.10.007
31. *Steine IM, Harvey AG, Krystal JH, et al. Sleep disturbances in sexual abuse victims: A systematic review. S*leep Med Rev*, 2012;16(1):15-25. https://doi.org/10.1016/j.smrv.2011.01.006
32. *Glod CA, Teicher MH, Hartman CR, Harakal T. Increased nocturnal activity and impaired sleep maintenance in abused children. *J Am Acad Child Psy*. 1997;36(9):1236-1243.
33. Servot S, St-Amand A, Rousseau M, Simard V, Touchette E. Sleep ecology, sleep characteristics and behavior problems in young maltreated children: a scoping review. Child Abuse Negl. 2021;122:1-15.
34. Buysse DJ. Sleep health: can we define it? Does it matter? *SLEEP*. 2014;37(1):9-17.
35. Meltzer LJ, Williamson AA, Mindell JA. Pediatric sleep health: It matters, and so does how we define it. *Sleep Med Rev*. 2021;57:1-13.
36. Shaw, JA. Children, adolescents and trauma. *Psychiatr Q.* 2000;*71*(3):227-243. https://doi.org/0033-2720/00/0900-0227
37. Bramer, W. M., Giustini, D., de Jonge, G. B., Holland, L., & Bekhuis, T. (2016). De-duplication of database search results for systematic reviews in EndNote. Journal of the Medical Library Association: *JMLA*, 104(3), 240-243.
38. Dubois-Comtois K, Cyr C, Pennestri, MH, Godbout R. Poor quality of sleep in foster children relates to maltreatment and placement conditions. *SAGE Open.* 2016; 6(4):1-7. https://doi.org/10.1177/2158244016669551
39. Wells RD, McCann J, Adams J, Voris J, Ensign J. Emotional, behavioral, and physical symptoms reported by parents of sexually abused, nonabused, and allegedly abused prepubescent females. *Child Abuse Negl.* 1995;19(2):155-163. https://doi.org/10.1016/0145-2134(94)00113-9

40. *Hébert M, Langevin R, Guidi E, Bernard-Bonnin AC, Allard-Dansereau C. Sleep problems and dissociation in preschool victims of sexual abuse. *J Trauma Dissociation,* 2017;18(4):507-521. https://doi.org/10.1080/15299732.2016.1240739
41. *Langevin R, Hébert M, Guidi E, Bernard-Bonnin AC, Allard-Dansereau C. Sleep problems over a year in sexually abused preschoolers. *J Paediatr. Child Health.* 2017;*22*(5): 273-276. https://doi.org/10.1093/pch/pxx077
42. Bicanic IA, Postma RM, Sinnema G, et al. Salivary cortisol and dehydroepiandrosterone sulfate in adolescent rape victims with post traumatic stress disorder. *Psychoneuroendocrinology.* 2013;38(3):408-415.
43. Keeshin BR, Strawn JR. Psychological and pharmacologic treatment of youth with posttraumatic stress disorder: an evidence-based review. *Child Adol Psychia Clin.* 2014;23(2):399-411. https://doi.org/10.1016/j.chc.2013.12.002
44. Keeshin BR, Strawn JR, Out D, Granger DA, Putnam FW. Elevated salivary alpha amylase in adolescent sexual abuse survivors with posttraumatic stress disorder symptoms. *J Child Adolesc Psychopharmacol.* 2015;*25*(4):344-350. https://doi.org/10.1089/cap.2014.0034
45. Mansbach-Kleinfeld I, Ifrah A, Apter A, Farbstein I. Child sexual abuse as reported by Israeli adolescents: Social and health related correlates. *Child Abuse Negl*. 2015;40:68-80. https://doi.org/10.1016/j.chiabu.2014.11.014
46. Hibbard RA, Ingersoll GM, Orr DP. Behavioral risk, emotional risk, and child abuse among adolescents in a nonclinical setting. *Pediatrics.* 1990;86(6):896-901.
47. Fontes LFC, Conceição OC, Machado S. Childhood and adolescent sexual abuse, victim profile and its impacts on mental health. *Ciencia Saude Coletiva,* 2017;22:2919-2928. https://doi.org/10.1590/1413-81232017229.11042017
48. Edgardh K, Ormstad K. Prevalence and characteristics of sexual abuse in a national sample of Swedish seventeen-year-old boys and girls. *Acta Paediatrica*, 2000;89(3):310-319.
49. Mignot S, Fritel X, Loreal M, et al. Identifying teenage sexual abuse victims by questions on their daily lives. *Child Abuse Negl.* 2018;85:127-136. https://doi.org/10.1016/j.chiabu.2018.07.027
50. Turner S, Menzies C, Fortier J, et al. Child maltreatment and sleep problems among adolescents in Ontario: a cross sectional study. *Child Abuse Negl*; 2020;*99*:1-8. https://doi.org/10.1016/j.chiabu.2019.104309
51. McPhie ML, Weiss JA, Wekerle C. Psychological distress as a mediator of the relationship between childhood maltreatment and sleep quality in adolescence: Results from the Maltreatment and Adolescent Pathways (MAP) Longitudinal Study. *Child abuse Negl.* 2014;38(12):2044-2052. https://doi.org/10.1016/j.chiabu.2014.07.009
52. Hébert-Ratté R, Hébert M, Zadra A, Blais M. (2018). 0800 Impact Of Childhood Sexual Abuse On Nightmare Frequency In Young Adolescents. *Sleep*, 41, A297.
53. Harrison PA, Hoffmann NG, Edwall GE. Sexual abuse correlates: Similarities between male and female adolescents in chemical dependency treatment. *J Adolesc Res.* 1989;4(3):385-399.
54. Sadeh, A., Hayden, R. M., McGuire, J. P., Sachs, H., & Civita, R. Somatic, cognitive and emotional characteristics of abused children in a psychiatric hospital. *Child Psychiatry Hum Devel*.1994;24(3):191-200.

55. Sadeh A, McGuire JP, Sachs H, et al. Sleep and psychological characteristics of children on a psychiatric inpatient unit. *J Am Acad Child Psy.* 1995;34(6):813-819.
56. *Usta J, Farver J. Child sexual abuse in Lebanon during war and peace. *Child Care Health Dev.* 2010;36(3):361-368. https://doi.org/10.1111/j.1365-2214.2010.01082.x
57. Wells R, McCann J, Adams J, Voris J, Dahl B. A validational study of the structured interview of symptoms associated with sexual abuse (SASA) using three samples of sexually abused, allegedly abused, and nonabused boys. *Child Abuse Negl.* 1997;21(12):1159-1167. https://doi.org/10.1016/S0145-2134(97)00091-4
58. Brown TSH, Belcher HM, Accardo J, Minhas R, Briggs EC. Trauma exposure and sleep disturbance in a sample of youth from the National Child Traumatic Stress Network Core Data Set. *Sleep Health.* 2016;2(2):123-128. https://doi.org/10.1016/j.sleh.2016.03.001
59. *Wamser-Nanney R, Chesher RE. Trauma characteristics and sleep impairment among trauma-exposed children. *Child Abuse Negl.* 2018;76:469-479. https://doi.org/10.1016/j.chiabu.2017.11.020
60. Spaccarelli S. Stress, appraisal, and coping in child sexual abuse: A theoretical and empirical review. *Psychol Bull,* 1994;116(2):340-362. https://doi.org/10.1037/0033-2909.116.2.340
61. Werner GG, Riemann D, & Ehring T. Fear of Sleep and Trauma-Induced Insomnia: A Review and Conceptual Model. *Sleep Med Rev*. 2020:1-11 https://doi.org/10.1016/j.smrv.2020.101383
62. Sinha SS. Trauma-induced insomnia: A novel model for trauma and sleep research. *Sleep Med Rev*, 2016;*25*:74-83.
63. Harvey AG, Jones C, Schmidt DA. Sleep and posttraumatic stress disorder: a review. *Clinical Psychol Rev*. 2003;*23*(3):377-407.
64. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (DSM-5®). Arlingon:American Psychiatric Pub; 2013
65. Germain A. Sleep disturbances as the hallmark of PTSD: where are we now? *Am J Psychiatry*. 2013;170(4):372-382. https://doi.org/10.1176/appi.ajp.2012.12040432
66. Ivanenko A, Crabtree VM, Gozal D. Sleep and depression in children and adolescents. *Sleep Med Rev.* 2005;9(2):115-129. https://doi.org/10.1016/j.smrv.2004.09.006
67. Kovachy B, O'Hara R, Hawkins N, et al. Sleep disturbance in pediatric PTSD: current findings and future directions. *J Clin Sleep Med.* 2013;9(5):501-510. https://doi.org/10.5664/jcsm.2678
68. Maniglio R. Child sexual abuse in the etiology of depression: A systematic review of reviews. *Depress Anxiety.* 2010;27(7):631-642. https://doi.org/10.1002/da.20687
69. Newbury JB, Arseneault L, Moffitt TE, et al. Measuring childhood maltreatment to predict early-adult psychopathology: Comparison of prospective informant-reports and retrospective self-reports. *J Psychiatr Res.* 2018;96:57-64. https://doi.org/10.1016/j.jpsychires.2017.09.020
70. Luca G, Haba Rubio J, Andries D, et al. Age and gender variations of sleep in subjects without sleep disorders. *Ann Med.* 2015;47(6):482-491. https://doi.org/10.3109/07853890.2015.1074271
71. Fadzil A. Factors affecting the quality of sleep in children. *Children*, 2021;*8*(2):122.
72. Finkelhor D, Ormrod R, Turner H, Holt M. Pathways to poly-victimization. *Child Maltreatment*, 2009;14(4):316-329. https://doi.org/10.1016/j.chiabu.2008.09.012

73. Assink M, van der Put CE, Meeuwsen MW, et al. Risk factors for child sexual abuse victimization: A meta-analytic review. *Psychol Bull*, 2019;145(5):459. https://doi.org/10.1037/bul0000188
74. Wilson KR, Hansen DJ, Li M. The traumatic stress response in child maltreatment and resultant neuropsychological effects. *Aggress Violent Behav.* 2011;16(2):87-97. https://doi.org/10.1016/j.avb.2010.12.007
75. Upton P, Lawford J, Eiser C. Parent–child agreement across child health-related quality of life instruments: a review of the literature. *Qual Life Res*, 2008;17(6):895-913.

Figure 1. PRISMA Flow Diagram of the study selection process.

Table 1. A summary of the included studies documenting associations between childhood sexual abuse and sleep.

Table 1: Included Studies Documenting Association between CSA and Sleep

Reference	Study aims	Sample	Study design	Measures	Principal results
Child Samples (0-12 years old)					
Dubois-Comtois et al. [38] Canada	Investigate sleep in maltreated children living in foster care	**Children** **Total sample:** 25 foster children 3-7 years old (M = 5.02, SD = 1.56) CPS sample 76% male	**Design:** Cross-sectional **Quality Appraisal**: Poor	**CSA classification:** Substantiated abuse, CSA (yes or no) **Sleep measure:** Your child sleep (questionnaire completed by the foster caregiver) (unknown item number) **Sleep variables:** Non-restorative sleep index, poor sleep index, parasomnia index, sleep duration	History of sexual abuse associated with greater indices of poor sleep (r = .50, p < .05). No association between CSA and sleep duration. Covariates: Age Comparative details not available.
Glod et al. [32] USA	Examine effect of childhood sexual abuse on sleep disruption and nocturnal activity	**Children** **Clinical abused group**: 19 sexually and physically abused children 6 to 12 years old (M = 9.4, SD = 2.3); 6 sexually, 10 physically, 3 both. 68% boys Clinical sample	**Design**: Cross-sectional **Quality Appraisal**: Good	**CSA classification**: Substantiated abuse, CSA (yes or no) **Sleep Measures:** Actigraphy for 72 consecutive hours during weekdays and sleep logs to support actigraphy data.	Association between CSA and lower sleep efficiency, longer sleep latency and higher level of nocturnal activity. No effect size reported. Covariates: gender, age, PTSD, physical abuse, location (hospital or not), depression Nocturnal activity: controls, 52.6 (13.9) vs. abused group, 104.7 (51.3), p = 0.001

		Control non - abused group: 15 volunteers 6 to 12 years old (M = 8.3, SD = 1.9) 60% boys Community sample **Control clinical group:** 10 non-abused children with depressive disorders 6 to 12 years old (M = 10, SD = 1.6) 50% boys Clinical sample		**Sleep variables:** Percentage of nocturnal activity, sleep latency, sleep efficiency	% nocturnal activity: controls, 3.6 (1.1) vs. abused group, 7.4 (3.1), p > 0.001 Sleep latency (mins): controls, 11.0 (8.8) vs. abused group, 33.9 (27.2), p = 0.005 Total sleep time (mins): controls, 559.3 (45.3) vs. abused group, 562.9 (40.4), ns % sleep efficiency: controls, 96.1% (1.6) vs. abused group, 91.6% (5.1), p = 0.005 Wake after sleep onset (mins): controls, 12.7 (4.7) vs. abused group, 21.6 (17.4), ns # of awakenings: controls, 9.5 (3.9) vs. abused group, 11.4 (5.0), ns
Hébert et al. [40] Canada	Determine the relationship between dissociation and sleep disturbances in sexually abused preschoolers	**Children** **Total sample:** 179 sexually abused children 3-6 years old (M=4.67; SD=0.77). Clinical sample. 82.7% female	**Design:** Cross-sectional **Quality appraisal:** Good	**CSA classification:** History of victimization form based on the child's medical chart, duration of CSA. **Sleep measure:** Child behavior checklist–Preschool version, Sleep problems subscale (7 items) **Sleep variable:** Total score of the sleep problems scale (i.e.,	Sleep problems were not associated with the duration of CSA (r = 0.05, p > 0.05). Covariates: None Comparative details not available.

				overtiredness; sleeps less than most kids; sleeps more than most kids during day and/or night; trouble sleeping; nightmares; and talks or walks in sleep.)	
Langevin et al. [41] Canada	Examine the longitudinal effects of sexual abuse on sleep problem in preschoolers.	**Children** **CSA:** 224 children aged 3-6 years old. Clinical sample. 85% female. **Control:** 83 aged 3-6-years old. Community sample. 59% female M= 4.7, SD=0.8	**Design:** Longitudinal: Baseline and 1-year later **Quality rating:** Good	**CSA classification:** History of victimization form based on the child's medical chart, CSA (yes or no) **Sleep measure:** Child behavior checklist–Preschool version, Sleep problems subscale (parents) (7 items) **Sleep Variable:** Total problem scores, individual items.	Time 1: Higher total score of sleep problems and all individual items in CSA than in control group (η^2=0.097). 25.3% of CSA displayed clinical levels for sleep problems vs. 1.2% of controls Time 2: Higher total score of sleep problem and all individual items in CSA than in control group, except refusing to sleep alone (η^2=0.182). 14.1% of CSA displayed clinical levels for sleep problems vs. 0% of controls Covariates: child sex, single-parent family status and maternal level of education
Wells, et al. [39] USA	Compare emotional, behavioral, and physical symptoms among substantiated	**Children** **CSA with perpetrator confession**: 68 prepubescent	**Design**: Cross-sectional **Quality Appraisal**: Poor	**CSA classification:** Structured interview for signs associated with sexual abuse (SASA, parent report): yes substantiated, yes alleged, or no.	Combined CSA groups (substantiated and alleged) vs. non-abused group: -more difficulty getting to sleep -no difference on bedwetting, nightmares, or sleeping more than usual. No effect size reported.

	abused, alleged abused and non-abused prepubescent females.	females 2-11 years old (M = 7). CPS sample **Alleged CSA without perpetrator confession**: 68 prepubescent females 2-11 years old (M = 7) CPS sample **Control group**: 68 prepubescent females 2-11 years old (M = 7) Community sample 90% Caucasian, 10% black		**Sleep Measure:** SASA (parental report) (3 items) **Sleep variables**: Difficulty getting to sleep, sleeping more than usual, nightmares, bedwetting.	Covariates: none 7% of non-abused vs. 33% of alleged abuse vs. 43% of confirmed sexual abuse report difficulty getting to sleep, $p<0.05$ 17% of non-abused vs. 30% of alleged abuse vs. 39% of confirmed sexual abuse report nightmares, ns No non-abused vs. 8% alleged abuse vs. 12% confirmed sexual abuse report sleeping more than usual, ns 26% non-abused vs. 25% alleged abuse vs. 25% confirmed sexual abuse report bedwetting, ns
Adolescent Samples (12-18 years old)					
Bicanic et al. [42] Netherlands	Determine the effects of PTSD as a result of rape on the hypothalamic pituitary adrenal (HPA) axis.	**Adolescents** **CSA:** 52 rape survivors 15-16 years old (M= 16.1). Clinical sample. **Control:** 37 adolescents 15-16 years old (M=15.6). Community sample.	**Design:** Cross-sectional **Quality Appraisal**: Poor	**CSA classification:** Unvalidated interview, single rape event, CSA (yes or no) **Sleep measure:** Sleep log for one night **Sleep variables:**	CSA was associated with a later waking time and a shorter sleep duration. Rape was not associated with bedtime. No effect size reported. Covariates: none Comparative details not available.

		100% female		Bedtime, awakening time, and sleep duration	
Edgardh & Ormstad [48] Sweden	Report sexual abuse related problems in adolescents.	**Adolescents** **Total sample:** 2,153 adolescents 17 years old Community sample. 57.7% female	**Design:** Cross-sectional **Quality rating:** Fair	**CSA classification:** 6 unvalidated items**,** CSA (yes or no) **Sleep measure:** Unvalidated questionnaire (self-report) (unknown item number) **Sleep variable:** Sleep disturbances (unspecified)	CSA was associated with increased sleep disturbances in females, but not in males. 4.4% of non-abused boys vs. 0% of abused boys reported a sleep disorder, $p = 0.62$ 4.1% of non-abused girls vs. 12.4% of abused girls reported a sleep disorder, $p < 0.001$ No effect size reported. Covariates: None
Fontes et al. [47] Brazil	Describe characteristics of victims of childhood and adolescent sexual abuse and analyze effects on mental health	**Adolescents** **Total sample**: 2, 575, 269 9^{th} graders 48% male Community sample.	**Design**: Cross-sectional **Quality Appraisal**: Fair	**CSA classification**: Yes/No: "Have you ever been forced to have sexual intercourse?", CSA (yes or no) **Sleep Measure**: Unvalidated self-report questionnaire (1 item) **Sleep variables:** Has trouble sleeping	Sexually abused students were 9.5% more likely to have insomnia because of their worries compared to non-abused students ($p < 0.001$). Gender differences: girls were 10.7% more likely and boys were 9.6% ($p < 0.001$). 26.4% of abused students vs. 10.89% of non-abused students reported insomnia. No effect size reported. Covariates: None

				because something worries him/her	
Hébert-Ratté et al. [52] Canada	Investigate effect of sexual abuse on nightmare frequency in teenagers (abstract)	**Adolescents** **CSA**: 402 sexually abused teenagers (M =15.85, SD = 0.87) 88% female Clinical sample **Control**: 402 non-victims matched for age and gender. Populational sample	**Design**: Cross-sectional **Quality Appraisal**: Fair	**CSA classification:** Self-reported history of sexual abuse, CSA (yes or no) **Sleep Measure:** Nightmare frequency over the past 6 months reported on a Likert-type scale ranging from 0 (never) to 4 (very often) (1 item) **Sleep variable:** Nightmare frequency	Higher frequency of nightmares in sexually abused teenagers (OR: 8.36 [5.52-12.64]). Covariates: gender, age, intra-family sexual abuse and number of other traumas Comparative details not available.
Hibbard et al. [46] USA	Determine relationship between physical and sexual abuse and behaviours among adolescents	**Adolescents** **Total sample**: 3998 grades 7-12 students (age not available). Community sample 51% girls	**Design**: Cross-sectional **Quality Appraisal**: Fair	**CSA classification:** Self-report, unvalidated questionnaire (health behaviour survey), CSA (yes or no) **Sleep Measure**: Unvalidated questionnaire (self-report) (1-item) **Sleep variable**: Having trouble sleeping	No association between CSA and no abuse on self-reported trouble sleeping. 76% of no abuse vs. 81% of sexually abused students reported trouble sleeping No effect size reported. Covariates: None

Keeshin et al. [43] USA	Examine associations among salivary concentrations, awakening response, diurnal variation and PTSD in sexually abused adolescent girls and healthy controls	**Adolescents** **CSA**: 24 adolescent girls 12-17 years old (M = 15, SD = 1.5) Clinical sample **Control**: 12 healthy, non-traumatized comparison subjects, similar to CSA group in age, race and pubertal status (M = 14.8, SD = 1.3) Community sample	**Design**: Cross-sectional **Quality Appraisal**: Poor	**CSA classification:** Forensically substantiated sexual abuse within 1–6 months as documented in the medical record, CSA (yes or no) **Sleep Measure:** Unvalidated self-report for three days during a salivatory cortisol protocol (1 item) **Sleep variables**: Sleep duration and sleep problems	More self-reported sleep problems in the CSA group than in the control group during the first night of data collection. No difference in sleep duration. Day 1: 25% of healthy comparison vs. 75% abused girls report any sleep problem ($p<.05$). Day 2: 33% of healthy comparison vs 54% abused girls report any sleep problem (ns). Day 3: 25% of healthy comparison vs. 42% of abused girls report any sleep problem. (ns). No effect sizes reported. Covariates: None
Keeshin, et al. [44] USA	Identify neuroendocrine responses in sexually abused adolescent girls with PTSD	**Adolescents** **CSA**: 24 adolescent girls 12-17 years old (M = 15, SD = 1.4) Clinical sample 38% Caucasian **Control**: 12 healthy comparison subjects (M = 14.8, SD = 1.3) Community sample	**Design**: Cross-sectional **Quality Appraisal**: Poor	**CSA classification:** Forensically substantiated sexual abuse within 1–6 months as documented in the medical record, CSA (yes or no) **Sleep Measure:** Unvalidated self-report for three days during a salivatory cortisol protocol	More self-reported sleep problems in the CSA group than in the control group (one of the following: unable to fall asleep, waking up during the night, nightmares, constantly going to the bathroom). 88% of abused girls vs. 50% healthy controls reported at least one sleep difficulty over 3 study days ($p<.01$) No effect size reported.

		50% Caucasian Same sample as Keeshin et al., 2014.		(mean of the 3 nights) (1 item) **Sleep variables**: Sleep duration and sleep problems (i.e., unable to fall asleep, waking up during the night, nightmares, constantly going to the bathroom)	Covariates: none
Langevin et al. [21] Canada	Determine the effects of interpersonal violence on sleep disorders.	**Adolescents** 265 participants aged 14-18 years old (M=15.51). CPS sample. 42.5% female	**Design**: Cross-sectional **Quality rating:** Fair	**CSA classification:** Unvalidated interview or data from the CPS admission file, CSA (yes or no) **Sleep measure:** Unvalidated interview with adolescents (4 items) (4 items) **Sleep variable:** Sleep disturbances (composite score of sleep quality, falling asleep, awakenings, and nightmares)	CSA was associated with sleep disturbances above and beyond the effects of all predictors included. (Correlation between CSA and sleep disturbances = 0.25, $p<0.05$) Covariates: gender, anxiety, mood, low self-esteem, ADHD symptoms, extrafamilial physical abuse, intrafamilial physical abuse, admitted to CPS for neglect, admitted to CPS for maltreatment. Comparative details not available
Mansbach-Kleinfeld et al. [45] Israel	Determine prevalence of CSA in Israeli adolescents and examined	**Adolescents** **Total sample**: 906 adolescents 14-17	**Design**: Cross-sectional	**CSA classification:** Unvalidated interview (self-report), CSA (yes or no)	CSA was associated with more difficulty falling asleep (OR: 4.00 [1.6-10.3], p = 0.004).

	relationship of CSA with socio-demographic, physical and mental health variables	years old and their mothers. Populational sample. 50.3% boys	**Quality Appraisal**: Fair	**Sleep measure:** Unvalidated interview (unknown item/question number) **Sleep variable**: Difficulty falling asleep in the past 6 months (self-report)	Covariates: Gender, chronic learning disability and depression 44.3% of sexually abused vs. 12.2% of non-abused adolescents reported sleep problems, p<0.001.
McPhie et al. [51] Canada	Examine longitudinal relationship between childhood maltreatment and sleep quality	**Adolescents** **Total sample:** 73 youth 14-17 years old (M=15.9, SD= 1.06). CPS sample. 64.4% female 21.9% Caucasian	**Design:** Longitudinal: baseline (CSA) and two years later (sleep) **Quality rating:** Fair	**CSA classification:** Childhood trauma questionnaire, CSA (yes or no). **Sleep measure:** Self-report questionnaire that was adapted from the Short insomnia questionnaire (11 items) **Sleep variable:** Yes or no to 11 different types of sleep problems (e.g., difficulty falling asleep, nocturnal awakenings, awakening too early in the morning).	CSA was associated with sleep disturbances two years later (r = 0.23, p < 0.05). Covariates: None Comparative details not available.
Mignot et al. [49]	Investigate the relationship and predictive value	**Adolescents** **Total sample**:	**Design**: Cross-sectional	**CSA classification:** One question from unvalidated 88-item	Less satisfactory sleep (OR: 3.33 [1.84 - 6]), more difficulty falling asleep (OR: 2.25 [1.31-3.87]), more nocturnal awakenings

France	of daily life events with CSA	1719 15-year-olds. Populational sample. 49% male	**Quality Appraisal**: Poor	questionnaire, CSA (yes or no). **Sleep Measure:** Same self-reported unvalidated 88-item questionnaire (unknown sleep item number) **Sleep variables**: Quality of sleep (satisfactory or not), difficulty falling asleep, nocturnal awakenings, awakening too early in the morning, nightmares.	(OR: 3.17 [1.8-5.56]), awakening too early in the morning (OR: 2.3 [1.33-3.99]), and more nightmares (OR: 3.51[1.94-6.36]) reported in adolescents reporting CSA than in non-abused adolescents. Covariates: None 1/4 of CSA victims vs. 1/2 of non-CSA victims reported being satisfied with their sleep.
Turner et al. [50] Canada	Examine the relationship between child maltreatment and sleep in adolescents	**Adolescents** **Total sample:** 2,910 children 14-17 years old. Populational sample. 51.39% male	**Design**: Cross-sectional **Quality Appraisal**: Fair	**CSA classification:** Self-report using questions adapted from the Childhood experience of violence questionnaire, CSA (yes or no) **Sleep measure:** Unvalidated questionnaire (adolescent self-report) (4 items)	Adolescents with CSA histories reported sleeping significantly less on the weekends and weekdays. Also had increased odds of waking up 1-7 times a night per week (OR: 1.58 [1.38-1.81]) and of taking more than 10 minutes to fall asleep (OR: 5.73 [4.96-6.62]) compared to non-sexually abused adolescents. Covariates: age, sex, income, and single parent status 21.13% of non-sexually abused adolescents vs. 63.47% of sexually abused adolescents

				Sleep variables: Time it takes to fall asleep, waking during the night, duration of sleep on weekdays and duration of sleep on weekends	reported waking up during the night 1-7 times a week
Xiao et al. [20] China	Investigate relationship between maltreatment experienced in childhood and sleep disruption with a focus on gender differences	**Adolescents** **Total sample**: 153,547 students 12-18 years old (M = 15.0, SD = 1.8) Populational sample 52% female	**Design**: Cross-sectional **Quality Appraisal**: Good	**CSA classification:** Childhood trauma questionnaire-short form (CTQ-SF), Chinese version (sexual abuse), CSA (yes or no) **Sleep measure:** Chinese version of the Pittsburgh sleep quality index (CPSQI) (17 items) **Sleep variables**: Sleep quality and disturbances over one-month period	CSA positively associated with sleep disturbance (OR: 1.16 [1.15-1.18], p <0.001) Covariates: age, gender, grade, living arrangement, household socioeconomic status, academic achievement, classmate relations, teacher-classmate relations, current smoking and drinking
Child and Adolescent Samples					
Brown et al. [58] USA	Determine the effects of adverse childhood experiences on sleep disturbances.	**Children and adolescents** **Total sample:** 4559 youth 7-18 years old (M=12.42). Clinical sample.	**Design:** Cross-sectional **Quality appraisal:** Fair	**CSA classification:** University of California at Los Angeles Post-traumatic stress (UCLA PTSD) Reaction index, sexual	Bivariate associations: -Sexual assault victims aged 7-12-years-old were at greater risk of sleep disturbances than non-abused children. -Sexual assault and sexually abused victims aged 13-18 years old were at greater risk of

		55.3% female 56.8% Caucasian		abuse or sexual assault, CSA (yes or no) **Sleep measure:** Clinical assessment (unspecified), parent/caregiver reports (unspecified), and medical records. (Unknown item number) **Sleep variable:** Sleep disturbance	sleep disturbances than non-abused children. When introducing covariates: -Sexual assault victims aged 7-12 years old were at greater risk of sleep disturbances than non-abused children (OR: 1.76 [1.21-2.57], p = 0.01), but not in 13-18 year olds (OR: 1.31 [0.97-1.76], p = 0.07). Covariates: Sex, PTSD, amount of trauma experienced, and recruitment site (urban, rural or frontier areas) 16% of sample vs. 3.7% of non-trauma exposed peers reported a clinician-assessed sleep disturbance.
Demirci [19] Turkey	Examine the effects of CSA on emotion regulation, non-suicidal self-injury, emotional eating, and insomnia in adolescents.	**Children and adolescents** **CSA:** 52 children and adolescents 10-18 years old (M= 13.2). Clinical sample. **Control:** 33 children and adolescents 10-18 years old (M=14.3). Community sample.	**Design:** Longitudinal: baseline and six months later **Quality Appraisal**: Fair	**CSA classification:** Unspecified assessment at the hospital, CSA (yes or no) **Sleep measures:** Pittsburgh sleep quality index (PSQI) (19 items) and the Insomnia severity index (ISI) (7 items). **Sleep variable: sleep disturbances (PSQI):** 7 component scores:	Six months after abuse: CSA group had poorer sleep than control group (higher PSQI scores). Using the ISI, 40.7% of CSA victims with PTSD reported sub-threshold insomnia vs. 20% of CSA victims without PTSD and 0% in controls. No effect size reported. Covariates: none

		69.9% female		subjective sleep quality, sleep latency, duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction); insomnia severity (ISI)	
Harrison et al. [53] USA	Evaluate the relationship between CSA and psychological distress, behavioral problems, and substance use in adolescents	**Children and Adolescents** **Total sample:** 1415 adolescents 10-19 years old (M= 15.9). Clinical sample. 31.4% female 93% Caucasian	**Design:** Cross-sectional **Quality appraisal:** Poor	**CSA classification:** Unvalidated interview, CSA (yes or no) **Sleep measure:** Unvalidated interview (Unknown item/question number) **Sleep variable:** Sleeplessness (unspecified)	CSA was associated with greater sleeplessness than in non-abused girls and boys. No effect size reported. Covariates: None Girls: 67.5% of victims vs. 48.1% of non-victims reported sleeplessness ($p<.001$). Boys: 52.6% of victims vs. 38.3% of non-victims reported sleeplessness. ($p<.05$).
Sadeh et al. [54] USA	Determine the effects of child abuse on cognitive, behavioural, and emotional domain in children with psychopathology.	**Children and adolescents** **Total sample:** 100 children 2-13 years old (M= 8.07, SD=2.55). Clinical sample.	**Design:** Cross-sectional **Quality rating:** Poor	**CSA classification:** Unvalidated interviews of child and parents (separately), CSA (yes/no) **Sleep measure:** Medical chart progress notes and individual	Prior to hospital admission: higher incidence of parasomnias in CSA (compared to CPA and controls). CSA not associated with nocturnal awakenings or difficulty falling asleep. During hospital stay: Parasomnias, nocturnal awakenings, and difficulty falling asleep not associated with CSA.

		Previous history of CSA n = 49 17% female		unvalidated interviews with child and parents **Sleep Variables:** Parasomnia incidence, nocturnal awakenings, and difficulty falling asleep prior and during admission.	No effect size reported Covariate: Age Prior to hospital admission, 20.4% of sexually abused children vs. 3.7% of non-abused children reported a higher incidence of parasomnias ($p<.05$).
Sadeh et al. [55] USA	Examine the effects of child abuse on sleep-wake patterns.	**Children and Adolescents** **Total sample:** 39 children 7-14 years old. (M= 9.51, SD= 1.9). Clinical sample. 23% female	**Design:** Cross-sectional **Study Quality:** poor	**CSA classification:** Unvalidated interviews of child and parents (separately), CSA (yes/no) **Sleep measure:** Actigraphy for 1 to 3 nights **Sleep variable:** Sleep onset time, total sleep period. sleep percent, true sleep time, longest sleep period, and quiet sleep	CSA alone was not associated with any of the actigraphy variables. Physically and sexually abused children spent less time in quiet-motionless sleep relative to non-abused children No effect size reported Covariate: age Sleep onset time (24h): no abuse, M = 22.2 (SD = .46) vs. sexual abuse, M = 22.1 (SD =.76), ns Total sleep period (mins): no abuse, M = 541 (SD = 31) vs. sexual abuse, M = 556 (SD = 38), ns Sleep percent: no abuse, M = 93.1 (SD = 3.7) vs. sexual abuse, M = 93.9 (SD = 1.4), $p<0.05$

					True sleep time (mins): no abuse, M = 504 (SD = 40) vs. sexual abuse, M = 522 (SD = 31), ns Longest sleep period (mins): no abuse, M = 178 (SD = 56) vs. sexual abuse, M = 178 (SD = 50), ns Quiet sleep percent: no abuse, M = 67.8 (SD = 9.7) vs. sexual abuse, M = 67.3. (SD = 6.1), p<0.05
Usta & Farver [56] Lebanon	Describe prevalence, risk factors and effects of CSA in Lebanese children before, during and after the 2006 Hezbollah-Israeli war	**Children and adolescents** **Total sample:** 1028 Lebanese children 8-17 years old (M = 11.89, SD = 1.67). Combined community and clinical sample. 46% female 68% Muslim	**Design**: Cross-sectional **Quality Appraisal**: Good	**CSA classification:** International child abuse screening tool, CSA (yes or no) **Sleep measure:** Trauma symptom checklist for children (4 items) **Sleep variable**: Sleep disturbance (insomnia, restless sleep, nightmares, and waking up in the middle of the night)	More sleep disturbance in children reporting CSA before (r = .259, p < .01), during (r = .278, p < .01) and after (r = .155, p < .05) the war compared to those without CSA experiences. Sexually abused girls reported more sleep disturbances than sexually abused boys. Covariates: none Comparative details not available
Wamser-Nanney & Chesher [59] USA	Determine whether childhood trauma is associated with sleep disturbance.	**Children and Adolescents** **Total sample:** 276 children 6–18 years	**Design:** Cross-sectional	**CSA classification:** Trauma symptom checklist for young children, or the Trauma symptom	CSA was not associated with nightmares (d = 0.22), poor sleep quality (d = 0.02), difficulties falling asleep (d = 0.1), overtiredness (d = 0.06), or sleepwalking (d = 0.02).

		old (M= 10.88, SD = 3.39). CPS sample. 63.4% female 62.7% Black	**Quality Appraisal**: Good	checklist for children, CSA (yes or no) **Sleep measure:** Child behaviour checklist (6 items), Trauma symptom checklist for young children (2 items), Trauma symptom checklist for children (1 item), and the UCLA PTSD index for DSM-IV child version (2 items). **Sleep variables:** Nightmares, poor sleep quality, difficulties falling asleep, overtiredness, and sleepwalking.	Covariates: age, gender, race, income Comparative details not available.
Wells et al. [57] USA	Validate the Structured Interview of Symptoms Associated with Sexual Abuse.	**Children and adolescents** **CSA with perpetrator confession:** 22 boys 3-15 years old. CPS sample **Alleged CSA without**	**Design:** Cross-sectional **Quality rating:** Poor	**CSA classification:** Structured interview of signs associated with sexual abuse (SASA; parental report): yes substantiated, yes alleged, or no.	CSA sample reported higher incidence of difficulty getting to sleep and bedwetting than alleged CSA. No difference in nightmares and sleeping more than usual. CSA reported higher incidence of difficulty getting to sleep and sleeping more than normal, compared to non-abused. No difference in nightmares and bedwetting.

		perpetrator confession: 47 boys 3-15 years old. Child Protective Services sample **Control:** 106 boys 3-15 years old. Community sample. M=8.4 53% Caucasian		**Sleep measure:** SASA (parental report) (3 items) **Sleep variables:** Difficulty getting to sleep, nightmares, sleeping more than usual, bedwetting	No effect size reported. Covariates: None 11% of non-abused vs. 33% of alleged abuse vs. 65% of confirmed sexual abuse reported difficulty getting to sleep ($p<.0001$) 22% of non-abused vs. 36% of alleged abused vs. 45% of confirmed sexual abuse reported nightmares, ns. No non-abused vs. 9% alleged abuse vs. 27% confirmed sexual abuse reported sleeping more than usual, $p<0.05$. 20% of non-abused vs. 0% of alleged abused vs. 20% of confirmed sexual abuse reported bedwetting, ns.

Note. Attention deficit and hyperactivity disorder (ADHD); Child physical abuse (CPA); Child protective services (CPS); Child sexual abuse (CSA); Mean (M); PTSD (Post-traumatic stress disorder); Standard deviation (SD)

Figure 1. Flowchart of Study Selection Process