Presence of Sleep Disturbances Among Child Trauma Survivors: Comparison of Caregiver and Child Reports

Rachel Wamser-Nanney¹ · Rebecca E. Chesher¹

Published online: 3 November 2017
© Springer International Publishing AG 2017

Abstract A significant body of research has been devoted to demonstrating high rates of sleep impairment, and the subsequent adverse implications of sleep difficulties, among adult trauma survivors, particularly those diagnosed with posttraumatic stress disorder (PTSD). Yet considerably less work has been focused on sleep disturbances among trauma-exposed children, especially preschoolers. Pediatric research is paramount in light of the numerous developmental and functional implications that may result from sleep impairment. Prior studies have also documented disagreement between caregiver's and children's reports of trauma-related symptoms; however, the level of concordance rates regarding sleep difficulties is unknown in this population. The present study investigated the rates of multiple types of sleep disturbances using caregiver's and children's reports as well as caregiver-child concordance rates regarding these difficulties. Three hundred and forty-two treatment-seeking children ages of 3–18 years ($M=9.68$, $SD=4.00$; 61.1% female, 60.4% Black) and their caregivers were included in the study. Sleep disturbances were common in this sample, and children endorsed higher levels of sleep symptoms (range 46–72%) than their caregivers (range 14–51%). Nearly half (47%) of preschool children evinced significant sleep impairment per their caregiver. Inter-rater agreement between caregiver's and children's reports for all sleep symptoms were below acceptable levels (range $\kappa = 0.01$ –.13), indicating that the concordance rate for caregiver-child trauma-related sleep problems is quite low. Findings illustrate the relevance of sleep disturbances among trauma-exposed children and point

to the need to assess both caregiver's and children's symptoms regarding sleep impairment.

Keywords Child trauma · Sleep disturbances · PTSD · Concordance · Preschoolers

Sleep difficulties are common, and arguably a hallmark, symptom among trauma survivors with posttraumatic stress disorder (PTSD) (Spoormaker and Montgomery 2008). Indeed, nightmares have been a symptom of PTSD since its introduction into the *Diagnostic Statistical Manual (DSM-III; APA, 1980)* and sleep disturbances are conceptualized as a core symptom of PTSD including issues falling and staying asleep (Babson and Feldner 2010; Kovachy et al. 2013). Some have posited that sleep impairment is integrally involved in the development and maintenance of PTSD (Spoormaker and Montgomery 2008). Nightmares and other sleep problems among trauma survivors may also contribute to the development of other important health related issues, such as pain and hypertension (Galovski et al. 2009) as well as functional impairment (Norman et al. 2007). Increased sympathetic activity during rapid eye movement (REM) sleep, which is present in trauma-exposed individuals, may also interfere with PTSD treatment (Charuvastra and Cloitre 2009; Mellman & Hippolito 2004). Given these functional and clinical implications, trauma-related sleep problems are a clear research priority.

However, the majority of sleep research has been conducted with adult trauma survivors, and relatively less is known regarding sleep impairment among trauma-exposed children, particularly preschool children. Preliminary studies find that sleep disturbances are also present in child samples (Kovachy et al. 2013), although additional work with larger sample sizes is needed to further examine the prevalence

✉ Rebecca E. Chesher
WamserR@umsl.edu

¹ Psychological Sciences, University of Missouri- St. Louis,
St. Louis, MO 63121, USA

in this population. Further, levels of concordance between caregiver's and child's reports regarding sleep problems are uncharted. As children require more sleep than adults (Roberts et al. 2009) and childhood is a time of rapid development, sleep difficulties are critical to understand in the context of pediatric trauma. The aims of the current study were to assess the prevalence of multiple sleep disturbances among trauma-exposed children ages 3–18 and determine the level of caregiver-child concordance rates regarding sleep impairment.

The prevalence rates of pediatric trauma exposure are, regrettably, high. A national survey in the United States found that 70% of children have experienced at least one traumatic event *in the previous year*, and nearly 80% of children were exposed to a trauma in their lifetime (Finkelhor, Ormrod, & Turner 2009). While not all children who undergo traumatic events will develop PTSD, PTSD and other trauma-related difficulties are relatively common following trauma exposure, although PTSD rates range considerably. For instance, one national study of children ages 12–17 reported a *DSM-IV* PTSD prevalence rate of 3.7% for males and 6.3% for females (Kilpatrick et al. 2003). Another large study reported a pediatric PTSD rate of 0.5% (Copeland et al. 2007). However, a recent systematic review pooled data from 42 studies that assessed pediatric PTSD and found an average prevalence rate of 16%, with reported rates as high as 89% (Alisic et al. 2014). Although prevalence rates of pediatric PTSD may vary by sample and trauma type, children may be less likely to exhibit PTSD after trauma, compared to adults (Copeland et al. 2007).

Lower rates of pediatric PTSD may be the result of PTSD being formulated for adults and challenges in diagnosing PTSD in children (Scheeringa 2011; Scheeringa et al. 2011, 2003), particularly prior to the development of the preschool subtype in *DSM-5*. Nonetheless, irrespective of a PTSD diagnosis, there are strong ties between childhood trauma exposure and a plethora of adverse physical and mental health outcomes (Brown et al. 2009; Cicchetti and Toth 1995; De Bellis 2001; De Bellis et al. 2013). Even in the absence of a PTSD diagnosis, trauma-related difficulties may warrant treatment (Cohen et al. 2006). It is therefore prudent to conduct childhood traumatic stress research with trauma-exposed children rather than limiting it to only those with PTSD.

Sleep Impairment Among Trauma-Exposed Adults

In adult samples, sleep disturbances affect approximately 70–90% of survivors with PTSD (Kovachy et al. 2013). Although high rates of sleep problems among individuals with PTSD are not terribly surprising as they are symptoms

of the disorder, research has emphasized the importance of sleep disturbances in the context of PTSD. Sleep impairment may facilitate the development and maintenance of PTSD as well as exacerbate PTSD symptoms (Spoormaker and Montgomery 2008). Longitudinal studies have observed that sleep problems prior to, and shortly after the trauma predict PTSD and are associated with greater PTSD severity (Bryant et al. 2010; Gehrman et al., 2013; Koffel et al. 2013; Koren et al. 2002; Mellman et al. 2002, 2007). It is important to note that sleep impairment can be broken down into two subcategories: initiation/maintenance and nightmares. In one sample, 66% of adults with PTSD had trouble initiating as well as maintaining sleep (Ohayon and Shapiro 2000). Adult trauma survivors may also have greater sleep onset latency, less total sleep time, and reduced sleep quality (Krakow et al. 2007). Previous research indicates that 20% of adults with PTSD endorsed nightmares, compared to less than 5% in a non-PTSD comparison group (Ohayon and Shapiro 2000). Additionally, trauma-related nightmares may lower sleep efficiency and create longer wake after sleep onset (Spoormaker and Montgomery 2008). Waking from these nightmares may lead to other problematic health behaviors that exacerbate sleep disruption such as sleeping with the light on, eating in the middle of the night, or drinking alcohol (Spoormaker and Montgomery 2008).

Research has also highlighted the link between PTSD and other sleep disturbances such as obstructed sleep apnea (OSA; Sharafkhaneh et al. 2005). One recent study of veterans found that having PTSD was a risk factor for developing OSA over and above traditional risk factors such as age and high body mass index (BMI; Colvonen et al. 2015). Other sleep disturbances such as periodic limb movement have also been shown to be prevalent in trauma survivors with PTSD (Spoormaker and Montgomery 2008). These sleep problems may cumulatively reduce the total sleep time and sleep efficiency of trauma survivors and contribute to the negative effects of sleep loss.

Sleep Difficulties Among Trauma-Exposed Children

Fewer studies have investigated the association between trauma exposure and sleep impairment in children. In a review of sleep disturbances among trauma-exposed children, several studies reported sleep impairment among trauma-exposed children; however, the range varied widely from 3 to 77.1% (Kovachy et al., 2013). Nightmares were examined most frequently, although rates varied considerably from 20.3 to 80.8%. Several of the prior studies were limited by small sample sizes ($ns < 60$) (e.g., Arnberg et al. 2011; Dollinger 1986; Carrion et al. 2002; Wittmann et al. 2010) and focus on one specific trauma,

all of which were non-interpersonal in nature, (e.g., Arnberg et al. 2011; Dollinger 1986; Wittmann et al. 2010). Indeed, rates of sleep problems following interpersonal trauma have been examined by remarkably few studies. In one sample of sexual abuse, sexually abused children were significantly more likely to experience sleep impairment such as nightmares, insomnia, and not feeling well rested, than non-trauma-exposed controls (Noll et al. 2006); however, specific rates of sleep problems were not reported. In a small sample of children exposed to interpersonal violence ($n = 59$), 64% self-reported frequent and distressing nightmares (Carrion 2002). In the only study to focus on sleep problems among preschoolers, young children who were exposed to high-intensity trauma from the World Trade Center attacks evinced more sleep impairment compared to those who experienced low-intensity trauma (Chemtob et al. 2008). It is premature to contrast the rates of sleep difficulties in children to those of adults; however, it is clear that sleep problems are relevant in the context of childhood trauma. Discrepancies in study findings may be partially due to different trauma type, assessment instruments, and who is reporting on the child's difficulty (caregiver vs. child). Among non-trauma-exposed samples, differences are also observed in the percent of children affected by sleep disturbance based on the reporter, with children reporting more overall sleep problems than caregivers (Kovachy et al. 2013), which highlights the need to investigate sleep impairment utilizing both caregiver's and children's reports.

Nonetheless, studies have not previously examined the indices of sleep impairment in cases of pediatric trauma utilizing both caregiver's and child's reports. Similar to discordant rates of sleep problems across reporters, prior research with trauma-exposed children indicates considerable disagreement in terms of caregiver's underestimating both children's traumatic exposure and PTSD symptoms (Ceballo et al. 2001; Oransky et al. 2013; Schreier et al. 2005; Stover et al. 2010). Concordance rates are important to investigate as high rates of discordance have significant implications for research and clinical work. Research studies using only caregiver's or children's reports may significantly underestimate the rates of sleep disturbances. Disagreements regarding the level of severity of sleep disturbance may pose a challenge for clinicians trying to determine whose symptom report to use and, in the case of a wrong decision, undermine the assessment process. Further, if discordance rates of sleep problems are observed and only the caregiver's reports of sleep disturbances are utilized, symptoms may go undetected and the child may not receive the most effective treatment.

Current Study

The present study had three aims. First, the current study sought to add to the small literature regarding sleep difficulties among trauma-exposed children by investigating the presence of pre-treatment sleep disturbances in a treatment-seeking sample of trauma-exposed children, utilizing both caregiver and child reports. As discussed, trauma-related difficulties may be present in the absence of a PTSD diagnosis, and thus, participation was not limited to children who were diagnosed with PTSD. Second, sleep disturbances among preschoolers have been previously overlooked, therefore, the present study specifically examined rates of sleep problems in young children. The third aim of the study was to extend the prior literature and examine concordance levels of sleep difficulties between the caregiver and the child. It was hypothesized that sleep disturbances would be endorsed by both caregivers of school-aged and preschool children as well as children. Levels of concordance were expected to be low, consistent with the prior research regarding rates of caregiver-child disagreement for trauma symptoms.

Methods

Participants Three hundred and forty-two children and adolescents between the ages of 3 and 18 years ($M = 9.68$, $SD = 4.00$) seeking treatment with their non-offending caregiver from a Child Advocacy Center (CAC) were included in the study. The sample was 61.1% female, 38.3% male. Racial/ethnic composition was as follows: 60.4% Black, 31.1% White, 7% Biracial/Multiracial, and 1.5% Hispanic. Mean household income was 1.74 ($SD = 0.93$), which corresponds to \$20,000–\$40,000.

Trauma exposure was indicated by the child's legal guardian. Eligible participants had experienced at least one traumatic event. Nearly three-fourths of the sample experienced sexual abuse (73.1%). Other traumas were also common: 33.1% emotional abuse, 30.7% physical abuse, 30.3% neglect, 28.4% domestic violence, 15.2% death of a loved one, 5.3% serious illness, 4.4% serious injury/accident, 3.8% homicide, 2.6% natural disaster, 2.6% suicide, 1.5% school violence, 1.5% community violence, 0.9% kidnapping, and 0.6% war/terrorism.

Measures

Child Behavior Checklist (CBCL/6–18; Achenbach and Rescorla 2001) The CBCL is a 113-item measure completed by caregivers of children ages 6–18. It assesses a wide array of symptomology, that are rated on a 3-point

Likert scale from 0 = *Not true* to 2 = *Very/often true*. The Cronbach's α has ranged from 0.78 to 1.0 (Achenbach and Rescorla 2001), and was 0.95 for this study. There were 247 completed CBCL/6–18 measures included in the study. As the CBCL does not have a subscale specific to sleep, a CBCL sleep composite variable was created, summing the responses of the 6 sleep-related items (potential range of 0–12; $M = 2.07$, $SD = 2.16$). However, this variable had a Cronbach's $\alpha = 0.65$ that fell outside of acceptable parameters, and was not included. The 6 individual items were therefore examined, specifically, nightmares, overtired, sleeps more than other kids, sleeps less than other kids, walks/talks in sleep, and trouble sleeping. A symptom was deemed to be present if it was rated a 1 or a 2.

CBCL Preschool Age (CBCL/1.5-5; Achenbach and Rescorla 2000) To assess the presence of sleep disturbances in young children, the CBCL/1.5-5 was also included. The preschool version of the CBCL assesses a range of behavioral and emotional symptoms among young children, similar to the school-age version. Psychometric properties have been established (Achenbach and Rescorla 2000). The CBCL/1.5/5 has a sleep problems subscale, composed of sleep difficulty items comparable to the CBCL school age version, which was utilized in the analyses. There were 69 completed CBCLs in the present study, Cronbach's $\alpha = 0.89$.

Trauma Symptom Checklist for Young Children (TSCYC; Briere 2005) The TSCYC is a 90-item caregiver report for children 3–12 years of age. It assesses PTSD and other trauma-related symptoms, and is comprised of 8 subscales: posttraumatic stress-intrusion, posttraumatic stress-avoidance, posttraumatic stress-arousal, sexual concerns, anxiety, depression, dissociation, and anger/aggression. Items are rated on a 4-point Likert scale, 0 = *Never* to 3 = *Almost all of the time/Very often*. The TSCYC has previously demonstrated good reliability, with α ranging from 0.81 to 0.93 (Briere et al. 2001), as well as predictive validity for childhood trauma. In the present study, the three items to sleep impairment were included in the analyses, specifically nightmares, not sleeping for two or more days, and not sleeping well. A symptom was deemed to be present if it was rated a 2 or a 3. There were 231 completed TSCYC measures for this study, Cronbach's $\alpha = 0.95$.

Trauma Symptom Checklist for Children (TSCC; Briere 1996) The TSCC is a 54-item standardized self-report measure for the assessment of trauma-related symptoms in children ages 8 to 16. The author has also indicated that 17-year-olds can use the TSCC; however, they may score lower on the anger subscale. The TSCC provides validity

subscales and clinical subscales for anxiety, depression, anger, posttraumatic stress, dissociation, and sexual concerns. Symptoms are rated on a 4-point Likert scale, 0 = *Never* to 3 = *Almost all of the time*. Alpha coefficients for clinical scales ranged from 0.77 to 0.89 in the standardization sample, and adequate convergent, divergent, and predictive validity have been demonstrated in normative and clinical samples. In the current study, children's reports of nightmares on this measure was examined, which is the only sleep-related item on the TSCC. A symptom was deemed to be present if rated a 2 or a 3. There were 207 completed TSCC measures, Cronbach's $\alpha = 0.95$.

UCLA PTSD Index for DSM-IV Child Version (UPID; Pynoos et al. 1998) The UPID is a 48-item child self-report measure for school-aged children 7–18. It measures both exposure to traumatic events and DSM-IV PTSD symptoms. The first 26 questions serve as a brief screening tool for traumatic exposure, as reported by the child. These questions address exposure to a natural disaster, physical, emotional, or sexual abuse, witnessing domestic or community violence, or violent death of a loved one. Children rate their level of PTSD symptoms in the previous month in regards to the traumatic event that distresses them most on 5-point Likert scale, 0 = *Never* to 4 = *Most of the time*. Satisfactory psychometric properties have been previously documented (Pynoos et al. 1998). The two individual items regarding sleep disturbances (i.e., nightmares and difficulty falling asleep) were examined in this study. Consistent with the scoring of the measure, a symptom was deemed to be present if it was rated a 3 or a 4. Two hundred and fifteen completed UPID measures were used in the analyses, Cronbach's $\alpha = 0.78$.

Procedure

Study participants were a sample of trauma-exposed children and their legal guardians who were seeking trauma-focused treatment. At intake, children and their legal guardians completed a battery of clinical measures as part of routine clinical practice. Participants were included in the study if they had completed an intake evaluation. There were no exclusionary criteria. All measures were completed at the beginning of treatment (i.e., first three sessions). Archival data was obtained from an existing database collected that was initially created for program evaluation that was used for the demographic data and pre-treatment symptom levels. Specific sleep instruments were not used as these measures were not utilized in the clinical battery at the CAC. The study was approved by the [Anonymous for Blind Review].

Results

Presence of Caregiver-Reported Sleep Disturbances. CBCL/6–18 Caregiver's reported sleep problems in a relatively small subset of children as detailed in Table 1. Nightmares were the most common symptom, present in 13.8% of the children, followed by 11.6% difficulty sleeping, 8.2% sleeps more than most kids, 6.5% sleeps less than most kids, 4.9% talks/walks in sleep, and 3.3% overtired.

CBCL/1.5–5 Sleep impairment, as documented by symptoms at or above a T score of 65 on the sleep problems subscale on the CBCL/1.5–5, were present in approximately one-third of the preschool aged children (37.4%, $n = 24$) and borderline clinical symptoms (T scores 60–64) were found in an additional 11% of participants ($n = 8$). Thus, just under half of preschoolers exhibited sleep disturbances (47%; $n = 32$).

TSCYC Similar to the CBCL, the presence of sleep problems on the TSCYC was restricted to a relatively small subsample as reported by caregivers, 14.4% often had nightmares, 9.2% very often had nightmares (see Table 2). Trouble sleeping was endorsed by approximately 20% of the sample, 11.7% often had difficulty sleeping and 9.1% of children very often had sleep difficulties. Not sleeping for two or more days was present in 1.3% of the sample.

Presence of Child-Reported Sleep Disturbances. TSCC On the TSCC approximately 20% of children

endorsed nightmares: 9.2% reported nightmares as occurred lots of times and 10.6% indicated they occurred almost all of the time.

UPID Nightmares on the UPID were also common, nearly one-third of children (30.5%) endorsed experiencing nightmares (21.1% most of the time, 9.4% much of the time) (see Table 3). Almost half of the sample (43.5%) reported difficulties falling asleep, 12.6% of the children endorsed having difficulty falling asleep much of the time and 30.7% acknowledged sleep difficulty most of the time. Rates of sleep impairment endorsement appear to be slightly higher than those reported by their caregivers (e.g., caregiver-reported nightmares CBCL/6–18 13.8%, TSCYC 14.4% vs TSCC 20%, 30.5% UPID).

Sleep Impairment Item Intercorrelations Intercorrelations of sleep difficulty items across measures are presented in Table 4. Among items on the CBCL, all but two of the sleep disturbance items were correlated (i.e., nightmares and sleeps more than other kids; sleeps less than other kids and talks/walks in sleep). Correlations of the CBCL items were generally small to medium (range $r = .06$ –.46). Across instruments, many of the items were significantly correlated (range $r = .003$ –.68) and all of the child-reported items were significantly related (range $r = .29$ –.45), which suggests that the presence of one sleep disturbance symptom may increase the risk for the endorsement of other sleep symptoms.

As expected, significant associations were fewer, and often smaller, for items reported by both the caregiver and the child. For example, whereas many of the items on the CBCL were significantly correlated with items on the TSCYC (e.g., TSCYC- Nightmares was significantly correlated with 3 of the 6 CBCL items, TSCYC- not sleeping well related to all 6 CBCL items) only TSCC-Nightmares was associated with one item on the CBCL (nightmares).

Table 1 Presence of sleep difficulties on the CBCL

	Not true	Somewhat/ sometimes true	Very/often true
Nightmares	49%	37.2%	13.8%
Overtired	75.6%	21.1%	3.3%
Sleeps less than most kids	80.2%	13.4%	6.5%
Sleeps more than most kids	76.7%	15.1%	8.2%
Talks/Walks in Sleep	85.4%	9.7%	4.9%
Trouble Sleeping	72.3%	16.1%	11.6%

Table 2 Sleep difficulties on the TSCYC and TSCC

	Never/Not at all	Sometimes	Lots of times/Often	Almost all of the time/Very often
TSCYC- Nightmares	38.9%	37.6%	14.4%	9.2%
TSCYC- Not sleeping 2 or more days	94.8%	3.9%	0%	1.3%
TSCYC- Not sleeping well	53.7%	25.5%	11.7%	9.1%
TSCC- Nightmares	27.1%	53.%	9.2%	10.6%

Table 3 Presence of sleep difficulties on the UPID

	None	Little	Some	Much	Most
Bad Dreams/nightmares	33.3%	19.2%	16.9%	9.4%	21.1%
Trouble falling asleep	27.9%	16.7%	12.1%	12.6%	30.7%

Table 4 Intercorrelations among sleep items

	1	2	3	4	5	6	7	8	9	10	11	12
1. CBCL- Nightmares	–	0.16**	0.17**	0.10	0.21***	0.36***	0.68***	0.04	0.43***	0.43***	0.33***	0.19**
2. CBCL- Overtired	0.16**	–	0.17**	0.42***	0.18**	0.37***	0.09	0.05	0.33***	0.005	0.09	0.13
3. CBCL- Sleeps less than most kids	0.17**	0.17**	–	0.13*	0.06	0.45***	0.13	0.17*	0.49***	–0.04	0.06	0.09
4. CBCL- Sleeps more than most kids	0.10	0.42***	0.13*	–	0.17**	0.27***	0.01	–0.03	0.19*	–0.13	0.06	0.09
5. CBCL- Talks/ Walks in Sleep	0.21***	0.18**	0.06	0.17**	–	0.18**	0.19*	0.24**	0.20**	0.02	0.01	0.15*
6. CBCL-Trouble Sleeping	0.36***	0.37***	0.45***	0.27***	0.18**	–	0.32***	0.15	0.63***	0.08	0.10	0.17*
7. TSCYC- Nightmares	0.68***	0.09	0.13	0.01	0.19*	0.32***	–	0.13*	0.49***	0.21*	0.23*	0.08
8. TSCYC- Not sleeping 2 days	0.04	0.05	0.17*	–0.03	0.24**	0.15	0.13*	–	0.18**	0.12	0.03	0.02
9. TSCYC- Not sleeping well	0.43***	0.33***	0.49***	0.19*	0.20**	0.63***	0.49***	0.18**	–	0.09	–0.003	0.18*
10. TSCC- Nightmares	0.28***	0.005	–0.04	–0.13	0.02	0.08	0.21*	0.12	0.09	–	0.45***	0.29***
11. UPID- Nightmares	0.33***	0.09	0.06	–0.09	0.01	0.10	0.23*	0.03	–0.003	0.45***	–	0.36***
12. UPID- Falling Asleep	0.19**	0.13	0.09	0.01	0.15*	0.17*	0.08	0.02	0.18*	0.29***	0.36***	–

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

Concordance between Caregiver and Child Concordance between caregiver and child reports was generally poor and most values were well below acceptable ranges. Nightmares on the CBCL and UPID yielded a $\kappa = 0.11$. Nightmares on the CBCL and TSCC had slight agreement, with a $\kappa = 0.13$. When nightmares were compared on the TSCYC, a $\kappa = 0.02$ was found for the UPID and a 0.01 for the TSCC. Trouble sleeping on the CBCL and difficulty falling asleep on the UPID yielded a $\kappa = 0.06$. On the TSCYC, a $\kappa = 0.04$ was observed for difficulty falling asleep on the UPID.

Discussion

The aims of the current study were to: (1) examine rates of sleep problems among trauma-exposed children as reported by both caregivers and children, (2) extend the prior literature by identifying rates of sleep disturbances among preschool children, and (3) assess levels of concordance between caregiver's and children's rates of sleep difficulties. Sleep difficulties were examined using multiple items across caregiver- and child-reported instruments. Although previous research has assessed the reports of sleep disturbance in children exposed to trauma, much of the prior literature utilized small sample sizes and focused on one trauma type. Only one study examined sleep impairment among preschoolers (Chemtob et al. 2008). Further, to date, no study has assessed both caregiver's and children's reports of sleep problems as well as examined levels of concordance of these symptoms.

As expected, on the CBCL, caregivers endorsed sleep disturbances in their trauma-exposed children, including nightmares (51%) trouble sleeping (27%), being overtired (24%) sleeping more often than other children (23%), sleeping less often than other children (20%), and talking/

walking in sleep (14%). Rates on the TSCYC were comparable, nightmares 23.6%, difficulty sleeping 20.8%, not sleeping for two or more days 1.3%. These rates of sleep impairment are in line with previous work that has found sleep problems in trauma-exposed children (e.g., Carrion et al. 2002; Chimienti et al. 1989; Kovachy et al. 2013). Nightmares were the most common symptom. Elsewhere, nightmares have been found to be endorsed at higher rates than other sleep disturbances among trauma-exposed children (Kovachy et al. 2013), which may indicate that nightmares are the most prominent sleep difficulty in this population. However, if the child is waking and crying/screaming out it is possible that nightmares are more known to caregivers than other sleep difficulties such as difficulties falling asleep. Interestingly, outside of nightmares, approximately three-fourths of caregivers in the current study denied sleep disturbances in their children; however, since instruments specific to sleep were not utilized it is possible that sleep assessment tools would be better able to detect sleep symptoms.

Among preschoolers, sleep problems were also common, with 37.4% of caregivers of young children endorsing clinical levels of sleep disturbances and 11% of reporting borderline level of difficulties. Although specific rates of sleep difficulties among trauma-exposed preschoolers have not previously been reported, Chemtob and colleagues (2008) found that sleep impairment was 5 times more likely among children who experienced high levels of trauma from 9/11 compared to low levels of trauma. The CBCL does not have sleep problems subscale for the school-age form; however, examination of the rates of endorsement of sleep problems among very young children appear to be higher compared to school-age children. It is therefore clear that these symptoms are highly relevant in this age group and that further work is needed in this area. Future studies should further disentangle

whether age is a factor in children's experience of trauma-related sleep problems.

Trauma-exposed children similarly acknowledged experiencing multiple sleep disturbances including nightmares (47–72%), trouble falling asleep (55%), and poor sleep quality (46%). These results are consistent with previous studies that have documented rates of sleep difficulties among children exposed to trauma (Kovachy et al. 2013; Noll et al. 2006), although children in the current study self-reported lower levels of nightmares than in some studies (e.g., Carrion 2002). Differences in rates of sleep impairment may fluctuate based on differences in sample and trauma type and future research should examine whether rates of sleep problems differ depending upon type(s) of traumatic exposure and characteristics of the trauma. Thus, regardless of a PTSD diagnosis, sleep disturbances are a relatively common phenomenon among trauma-exposed children and merit further attention to determine if, and how, these symptoms may exacerbate other trauma-related symptoms and/or behavioral difficulties, the extent to which trauma-related sleep difficulties correspond with functional impairment, and whether trauma-focused treatment is effective in remediating these symptoms. There is preliminary evidence that adult trauma-focused treatments are associated with reductions in sleep difficulties (Galovski et al. 2009); however, this research has yet to be conducted in child populations.

Although is premature to contrast children's endorsement rates with the caregiver's rates, especially as some of the items are not directly comparable, children tended to report higher levels of overall sleep disturbances than their parents, with 46–72% of children reporting sleep symptoms, and 14–51% of parents reporting sleep difficulties in their children. However, caregiver-reported rates were higher among preschoolers (43%). As children age, they may be more aware of, and better able to report, their sleep problems. Further, concordance levels between caregivers and children were very low on all symptoms of sleep disturbance, with the reliabilities across raters consistently below acceptable thresholds. These results suggest that either caregivers are unaware of, or underestimate, the extent to which their child is affected by sleep disturbances, or they are underreporting sleep symptoms. Conversely, children may be less accurately reporting their level of sleep impairment, although this seems less likely. Prior research has also found discordance between caregiver and child reporting of exposure to traumatic events and PTSD symptoms in a similar pattern and it has been suggested that caregiver's underreporting may be due to their own trauma-related symptoms and avoidance of their own trauma history (Oransky et al. 2013). Future work is needed to parse apart caregiver's own level of distress and how it may impact levels of concordance for trauma-related symptoms. Nonetheless, these findings illustrate the importance of assessing sleep problems in both caregivers and

children to obtain the most comprehensive understanding of the child's level of sleep difficulties.

Despite the importance of these findings, the current study is not without limitations. First, individual sleep items were utilized from trauma-related assessments, and composite sleep variables for caregivers and children were not available with the exception of the preschool CBCL. In the absence of sleep specific measures, some of the indices of sleep disturbances were single items, which may lack adequate sensitivity and breadth. Although we attempted to create a composite sleep variable for the CBCL, it did not have adequate internal reliability. Future research should use instruments designed specifically to measure sleep difficulties as reported by caregivers and children to more sensitively and thoroughly assess sleep problems and examine the concordance rates. Use of objective sleep measures are also greatly needed to extend this line of research.

Importantly, the study utilized a treatment-seeking sample; therefore, the results are non-generalizable to all trauma-exposed children. Trauma-exposed children who have come to the attention of a caregiver for trauma symptoms may be exhibiting a higher level of trauma-related symptoms. Further, not all children have a caregiver who is willing and able to initiate trauma-focused treatment, which also decreases the generalizability of the findings. It is possible that the children in this sample had a higher prevalence of sleep disturbances due to greater trauma symptom severity requiring treatment. The inclusion of both treatment-seeking and non-treatment-seeking samples of trauma-exposed children is needed to explore this issue as well as more comprehensively capture the true prevalence of sleep impairment in this population. Finally, as the assessment tools for children are not appropriate for children 6 and under, young children's own reports of sleep problems were not assessed and we were not able to investigate concordance levels among these children. Very young children may not be able to express their issues with sleep disturbances to their caregivers or to clinicians as well as older children; thus, rates of sleep difficulties in younger children may be even higher than currently reported by their caregivers. Nonetheless, some studies indicate that younger children overall report more nightmares than older children and adolescents (Kovachy et al. 2013). Measures that specifically address sleep in younger children should be used to ensure accurate assessment of sleep disturbance symptoms.

Despite these limitations, the current study contributes to the small literature regarding sleep problems in pediatric traumatic stress. It appears that approximately one-half of trauma-exposed children experience some sleep disturbance symptoms, although concordance rates between caregivers and children were very low. These results have implications future research and clinical work. The relatively high rates of sleep problems observed indicate the importance

of future research to further understand the development, maintenance, and functional impact of trauma-related sleep difficulties. The presence of these symptoms also illustrate the need to address sleep difficulties within trauma-focused treatment. Low concordance rates point to the importance of examining trauma-related sleep disturbances from both the caregiver's and the child's perspectives, as utilizing only one source of information may lead to symptoms may being undetected, and, most importantly, untreated. Although measures designed specifically to assess sleep in children were not used, this study provided a prospective indication that sleep disturbances are very relevant within this population and that trauma-focused sleep assessment should utilize both caregiver's and children's reports.

Compliance with Ethical Standards

Conflict of interest None.

References

- Achenbach, T. M., & Rescorla, L. A. (2000). ASEBA preschool forms & profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth and Families.
- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. Burlington: University of Vermont, Research Center for Children, Youth, and Families.
- Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafsrød, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *The British Journal of Psychiatry*, 204, 335–340.
- American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (DSM-III). Washington, DC: Author.
- Arnberg, F. K., Rydelius, P. A., & Lundin, T. (2011). A longitudinal follow-up of posttraumatic stress: from 9 months to 20 years after a major road traffic accident. *Child and Adolescent Psychiatry and Mental Health*, 5, 3–8. <https://doi.org/10.1186/1753-2000-5-8>.
- Babson, K. A., & Feldner, M. T. (2010). Temporal relations between sleep problems and both traumatic event exposure and PTSD: A critical review of the empirical literature. *Journal of Anxiety Disorders*, 24(1), 1–15. <https://doi.org/10.1016/j.janxdis.2009.08.002>.
- Briere, J. (1996). *Trauma Symptom Checklist for Children (TSCC)*. Psychological Assessment Resources, Odessa.
- Briere, J. (2005). *Trauma Symptom Checklist for Young Children (TSCYC)*. Psychological Assessment Resources, Odessa.
- Briere, J., Johnson, K., Bissada, A., Damon, L., Crouch, J., Gil, E., Hanson, R., & Ernst, V. (2001). The trauma symptom checklist for young children (TSCYC): reliability and association with abuse exposure in a multi-site study. *Child Abuse & Neglect*, 25, 1001–1014. [https://doi.org/10.1016/S0145-2134\(01\)00253-8](https://doi.org/10.1016/S0145-2134(01)00253-8).
- Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American journal of Preventive Medicine*, 37(5), 389–396. <https://doi.org/10.1016/j.amepre.2009.06.021>.
- Bryant, R. A., Creamer, M., O'Donnell, M., Silove, D., & McFarlane, A. C. (2010). Sleep disturbance immediately prior to trauma predicts subsequent psychiatric disorder. *Sleep*, 33(1), 69–74.
- Carrion, V. G., Weems, C. F., Ray, R., & Reiss, A. L. (2002). Toward an empirical definition of pediatric PTSD: the phenomenology of PTSD symptoms in youth. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(2), 166–173.
- Ceballo, R., Dahl, T. A., Aretakis, M. T., & Ramirez, C. (2001). Inner-city children's exposure to community violence: how much do parents know? *Journal of Marriage and Family*, 63(4), 927–940.
- Charuvastra, A., & Cloitre, M. (2009). Safe enough to sleep: Sleep disruptions associated with trauma, posttraumatic stress, and anxiety in children and adolescents. *Child Adolescent Psychiatric Clinics of North America* 18, 877–91.
- Chemtob, C. M., Nomura, Y., & Abramovitz, R. A. (2008). Impact of conjoined exposure to the world trade center attacks and to other traumatic events on the behavioral problems of preschool children. *Archives of Pediatrics & Adolescent Medicine*, 162(2), 126–133. <https://doi.org/10.1001/archpediatrics.2007.36>.
- Chimienti, G., Nasr, J. A., & Khalifeh, I. (1989). Children's reactions to war-related stress. Affective symptoms and behaviour problems. *Social Psychiatry & Psychiatric Epidemiology*, 24, 282–287.
- Cicchetti, D., & Toth, S. L. (1995). A developmental psychopathology perspective on child abuse and neglect. *Journal of the American Academy of Child & Adolescent Psychiatry*, 34(5), 541–565. <https://doi.org/10.1097/00004583-199505000-00008>.
- Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2006). *Treating trauma and traumatic grief in children and adolescents*. New York: Guilford Press.
- Colvonen, P. J., Masino, T., Drummond, S. P. A., Myers, U. S., Angkaw, A. C., & Norman, S. B. (2015). Obstructive sleep apnea and posttraumatic stress disorder among OIF/OEF/OND veterans. *Journal of Clinical Sleep Medicine*, 11, 513–518. <https://doi.org/10.5664/jcs.4692>.
- Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry*, 64(5), 577–584. <https://doi.org/10.1001/archpsyc.64.5.577>.
- De Bellis, M. D. (2001). Developmental traumatology: The psychobiological development of maltreated children and its implications for research, treatment, and policy. *Development and Psychopathology*, 13(03), 539–564.
- De Bellis, M. D., Woolley, D. P., & Hooper, S. R. (2013). Neuropsychological findings in pediatric maltreatment: relationship of PTSD, dissociative symptoms, and abuse/neglect indices to neurocognitive outcomes. *Child Maltreatment*, 18(3), 171–183. <https://doi.org/10.1177/1077559513497420>.
- Dollinger, S. J. (1986). The measurement of children's sleep disturbances and somatic complaints following a disaster. *Child Psychiatry & Human Development*, 16(3), 148–153.
- Finkelhor, D., Turner, H., Ormond, R., & Hamby, S. L. (2009). Violence, abuse, and crime exposure in a national sample of children and youth. *Pediatrics*, 124, 1411–1423. <https://doi.org/10.1542/peds.2009-0467>.
- Galovski, T. E., Monson, C., Bruce, S. E., & Resick, P. A. (2009). Does cognitive-behavioral therapy for PTSD improve perceived health and sleep impairment? *Journal of Traumatic Stress*, 22, 197–204. <https://doi.org/10.1002/jts.20418>.
- Gehrman, P., Seelig, A. D., Jacobson, I. G., Boyko, E. J., Hooper, T. I., Gackstetter, G. D., ... & Smith, T. C. (2012). Predeployment sleep duration and insomnia symptoms as risk factors for new-onset mental health disorders following military deployment. *Sleep*, 36(7), 1009–1018. <https://doi.org/10.5665/sleep.2798>.
- Kilpatrick, D. G., Ruggiero, K. J., Acierio, R., Saunders, B. E., Resnick, H. S., & Best, C. L. (2003). Violence and risk of PTSD, major depression, substance abuse/dependence, and comorbidity: results from the National survey of adolescents. *Journal of Consulting Clinical Psychology*, 71, 692–700.
- Koffel, E., Polusny, M. A., Arbisi, P. A., & Erbes, C. R. (2013). Pre-deployment daytime and nighttime sleep complaints as predictors of post-deployment PTSD and depression in national guard

- troops. *Journal of Anxiety Disorders*, 27(5), 512–519. <https://doi.org/10.1016/j.janxdis.2013.07.003>.
- Koren, D., Arnon, I., Lavie, P., & Klein, E. (2002). Sleep complaints as early predictors of posttraumatic stress disorder: a 1-year prospective study of injured survivors of motor vehicle accidents. *American Journal of Psychiatry*, 159(5), 855–857.
- Kovachy, B., O'Hara, R., Hawkins, N., Gershon, A., Primeau, M. M., Madej, J., & Carrion, V. (2013). Sleep disturbance in pediatric PTSD: current findings and future directions. *Journal of Clinical Sleep Medicine*, 9, 501–510. <https://doi.org/10.5664/jcsm.2678>.
- Krakow, B., Haynes, P. L., Warner, T. D., Melendrez, D., Sisley, B. N., Johnston, L., Hollifield, M., & Lee, S. (2007). Clinical sleep disorder profiles in a large sample of trauma survivors: an interdisciplinary view of posttraumatic sleep disturbance. *Sleep and Hypnosis*, 9, 6–15.
- Mellman, T. A., Bustamante, V., Fins, A. I., Pigeon, W. R., & Nolan, B. (2002). REM sleep and the early development of posttraumatic stress disorder. *American Journal of Psychiatry*, 159(10), 1696. <https://doi.org/10.1176/appi.ajp.159.10.1696>.
- Mellman, T. A., & Hipolito, M. M. S. (2006). Sleep disturbances in the aftermath of trauma and posttraumatic stress disorder. *CNS Spectrums*, 11(08), 611–615.
- Mellman, T. A., Pigeon, W. R., Nowell, P. D., & Nolan, B. (2007). Relationships between REM sleep findings and PTSD symptoms during the early aftermath of trauma. *Journal of Traumatic Stress*, 20(5), 893–901. <https://doi.org/10.1002/jts.20246>.
- Noll, J. G., Trickett, P. K., Susman, E. J., & Putnam, F. W. (2006). Sleep disturbances and childhood sexual abuse. *Journal of Pediatric Psychology*, 31, 469–480. <https://doi.org/10.1093/jpepsy/psj040>.
- Norman, S. B., Stein, M. B., & Davidson, J. R. (2007). Profiling posttraumatic functional impairment. *Journal of Nervous and Mental Disease*, 195(1), 48–53. <https://doi.org/10.1097/01.nmd.0000252135.25114.02>.
- Ohayon, M. M., & Shapiro, C. M. (2000). Sleep disturbances and psychiatric disorders associated with posttraumatic stress disorder in the general population. *Comprehensive Psychiatry*, 41, 469–478. <https://doi.org/10.1053/comp.2000.16568>.
- Oransky, M., Hahn, H., & Stover, C. S. (2013). Caregiver and youth agreement regarding youths' trauma histories: implications for youths' functioning after exposure to trauma. *Journal of Youth and Adolescence*, 42(10), 1528–1542. <https://doi.org/10.1007/s10964-013-9947-z>.
- Pynoos, R., Rodriguez, N., Steinberg, A., Stuber, M., & Frederick, C. (1998). *UCLA PTSD Index for DSM-IV*. UCLA Trauma Psychiatry Program, Los Angeles.
- Roberts, R. E., Roberts, C. R., & Duong, H. T. (2009). Sleepless in adolescence: prospective data on sleep deprivation, health and functioning. *Journal of Adolescence*, 32, 1045–1057. <https://doi.org/10.1016/j.adolescence.2009.03.007>.
- Scheeringa, M. S. (2011). PTSD in children younger than the age of 13: Toward developmentally sensitive assessment and management. *Journal of Child & Adolescent Trauma*, 4(3), 181–197. <https://doi.org/10.1080/19361521.2011.597079>.
- Scheeringa, M. S., Zeanah, C. H., & Cohen, J. A. (2011). PTSD in children and adolescents: toward an empirically based algorithm. *Depression and Anxiety*, 28(9), 770–782. <https://doi.org/10.1002/da.20736>.
- Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(5), 561–570. <https://doi.org/10.1097/01.CHI.0000046822.95464.14>.
- Schreier, H., Ladakakos, C., Morabito, D., Chapman, L., & Knudson, M. M. (2005). Posttraumatic stress symptoms in children after mild to moderate pediatric trauma: a longitudinal examination of symptom prevalence, correlates, and parent-child symptom reporting. *Journal of Trauma and Acute Care Surgery*, 58(2), 353–363.
- Sharafkhaneh, A., Giray, N., Richardson, P., Young, T., & Hirshkowitz, M. (2005). Association of psychiatric disorders and sleep apnea in a large cohort. *Sleep*, 28, 1405–1411.
- Spoormaker, V. I., & Montgomery, P. (2008). Disturbed sleep in post-traumatic stress disorder: Secondary symptom or core feature? *Sleep Medicine Review*, 12, 169–184. <https://doi.org/10.1016/j.smrv.2007.08.008>.
- Stover, C. S., Hahn, H., Im, J. J., & Berkowitz, S. (2010). Agreement of parent and child reports of trauma exposure and symptoms in the early aftermath of a traumatic event. *Psychological Trauma: Theory, Research, Practice, and Policy*, 2(3), 159–168. <https://doi.org/10.1037/a0019156>.
- Wittmann, L., Zehnder, D., Schredl, M., Jenni, O. G., & Landolt, M. A. (2010). Posttraumatic nightmares and psychopathology in children after road traffic accidents. *Journal of Traumatic Stress*, 23(2), 232–239. <https://doi.org/10.1002/jts.20514>.