

Sleep Disturbances and Childhood Sexual Abuse

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Objective This longitudinal, prospective study examined the relationship between childhood sexual abuse and later sleep problems in adolescence while taking into account cooccurring psychopathology that is closely related to sleep disruption [e.g., depression and posttraumatic stress disorder (PTSD)]. **Method** Sleep disturbances in 147 females (78 sexually abused; 69 comparison) were assessed 10 years after disclosure of substantiated abuse. The follow-up protocol included self-report questions regarding typical sleeping patterns and sleep disturbances as well as measures of depression, PTSD, and lifetime victimization histories. **Results** Sleep disturbances correlated significantly with both depression and PTSD. Hierarchical regression analysis showed that sexually abused participants reported significantly greater rates of sleep disturbances than comparison participants above and beyond depression and PTSD. Sleep disturbances were related to revictimization rates independent of sexual abuse, depression, and PTSD. **Conclusions** Assessments of sleep disturbances should be integrated into standard of care for adolescents who have experienced sexual abuse.

Key words adolescence; sexual abuse; sleep disruption; victimization.

Sleep occurs in every animal species and is essential for survival. Sleep is especially important during periods of brain maturation during childhood and adolescence, thus making discussions of sleep particularly relevant to understanding adolescent health and development. Even though adolescents need sufficient sleep to maintain optimal health and functioning, many do not get the recommended hours of sleep they need. Because of increasingly later bed times coupled with early school start-times, adolescents find themselves with an increased "sleep debt" (Carskadon, 1990). There are also broad misconceptions that adolescents do not need as much sleep as they did when they were children. Not only do adolescents not get enough sleep, many suffer from poor quality sleep. Sleep involves active, dynamically changing patterns and progressive stages that occur throughout the night. Continuity, timing, and patterning of

these essential stages are necessary for full restorative sleep. Deprivation of rapid eye movement (REM) sleep, for example, results in excessive tiredness, fatigue, and emotional changes similar to those of having obtained insufficient sleep (Dahl & Lewin, 2002). Adolescence is a period when problems such as sleep distorted breathing (snoring, sleep apnea), insomnia, agitation, and nightmares begin to emerge and interfere with sleep quality.

The consequences of insufficient sleep have particular implications for the cognitive and emotional functioning of adolescents. First, sleepy adolescents have academic difficulties such as poor school performance, lower grades, problems sustaining attention and staying awake in classrooms, and decreased performance on abstract reasoning tasks (Dahl, Holtum, & Trubnick, 1994; Horne, 1993). Second, sleep-deprived adolescents have less control over emotional responses and show increased affect dysregulation,

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Journal of Pediatric Psychology 31(5) pp. 469–480, 2006
doi:10.1093/jpepsy/jsj040

Advance Access publication June 15, 2005

Journal of Pediatric Psychology vol. 31 no. 5 © The Author 2005. Published by Oxford University Press on behalf of the Society of Pediatric Psychology.
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anger, aggressivity, irritability, impatience, and low frustration tolerance (Dahl & Lewin, 2002). Third, there is an increased use of stimulants associated with sleep deprivation, thus placing sleepy adolescents at risk for developing substance use disorders (Carskadon, 1990). Fourth, sleep disturbances have been observed in children and adolescents with psychiatric disorders such as attention deficit, hyperactivity, depressive, and mood disorders (Chervin et al., 2002; Sadeh, Hayden, McGuire, & Sachs, 1994). Finally, sleep is important for the optimal performance of vigilance systems (Horne, 1993). Yet, many of the social contextual experiences that adversely affect sleep are unknown, particularly in, at risk youth.

Sleep is naturally restricted to times and places that feel safe. Feelings of safety promote sleep, whereas feelings of threat or stress inhibit sleep. If arousal is increased as a result of impending threat, sleep will likely suffer (Dahl & Lewin, 2002). Safety is a particularly salient issue for adolescents who have been traumatized. Threats to safety after a natural disaster (e.g., earthquake, fire, hurricane) or following the loss or death of a close relative or witnessing violence may likely cause short-term disturbances in sleep patterns. Ongoing threats to safety resulting from a lack of being protected—as is often true in cases of child maltreatment and abuse—likely result in extended periods of sleep disruption. The focus of this article is to examine whether a recognized extreme form of maltreatment, sexual abuse, is predictive of sleep disturbances in adolescent girls and young women. Sexual abuse compromises sleep safety because it often occurs at night in a place where the child must continue to sleep after being abused and/or during periods of ongoing abuse.

Sleep quality has been closely linked with depression in adolescents. The majority of children and adolescents with major depressive disorder complain of sleep problems, with 75% reporting insomnia and 25% reporting hypersomnia (Morielli, Ladan, Ducharme, & Brouillette, 1996). Remission from depressive illness is often accompanied by improvements in sleep quality (Berger, Reimann, Hochli, & Speigel, 1989). Depressed adolescents have elevated plasma cortisol levels near sleep onset, increased sleep latency (i.e., trouble falling asleep), and significant dysregulation in REM sleep patterns (McCracken, Poland, Lutchmansingh, & Edwards, 1997). The relationship between sleep and depression is likely bidirectional. The excessive worry, rumination, and negative attributions associated with depression contribute to the heightened physical and mental arousal that interferes with sleep. It has been suggested that mechanisms for sleep disturbances parallel aspects

of underlying pathophysiology of severe depression and may thus be indicative of biological vulnerability for developing depressive illness (McCracken, 2002). Given that depression has been identified as both acute and long-term sequelae of childhood sexual abuse (Trickett, Noll, Reiffman, & Putnam, 2001), inquiries into sleep patterns of abused individuals should logically include parallel inquiries into depression.

Posttraumatic stress disorder resulting from significant trauma, including sexual abuse, is to some extent characterized by sleep disturbances and nightmares in response to trauma (Harvey, Jones, & Schmidt, 2003). Nightmares typically describe reexperiencing symptoms and difficulty getting to sleep and staying asleep, typically, describe arousal symptoms. Individuals are reported to experience sleep disturbances only in the acute phases immediately following trauma (Lavie, 2001). Sleep problems associated with enduring PTSD are not well understood. A recent study reported relatively few objective sleep problems in a large sample of adults reporting PTSD in the preceding 5 years, and these problems were limited to higher rates of brief arousals from REM sleep (Breslau, 2004). Much of what is known about the connection between sleep and response to trauma is derived from studies of adults. However, studies of children are beginning to emerge showing that sleep disruption and nightmares are related to the stress of war, disasters, loss, and to other, more general, stressful life events (Ellis, Sores, & Mayou, 1998; Sadeh, Raviv, & Gruber, 2000). PTSD is a particularly salient feature of responses to childhood sexual abuse. PTSD has been identified in children immediately following the disclosure of abuse and as a long-term effect of sexual abuse (Widom & Kuhns, 1996). Further, persisting PTSD has been linked to adjustment problems in adolescents abused in childhood (Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003; Trickett et al., 2001). Studies attempting to elucidate the connection between sleep disturbances and sexual abuse should also take into account acute and persisting PTSD symptoms given the links between PTSD and sexual abuse.

Females abused in childhood have reported sexual and physical victimization in adolescence and early adulthood at rates three to five times greater than females without abuse histories (Boney-McCoy & Finkelhor, 1995; Noll et al., 2003a; Wekerle & Avgoustis, 2003). Although this phenomenon is not well understood, poor recognition of potential danger and impaired or inadequate response strategies may be mechanistic of an increased susceptibility for continued

victimization. Women with victimization histories have been shown to exhibit inordinately long latencies in signaling the point at which a date rape scenario should be halted (Marx, Calhoun, Wilson, Meyerson, & Brit, 1998; Wilson, Calhoun, & Bernat, 1999). Being sleepy increases the tendency toward brief mental lapses, microsleeps, and/or short gaps in awareness or responsiveness. Research has shown that sleep deprivation results in a loss of attentional focus and diminished impulse control (Dahl et al., 1996). A connection has been established between good sleep and the optimal performance of vigilance systems and higher cortical functioning (Horne, 1993). Sleepiness has also been associated with decreased control over emotions and lowered inhibitions in adolescents (Dahl, 1999). Thus, examining a potential connection between sleep problems and continued victimization of abuse survivors is warranted.

Research on the relationship between sexual trauma in childhood and sleep problems is scant. Research on adult sexual assault survivors has shown that upward of 77% of survivors reports insomnia, nightmares, sleep-disordered breathing, and/or sleep-related movement disorders and that suffering from sleep problems likely persists for many years after the initial trauma (Krakow et al., 2002), but these long-term studies have not been done to date. Studies of children and adolescents who have been sexually abused report sleep disturbances being among the varied symptoms of childhood abuse (Goldston, Turnquist, & Knutson, 1989). Most of these studies focused on short-term effects of sexual abuse and rely on samples of psychiatric inpatients to estimate effect sizes. Follow-up studies are few and are limited to only a few years (Calam, Horne, Glasgow, & Cox, 1998).

There are considerable individual differences within samples of abused children as regards the extent to which they display deleterious outcomes, with some victims displaying pronounced pathology, and others appearing remarkably resilient (Finkelhor & Browne, 1985; Trickett et al., 2001). This variation can, to some extent, be predicted by the characteristics of the offense (Finkelhor, Hotaling, Lewis, & Smith, 1990; Russell, 1983). Recent evidence, however, has cautioned against focusing on the severity of impact rather than on differential impact of these characteristics (Freyd, 1994; Noll, Trickett, & Putnam, 2003b). For example, victims suffering seemingly more "mild" forms of abuse appear to present asymptomatic in the acute phases immediately following disclosure, but these same individuals appear to be more symptomatic later in development (Trickett et al., 2001). Only one study to date has examined how characteristics of the abuse might relate to sleep prob-

lems in sexually abused victims. Rimsza and colleagues (Rimsza, Berg, & Locke, 1988) reported that the duration of abuse and the age of onset of abuse correlated positively with sleep problems, but that the type of abuse and assailant did not affect the frequency of reported symptoms.

Given the large set of comorbid sequelae of sexual abuse, and given the high prevalence of reported abuse by psychiatric inpatients, the unique contribution of sexual abuse to any single aspect of psychopathology is questionable (Goldston et al., 1989). Careful modeling of comorbid symptomatology is needed to isolate unique features attributable to sexual trauma *per se*. That is, it will never be clear that experiencing sexual trauma leads to sleep problems if cooccurring psychopathology that is closely related to, or to some extent defined by, sleep disruption (e.g., depression and PTSD) is not simultaneously taken into account. Thus, this study was designed to elucidate sexual abuse as a unique contributor to long-term sleep problems above and beyond these comorbid symptoms.

The following specific hypotheses were examined: (a) Sleep disturbances, including amounts of sleep, will be more pronounced in sexually abused females than in comparison females 10 years postdisclosure. (b) These effects will persist after taking into account comorbid depression and PTSD. (c) Sleep disturbances will be predictive of subsequent victimization above and beyond comorbid depression and PTSD. (d) Characteristics of the sexual abuse will differentiate within-group individual differences in sleep disturbances.

Methods

Participants

The sample consists of 84 sexually abused and 82 comparison females. Abused females were referred by protective service agencies in the greater Washington, DC, metropolitan area. Eligibility criteria for inclusion in the study were (a) the victim was female, aged 6–16; (b) disclosure of substantiated abuse occurred within six months of participation; (c) sexual abuse involved genital contact and/or penetration; (d) the perpetrator was a family member including parent, stepparent, sibling, uncle, or mother's live-in boyfriend; and (e) a nonabusing parent or guardian (usually the child's mother) was willing to participate. Data compiled from protective service records indicated that the median age at onset of abuse was between 7 and 8 years and the median duration was approximately 2 years. In 70% of the cases, the abuse included vaginal and/or anal penetration. In about 60% of the cases the abuser was the biological father (BF),

stepfather, or mother's live-in boyfriend. It is not possible to estimate with precision how similar the sample is to the average caseloads of protective service agencies. However, the information on the perpetrators, the average age of onset, and the average duration is similar to comparable information reported in national surveys of protective services caseloads in years proximal to obtaining the sample (NIS-2; NCCAN).

The comparison sample was recruited through advertisements in community newspapers and posters in welfare, daycare, and community facilities in the same neighborhoods in which the abused participants lived. Comparison families contacted study personnel and were screened for eligibility which included having no prior contact with protective service agencies and being demographically similar to a same-aged abused participant. At the time of study entry, comparison families were not informed that the study involved sexually abused girls; rather, they were told that the study was of "female growth and development." At the end of the initial interview, however, caregivers were told that the study pertained to sexual abuse, after which, information was obtained about any possible unwanted sexual experiences of the comparison girls or other family members. In a few cases ($N < 5$) families were dropped from the comparison group because some history of sexual abuse was ascertained. Seventy percent of the comparison families resided in the same zip code district, 20% in adjacent districts, and 10% in comparable, nearby districts. Comparison females were similar to the abused females in terms of ethnic group, age, predisclosure socioeconomic status, family constellation (one or two parent families), and other nonsexual traumas. All families ranged from low to middle SES, with mean Hollingshead (1975) scores of approximately 35 (defined as "blue collar" or working class). Forty-nine percent of the sample was Caucasian, 46% African American, 4% Hispanic, and 1% Asian American.

The follow-up sample was assessed approximately 10 years after the disclosure of the abuse and consisted of 159 participants resulting in a retention rate of 95.78%. During the course of the interview, 12 comparison participants revealed that they had been victims of some form of childhood sexual abuse and were dropped from analyses resulting in a total N of 147 (78 abused, 69 comparison). At the follow-up assessment participants ranged in age from 16.31 to 28.27 ($M = 20.41$, $SD = 3.38$). Abused and comparison groups did not differ with respect to age, minority status, or SES.

Measures

Sleep Disturbances

Six self-report questions regarding typical sleeping patterns were ascertained as part of a larger health history and update form designed for use in this study. Participants indicated whether or not ("Yes" or "No") they had experienced problems with the following symptoms over the past 2 years; (a) having trouble getting to bed on time, (b) having trouble falling asleep, (c) waking during the night (periods of insomnia), (d) having nightmares, (e) not sleeping well or not feeling rested in the morning, and (f) not getting as much sleep as needed. Four items from the youth self report (Achenbach, 1991) scale including items 47 (nightmares), 76 (sleep less than most), 77 (sleep more than most), and 100 (general trouble sleeping) were added to this composite along with two items from the Brief Symptom Inventory (Derogatis & Spencer, 1982) including items 25 (trouble falling asleep) and 49 (feeling so restless that can't relax or sit still). The resulting composite contained 12 standardized items with adequate internal consistency reliability ($\alpha = .83$). It is acknowledged that subjective estimates of sleep quality are inherently fallible as compared to objective polysomnographic (PSG) which are considered by many to be the "gold standard" (Carskadon & Rechtschaffen, 2000). Typically, participants are quite poor at adequately reporting their sleep onset latency and whether or not they have a sleep disorder (i.e., sleep apnea and periodic limb movement disorders), but do a better job at reporting periods of insomnia and daytime sleepiness (Coates & Al, 1982). Several studies have shown that self-report measures do an adequate job at discriminating those with insomnia from those without insomnia but are not as good at detecting other sleep disorders (Gehrman, Matt, Turingan, Dinh, & Ancoli-Israel, 2002). The 12-item composite used in this study resembles closely the sleep disturbances subscale of the Pittsburgh Sleep Quality Index (Buysse, III, Monk, Berman, & Kupfer, 1989) which is a widely used, reliable self-report measure of multiple dimensions of sleep.

Amounts of Sleep

Participants also indicated the number of hours they get in a typical weeknight. Based on previous research showing that adolescents who get less than 7 hr of sleep on school nights show decreased functioning (Wolfson & Carskadon, 1998), a variable indicative of unhealthily small amounts of sleep was created where participants received a score of "1" if they reported less than 7 hr per night (LT7) and "0" for greater than or equal to 7 hours. Because many adolescents report that they need

up to 9–9½ hr of sleep per night (Wolfson & Carskadon, 1998), a variable indicative of hypersomnia was created where participants received a score of “1” if they reported greater than 10 hr per night (*GT10*) and “0” for less than or equal to 10 hr.

Depression

Self-reported depression symptoms were measured through the Child Depression Inventory (CDI) (Kovacs, 1981). To maximize the age appropriateness of all CDI items for the entire range of the sample at follow-up, modifications were made to the three CDI items referring to problems in school or problems with school-work. For example, items indicating trouble in school were changed to “trouble in school/work.” Altering item-content was deemed preferable to substituting an analogue measure for the older participants in the sample [e.g., the Beck Depression Inventory (BDI)]; (Beck, Steer, & Brown, 1996) because of the complications in comparing disparate total scores within the sample and an inability to establish construct invariance across different inventories. Further, 16 of the 27 CDI items are highly similar in content to items of the BDI. The sample alpha for the CDI items at follow-up was .89 suggesting that the instrument is sufficiently reliable despite these slight wording changes. In the abused group 12.89% scored in the clinical range for depression according to CDI norms (Kovacs, 1981) compared to 1.98% of the comparison group ($p < .01$).

Revictimization

Victimization subsequent to the referring childhood sexual abuse was ascertained through the Comprehensive Trauma Interview (CTI; Noll et al., 2003a). The CTI is a semi-structured interview eliciting factual information on a broad range of traumatic or upsetting life events and subjective responses to those events. The CTI requires participants to describe the nature and extent of traumatic experiences across generally accepted domains of childhood trauma including (a) separations and losses; (b) physical and/or medical neglect; (c) emotional abuse; (d) physical abuse; (e) other physical harm including being beaten up by other kids or gangs, being mugged, physical assault by a domestic partner, or other serious physical harm; (f) self-inflicted harm including self-mutilation and/or suicide attempts; (g) sexual abuse and/or sexual assault; (h) natural disasters; and (i) witnessing violence including seeing others harmed or witnessing a serious accident. Along with the specific details of each trauma, participants indicate their age at the time of the trauma (or age at onset and age at offset), and how distressing the event(s) were. For this distress

rating, participants are again asked to rate the event(s) from 1 (“not upsetting at all”) to 5 (“the most upset I have been”). Traumas rated “4” or “5” are considered to be “significant” traumas. Participants were given one point for every significant sexual (including sexual assault or rape) or physical victimization (defined as having been beaten up, mugged, or physically hurt by a domestic partner or boyfriend). For sexually abused participants, this number represents the number of significant victimizations *subsequent to being sexually abused*, as traumatic events occurring prior to sexual abuse could not be considered subsequent traumas. For the comparison participants, this number represents the number of significant victimizations after study enrollment. The CTI has been shown to be effective in discriminating abuse and comparison females in terms of physical and sexual assaults, self-harm, and number of lifetime traumas. In addition, traumatic histories have been shown to correlate with PTSD and dissociation levels (Noll et al., 2003a).

Posttraumatic Stress Disorder

The PTSD symptoms scale was derived from (Davidson, Kudler, & Smith, 1989) but was modified to be DSM-IV compliant. These 18 questions were administered as part of the CTI (described above) and concern the trauma identified as the “worst”. Participants received one point for every symptom endorsed in the three PTSD diagnostic categories; arousal symptoms ($\alpha = .81$), reexperiencing symptoms ($\alpha = .79$), and avoidant symptoms ($\alpha = .80$).

Abuse Characteristics

Information about the sexual abuse was obtained through the Caseworker Abuse History Questionnaire (CAHQ; Trickett et al., 2001). Six principal characteristics of abuse were identified including (a) age at onset, (b) duration, (c) perpetrator identity—classified as BF, other father figure including mothers’ live-in boyfriend, or other relative, (d) severity of abuse ranging from genital fondling to penetration, (e) abuse by multiple perpetrators (MP), and (f) physical violence or treats of violence accompanying the abuse. In our previous work (reference withheld for review) a hierarchical cluster analysis was performed to determine how the sample might be partitioned into meaningful subgroups based on the abuse characteristics derived from the CAHQ. The MP subgroup ($N = 20$) was comprised of girls who had been abused by MP none of whom were their BF; the abuse was over a relatively short period of time, but was likely to have been accompanied by pronounced physical violence. The single perpetrator (SP) subgroup

($N = 21$) experienced abuse by a SP who was not the BF, the duration of the abuse was relatively short, and violence was not frequent. The BF subgroup ($N = 14$) was characterized by abuse by the BF over a long period, beginning at a relatively young age with a low occurrence of physical violence.

Procedures

Participants completed measures in a 2–3 hr laboratory session. Interviewers were PhD-level or Clinical Psychology PhD candidate females extensively trained to maximize rapport and detect and respond to signs of participant distress or fatigue. Participants first completed the health questionnaire which contained questions about sleep habits and then completed the CDI. After a 10 min break, a trained clinical interviewer administered the semi-structured CTI which included the PTSD assessment. Those under the age of 18 were accompanied by a nonabusing caretaker. Parents or guardians signed a consent form for participants under the age of 18 and participants 18 and over signed for themselves. Participants between the ages of 7 and 17 also provided assent. The caretaker was not present in the room when the assessments took place. Monetary compensation was awarded at the rate put forth by the National Institutes of Health Normal Volunteer program (approximately \$100 per family). The study received appropriate approval from the University Institutional Review Board and was awarded a Federal Certificate of Confidentiality.

Results

All analyses were performed using SAS version 8.2 and all models included data from all subjects (abused = 78; comparison = 69). To control for overlapping method variance, items from the CDI and PTSD scales having to do with problems related to sleep were removed from total scale scores for further analyses. Items 16 (sleepy) and 17 (tired) were removed from the CDI total score, and items 2 (distressing dreams) and 13 (sleep problems) were removed from the reexperiencing and arousal PTSD subscales, respectively. Since participants span a relatively large age range and distinct developmental stages are represented (median age = 18.23), age was controlled (as a covariate in a separate step) in all analyses as a proxy for developmental stage to partially control for potential confounds because of developmental differences between participants. Age was indeed correlated at the zero-order with PTSD symptoms (arousal, $r = .30$, $p < .01$; reexperiencing, $r = .26$, $p < .01$; avoidant,

$r = .18$, $p < .05$) but was not correlated with any of the other variables used in analyses. Table I contains variable means and standard deviations for the abused and comparison groups. An omnibus MANOVA model was tested for the set of variables in Table I to determine whether the groups differed significantly with respect to dependent variables while controlling for age. A main effect for group was significant for the set of dependent variables ($F(6,140) = 3.53$, $p < .01$). Planned post hoc comparisons revealed that abused participants reported significantly more sleep disturbances, significantly more PTSD reexperiencing, and avoidant symptoms, and slightly higher rates of PTSD arousal symptoms ($p = .06$) and revictimization ($p = .07$).

To ascertain the extent to which self-reported sleep variables were related to constructs thought to be indicative of sleep problems, partial correlations between sleep variables and depression and PTSD were examined with age partialled. Results indicated that sleep disturbances correlated significantly with depression ($r = .43$, $p < .01$) and all three types of PTSD symptoms; arousal ($r = .20$, $p < .01$), reexperiencing ($r = .20$, $p < .01$), and avoidant ($r = .26$, $p < .01$). Partial correlations did not differ across abused and comparison groups. In similar analyses, amounts of sleep did not correlate with depression and PTSD with one exception; sleeping greater than 10 hr per night was correlated with reexperiencing symptoms ($r = .22$, $p < .01$).

The extent to which childhood sexual abuse is an independent predictor of sleep disturbances was tested through a hierarchical regression model where depression, PTSD symptoms, and abuse status were entered in three separate steps and resulting model R^2 changes were evaluated. Table II includes parameter estimates and R^2 change analyses for each of these steps. Results indicate that abuse status continued to be a unique predictor of sleep disturbances even when in company with

Table I. Adjusted Means and Standard Deviations by group

Variable	Abused ($N = 78$, $M \pm SD$)	Comparison ($N = 69$, $M \pm SD$)	<i>P</i>
Sleep disturbances ^a	0.22 ± 1.06	-0.24 ± 0.90	.007
% Less than 7 (LT7)	26.60 ± 44.35	20.71 ± 41.03	.43
% Greater than 10 (GT10)	5.46 ± 21.80	5.16 ± 22.47	.97
Depression	13.38 ± 6.51	12.22 ± 4.82	.13
PTSD arousal ^a	0.16 ± 0.97	-0.14 ± 1.00	.06
PTSD reexperiencing ^a	0.24 ± 1.00	-0.24 ± 0.91	.003
PTSD avoidant ^a	0.35 ± 0.95	-0.34 ± 0.93	<.0001
Revictimization	5.72 ± 4.10	4.61 ± 3.11	.07

^aStandard scores presented ($M = 0$; $SD = 1$); moments adjusted for age.

Table II. Hierarchical Regression of Sleep Disturbances on Depression and posttraumatic stress disorder

Step	Variables	df	β	F	R^2	$R^2\Delta$
1	Depression	1	.49	50.42**	.25	.25**
2	Depression	1	.48	47.20**	.28	.03*
	PTSD arousal	1	.19	7.42*		
	PTSD reexperiencing	1	.11	2.56		
	PTSD avoidant	1	.09	1.64		
3	Depression	1	.47	44.24**	.33	.05*
	PTSD arousal	1	.18	6.25*		
	PTSD reexperiencing	1	.10	2.43		
	PTSD avoidant	1	.08	1.13		
	Abuse status	1	.24	7.64*		

Age controlled in analysis and did not contribute significantly to R^2 .* $p < .05$. ** $p < .01$.**Table III.** Regression Model of Revictimization on Abuse Status, Depression, posttraumatic stress disorder, and Sleep Disturbances

Variables	df	β	F
Abuse status	1	.06	1.68
Depression	1	.06	1.66
PTSD arousal	1	.22	6.06*
PTSD reexperiencing	1	.20	5.81
PTSD avoidant	1	.19	5.12
Sleep disturbances	1	.25	6.65**

Age controlled in analysis.

* $p < .05$. ** $p < .01$. Model $R^2 = .18$.

depression and PTSD symptoms. Although depression accounted for the major part of the total R^2 (25%; step 1), PTSD symptoms—chiefly arousal symptoms—accounted for an additional 3% (step 2), and abuse status accounted for an additional 5% (step 3).

To ascertain the extent to which sleep disturbances plays a role in revictimization rates, a regression equation was tested in which abuse status, depression, PTSD symptoms, and sleep disturbances were modeled as independent variables predicting revictimization rates. Table III demonstrates that sleep disturbances, along

with PTSD arousal symptoms, are a significant predictor of revictimization when in company with abuse status and depression.

Individual abuse characteristics (e.g., age at onset, duration, presence of violence, perpetrator identity) were examined separately, and there were no significant associations with sleep variables. However, results in Table IV show that abused participants in the SP subgroup reported significantly more sleep disturbances than the comparison group and reported getting unhealthily small amounts of sleep (LT7) to a greater extent than did participants in the MP subgroup after controlling for age, PTSD, and depression. Although the BF subgroup reported the highest rates of sleeping 10 hr or greater, these percentages were not significantly different across groups.

Discussion

The principal aim of this research was to understand more fully the connection between significant childhood trauma and sleep disruption later in adolescence and young-adulthood. There is a well-established connection between sexual abuse and acute and long-term depression and PTSD. Depression and PTSD are closely related to, and to some extent defined by, sleep disturbances such as nightmares and insomnia. Thus, this study further sought to establish a clear connection between early sexual abuse and sleep problems independent of any comorbid depression and PTSD. Indeed, this is the first prospective long-term study (10 years post-disclosure of abuse) to identify sleep disturbances in adolescence and early adulthood as long-term sequelae of childhood sexual abuse while controlling for additional psychopathology known to be closely related to sleep problems. Results of this study also indicate an important connection between sleep disturbances and victimization subsequent to childhood sexual abuse.

Table IV. Adjusted Means and Standard Deviations of Sleep Variables Across Abused Subgroups and the Comparison Group

	Abused			Comparison M (SD)
	MP ($M \pm SD$)	SP ($M \pm SD$)	BF ($M \pm SD$)	
Sleep disturbances ^a	0.18 ± 1.07	0.79 ± 1.11 ^c	0.23 ± 0.98	-0.18 ± 0.91
% Less than 7 (LT7)	13.19 ± 35.01	37.69 ± 49.15 ^b	25.08 ± 43.10	21.22 ± 41.02
% Greater than 10 (GT10)	5.00 ± 21.02	4.45 ± 19.01	8.53 ± 27.11	4.31 ± 21.04

BF, biological father abused subgroup (N = 20); MP, multiple perpetrators abused subgroup (N = 24); SP, single perpetrator abused subgroup (N=34).

Adjusted for age, PTSD, and depression.

^aStandard scores presented ($M = 0$; $SD = 1$).^bPlanned post hoc comparison; different from MP subgroup at $p < .05$.^cPlanned post hoc comparison; different from comparison group at $p < .05$.

Why Does Sexual Abuse Interfere with Sleep?

Anthropologic erudition indicates that sleep is naturally restricted to times and places of safety. Safety during sleep is likely compromised in cases of childhood sexual abuse where victimization takes place in the bedroom, which can thereafter become a place associated with sexual violation. In addition, abuse often occurs at night although the child is sleeping perhaps resulting in feelings of increased vulnerability during times set aside for rest. Thus, sexual abuse victims may suffer additional threats to safety and protection, which serve to compound sleep disturbances above and beyond those associated with coexisting depression and PTSD.

Several studies by Sadeh and colleagues (Sadeh et al., 1995) showed that sexually abused children admitted to a psychiatric unit reported high incidences of parasomnia before admission, but had better objective sleep quality than other psychiatric patients (including physically abused children) once in the hospital setting. At first these results seemed contradictory, but the authors reported that further clinical interviews with sexually abused children revealed that there was indeed significant fear and stress associated with sleep, being in bed, or being in the dark, which tended to remind victims of the actual abuse settings. The security of the inpatient unit, the isolation from the perpetrator, the adoption of new social expectancies, and fixed sleep-wake schedules may have also played a role in increased sleep quality of sexually abused inpatients. Sadeh (Sadeh, 2001) offers several suggestions for helping sexual abuse victims cope with the increased insecurity associated with sleeping. In addition to providing children with secure settings and stable, strict sleep regimes, nonabusing parents or caregivers may implement cosleeping for a limited time to reduce excessive anxieties and fear and establish parental presence and reassurance. Persisting sleep problems will likely require psychosocial intervention to reduce tension, hypervigilance, and anxieties associated with sleep and to teach adaptive coping and relaxation techniques.

The abused subgroup that experienced relatively less severe forms of abuse (abuse by a SP who was not the BF, little physical violence, older ages at onset, and shorter durations) displayed the highest levels of sleep disturbances and reported getting the least sleep on a typical week-night. Sexual abuse victims with this form of abuse are most likely than those who appear to be asymptomatic immediately following, or shortly after, disclosure (Elliott & Briere, 1994), but are more disturbed than other abused participants over the long term (Trickett et al., 2001). Because the abuse may have been

deemed "mild" and participants may have presented asymptomatic, initial intensive treatment may not have been received to the degree necessary to combat later disturbances. This SP subgroup may be displaying "sleeper effects" (Briere, 1992) that are triggered as issues associated with being sexually abused become increasingly salient in adolescence and early adulthood (e.g., issues of sexual identity, romantic relationships, and sexual advances by males). It is also important to note that participants in this subgroup experienced the onset of abuse at older ages than did other abused participants. For many of these victims, the onset of abuse coincided with, or occurred very shortly after, their self-reported age at menarche. It is possible that the impact of trauma proximal to dramatic developmental shifts results in a delay of discernible symptomatology. Acute responses to traumatic events may get confused with, or misinterpreted as solely attributable to, coinciding hormonal and pubertal changes associated with menarche. Thus, effects of trauma, as separate from the turmoil of puberty, might only be recognized when sufficient progress through puberty has been made.

Why is Sleep Related to Victimization?

Given that adolescence is a period in which there are increasing demands for appraisals and responses to threat and danger, sleepy adolescents are likely placed at increased risk for victimization because of impairments in cognition and lowered inhibitions. Sleepy individuals may misjudge or misinterpret volatile situations, fail to notice danger cues, and/or be ineffective at escaping threatening circumstances or exploitive people. These sleep-induced impairments, coupled with the heightened use of stimulants, alcohol, and substances to heighten arousal and decrease anxiety, may further contribute to victimization by decreasing inhibitions and increasing risky sexual behaviors and affiliations with deviant peers.

Both sleep disturbances and revictimization in sexual abuse survivors may also be explained by a third mechanism of larger disruption and dysregulation characterized by the aggregate of impaired executive cognitive capacity, emotional volatility, and behavior undercontrol (Mezzich, Tarter, Giancola, & Kirisci, 2001). Such dysregulation has been shown to be predictive of psychiatric disorders and early onset substance abuse disorder (Tarter et al., 2003). Given that childhood sexual abuse has been associated with various types of physiological dysregulation (DeBellis, Burke, Trickett, & Putnam, 1996) and that sexual abuse victims are at high-risk for subsequent victimizations

and significant lifetime traumas (Noll et al., 2003a), the possibility that sexual abuse contributes to a breakdown in global regulatory processes that are mechanistic of further disruption, is worthy of serious consideration.

Caveats and Conclusions

This study has several acknowledged limitations. First, roughly half of this sample is over the age of 18 and generalization to all of adolescence is not possible nor is it recommended. Many of these participants are taking on the developmental tasks of young adulthood (e.g., parenthood, college life, career exploration) and lead lives uncharacteristic of adolescence. However, given what is known about the detriments of insufficient sleep in adolescence, the fact that these disturbances may extend into early adulthood for sexual abuse victims is significant. Second, given that the present sample was recruited from child protective services and a nonabusing caretaker was required to participate, abused participants may not represent the most disturbed of the abused population. Cases where abuse was not reported and where a supportive caretaker was unavailable were not adequately represented. Abused subsample analyses were conducted on relatively small numbers, thus suggesting caution when generalizing to specific types of sexual abuse. These findings should be replicated in future research with larger samples. Third, the level of depression at follow-up was markedly similar across groups suggesting that the comparison females may not constitute an adequate "control" group for main-effect analyses. It should be noted, however, that adolescence is a particularly turbulent time, even in the most benign of circumstances, and depressive symptoms are heightened for most adolescent females. The fact that the two groups differed with regard to the majority of the constructs examined further enhances these findings, indicating that the effects of childhood abuse are likely detectable even in a developmental stage wrought with emotional challenges and psychopathological symptomatology. Fourth, self-reports of sleep disturbances are not optimal and generalizability of these findings are thus limited. Self-reports of sleep disturbances do, however, allow for the examination of such problems in relatively large samples and can be imbedded in larger protocols where the detection of sleep problems is not necessarily a primary aim. Future studies involving traumatized children and adolescents would benefit from PSG sleep laboratory protocols. Fifth, it is important to note that the relationship between revictimization and sleep is not

of a causal nature *per se*. Revictimization could have occurred before the onset of sleep problems and vice versa and it is impossible, from these data, to ascertain which variable is the more likely antecedent. Therefore, it is most accurate to interpret these data as having illuminated a connection between sleep disturbances and subsequent victimization. Finally, it is not known if the sleep disturbances reported by participants in this study existed before the abuse, existed as acute responses to the abuse, or whether these symptoms developed over time as issues associated with the abuse surfaced later in adolescence and early adulthood. It is therefore inaccurate to assert a causal connection between childhood sexual abuse and subsequent sleep disturbances. However, the prospective nature and long-term follow-up of this study provide considerable advances relative to retrospective studies of adult sleep habits, and short-term studies of sleep problems in child and adolescent inpatients.

This study identifies sleep disturbances as a long-term consequence of childhood sexual abuse. Ascertaining sleep disturbances that are independent of depression and PTSD symptoms should accompany comprehensive assessments and treatment of sexual abuse. Sleep complaints have been shown to be especially difficult to treat in adolescents (Krakow et al., 2001) thus underscoring the need for early detection and the revisiting of treatment at various stages of development. Adolescence is a developmental period in which reminders of sexual trauma are likely to surface and situations reminiscent of sexual abuse might be triggered, thus potentially contributing to sleep disturbances. Thus, adolescents sexually abused in childhood should receive increased care and assistance when navigating the particularly difficult tasks of adolescence such as dating initiation, sexual debut, individuation from parents, and peer negotiations. Too often, the treatment of childhood sexual abuse is limited to the period immediately following disclosure and is primarily focused on acute trauma reactions. These results suggest that treatment be continued throughout adolescence and/or be revisited as difficult developmental issues arise. The clinical course of treatment for sexually abused females should include ways to combat sleep difficulties and providers need to be aware that victims may have trouble sleeping even in the absence of clinical levels of depression or PTSD. Treatment providers should also be aware that the loss of vigilance and impaired cognition associated with sleepiness may play a key role in subsequent victimization. Attention to early and persisting sleep disturbance may be one avenue to prevent further psychological difficulties and

later revictimization in survivors of childhood sexual abuse.

Received February 16, 2005; revision received April 6, 2005 and May 16, 2005; accepted May 24, 2005

References

- Achenbach, T. M. (1991). *Integrative Guide for the 1991 CBCL/4–18, YSR, and TRF Profiles*. Burlington, VT: University of Vermont.
- Beck, A., Steer, R., & Brown, G. (1996). *BDI-II manual*. San Antonio, TX: The Psychological Corp.
- Berger, M., Reimann, D., Hochli, D., & Speigel, R. (1989). The cholinergic rapid eye movement sleep induction test with RS-86: State of trait marker of depression? *Archives of General Psychiatry*, 46, 421–428.
- Boney-McCoy, S., & Finkelhor, D. (1995). Prior victimization: A risk factor for child sexual abuse and for PTSD-related symptomatology among sexually abused youth. *Child Abuse and Neglect*, 19(12), 1401–1421.
- Breslau, N., Roth, T., Burduvali, E., Kapke, A., Schultz, L., & Roehrs, T. (2004). Sleep in lifetime posttraumatic stress disorder: A community-based polysomnographic study. *Archives of General Psychiatry*, 61(5), 508–516.
- Briere, J. N. (1992). *Child Abuse Trauma: Theory and Treatment of the Lasting Effects*. Newbury Park, CA: Sage.
- Buyssse, D. J., Reynolds, C. F., III, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*, 28, 193–213.
- Calam, R., Horne, J., Glasgow, D., & Cox, A. (1998). Psychological disturbance and child sexual abuse: A follow-up study. *Child Abuse and Neglect*, 22(9), 901–913.
- Carskadon, M. A. (1990). Patterns of sleep and sleepiness in adolescents. *Pediatrician*, 17, 5–12.
- Carskadon, M. A., & Rechtschaffen, A. (2000). Monitoring and staging human sleep. In M. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and Practice of Sleep Medicine* (3 eds, pp. 1197–1215). Philadelphia, PA: W.B. Saunders.
- Chervin, R. D., Archbold, K. H., Dillon, J. E., Panahi, P., Pituch, K. J., Dahl, R. E., et al. (2002). Inattention, hyperactivity, and symptoms of sleep-disordered breathing. *Pediatrics*, 109(3), 449–456.
- Coates, T. J., & Al, E. (1982). Estimating sleep parameters: A multitrait-multimethod analysis. *Journal of Consulting and Clinical Psychology*, 50(3), 345–352.
- Dahl, R. E. (1999). The Consequences of insufficient sleep for adolescents: Links between sleep and emotional regulation. *Phi Delta Kappan*, 80(5), 354–363.
- Dahl, R. E., Holttum, J., & Trubnick, L. (1994). A clinical picture of child and adolescent narcolepsy. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33(6), 834–841.
- Dahl, R. E., & Lewin, D. S. (2002). Pathways to Adolescent Health. *Sleep Regulation and Behavior. Journal of Adolescent Health*, 21(No. 6S), 175–184.
- Dahl, R. E., Ryan, N. D., Matty, M., Birmaher, B., al-Shabbout, M., Williamson, D. E., et al. (1996). Sleep onset abnormalities in depressed adolescents. *Biological Psychiatry*, 39, 400–410.
- Davidson, J., Kudler, H., & Smith, R. (1989). Validity and reliability of the DSM-III classification for post traumatic stress disorder. *Journal of Nervous and Mental Disorders*, 177, 336–341.
- DeBellis, M. D., Burke, L., Trickett, P. K., & Putnam, F. W. (1996). Antinuclear bodies and thyroid function in sexually abused girls. *Journal of Traumatic Stress Studies*, 9, 369–378.
- Derogatis, L., & Spencer, M. (1982). *The Brief Symptom Inventory (BSI): Administration, scoring, and procedures manual – 1*. Baltimore, MD: Johns Hopkins University School of Medicine.
- Elliott, D. M., & Briere, J. (1994). Forensic sexual abuse evaluations of older children: Disclosures and symptomatology. *Behavioral Sciences and the Law*, 12 (3), 261–277.
- Ellis, A., Sores, G., & Mayou, R. (1998). Psychological consequences of road traffic accidents in children. *European Child and Adolescent Psychiatry*, 7, 61–68.
- Finkelhor, D., & Browne, A. (1985). The traumatic impact of child sexual abuse: A conceptualization. *American Journal of Orthopsychiatry*, 55(4), 530–541.
- Finkelhor, D., Hotaling, G., Lewis, I. A., & Smith, C. (1990). Sexual abuse in a national survey of adult men and women. *Child Abuse and Neglect*, 14(1), 19–28.
- Freyd, J. J. (1994). Betrayal-trauma: Traumatic amnesia as an adaptive response to childhood abuse. *Ethics and Behavior*, 4, 307–329.
- Gehrman, P., Matt, G., Turingan, M., Dinh, Q., & Ancoli-Israel, S. (2002). Towards an understanding of self-reports of sleep. *Journal of Sleep Research*, 11, 229–236.
- Goldston, D., Turnquist, D., & Knutson, J. (1989). Presenting problems of sexually abused girls receiving psychiatric services. *Journal of Abnormal Psychology*, 98(3), 314–317.

- Harvey, A., Jones, C., & Schmidt, D. (2003). Sleep and posttraumatic stress disorder: A review. *Clinical Psychology Review*, 23, 377–407.
- Hollingshead, A. F. (1975). *Four Factor Index of Social Status*. New Haven, CT: Yale University.
- Horne, J. (1993). Human sleep, sleep loss, and behavior implications for the prefrontal cortex and psychiatric disorder. *British Journal of Psychiatry*, 162, 413–419.
- Kovacs, M. (1981). Rating scales to assess depression in school-age children. *Acta Paedopsychiatrica*, 46(5–6), 305–315.
- Krakow, B., Melendrez, D., Johnston, L., Warner, T., Clark, J., Pacheco, M., et al. (2002). Sleep-disordered breathing, psychiatric distress, and quality of life impairment in sexual assault survivors. *Journal of Nervous and Mental Disease*, 190(7), 442–452.
- Krakow, B., Sandoval, D., Schrader, R., Keuhne, B., McBride, L., Yau, C. L., et al. (2001). Treatment of chronic nightmares in adjudicated adolescent girls in a residential facility. *Journal of Adolescent Health*, 29(2), 94–100.
- Lavie, P. (2001). Sleep disturbances in the wake of traumatic events. *New England Journal of Medicine*, 345, 1825–1832.
- Marx, B. P., Calhoun, K. S., Wilson, A. W., Meyerson, L. A., & Brit, D. (1998). *The prevention of sexual revictimization: A preliminary investigation*. Paper Presented at the 32nd Annual Meeting of the Association for the Advancement of Behavior Therapy. Washington, DC.
- McCracken, J. T. (2002). The search for vulnerability signatures for depression in high-risk adolescents: Mechanisms and significance. In M. A. Carskadon (Ed.) *Adolescent Sleep Patterns: Biological, Social, and Psychological Influences* (pp. 254–269). New York: Cambridge University Press.
- McCracken, J. T., Poland, R. E., Lutchmansingh, P., & Edwards, C. (1997). Sleep electroencephalographic abnormalities in adolescent depressives: Effects of scopolamine. *Biological Psychiatry*, 42, 577–584.
- Mezzich, A. C., Tarter, R. E., Giancola, P. R., & Kirisci, L. (2001). The Dysregulation Inventory: A new scale to assess the risk for substance use disorder. *Journal of Child and Adolescent Substance Abuse*, 10(4), 35–43.
- Morielli, A., Ladan, S., Ducharme, F., & Brouillette, R. (1996). Can sleep and wakefulness be distinguished in children by cardiorespiratory and videotape recording. *Chest*, 109, 680–687.
- NIS-2; NCCAN (1988). *Second Study of National Incidence and Prevalence of Child Abuse and Neglect*. Washington, DC: US Department of Health and Human Services.
- Noll, J. G., Horowitz, L. A., Bonanno, G. A., Trickett, P. K., & Putnam, F. W. (2003a). Revictimization and self-harm in females who experienced childhood sexual abuse: Results from a prospective study. *Journal of Interpersonal Violence*, 18(12), 1452–1471.
- Noll, J. G., Trickett, P. K., & Putnam, F. W. (2003b). A prospective investigation of the impact of childhood sexual abuse on the development of sexuality. *Journal of consulting and clinical psychology*, 71(3), 575–586.
- Rimsza, M., Berg, R., & Locke, C. (1988). Sexual abuse: Somatic and emotional reactions. *Child Abuse and Neglect*, 12(2), 201–208.
- Russell, D. E. (1983). The incidence and prevalence of intrafamilial and extrafamilial sexual abuse of female children. *Child Abuse and Neglect*, 7(2), 133–146.
- Sadeh, A. (2001). Sleep and trauma in Children. In G. Stores & L. Wiggs (Eds.), *Sleep Disturbance in Children and Adolescents with Disorders of Development: Its Significance and Management*. Oxford, UK: Mac Keith Press.
- Sadeh, A., Hayden, R. M., McGuire, J. P. D., & Sachs, H. (1994). Somatic, cognitive and emotional characteristics of abused children in a psychiatric hospital. *Child Psychiatry and Human Development*, 24(3), 191–200.
- Sadeh, A., McGuire, J. P. D., Sachs, H., Seifer, R., Tremblay, A., Civita, R., et al. (1995). Sleep and psychological characteristics of children on a psychiatric inpatient unit. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34(6), 813–819.
- Sadeh, A., Raviv, A., & Gruber, R. (2000). Sleep patterns and sleep disruptions in school-age children. *Developmental Psychology*, 36, 291–301.
- Tarter, R. E., Kirisci, L., Mezzich, A. C., Cornelius, J. R., Pajer, K., Vanyukov, M., et al. (2003). Neurobehavioral disinhibition in childhood predicts early age at onset of substance use disorder. *American Journal of Psychiatry*, 160, 1078–1085.
- Trickett, P. K., Noll, J. G., Reiffman, A., & Putnam, F. W. (2001). Variants of intrafamilial sexual abuse experience: Implications for short- and long-term development. *Development and Psychopathology*, 13(4), 1001–1019.
- Wekerle, C., & Avgoustis, E. (2003). Child maltreatment, adolescent dating, and adolescent dating violence. In P. Florsheim & D. o. P. U. Utah (Eds.), *Adolescent Romantic Relations and Sexual Behavior*:

- Theory, Research, and Practical Implications
(pp. 213–241 xvii, 414).
- Widom, C. S., & Kuhns, J. B. (1996). Childhood victimization and subsequent risk for promiscuity, prostitution, and teenage pregnancy: A prospective study. *American Journal of Public Health*, 86(11), 1607–1612.
- Wilson, A. E., Calhoun, K. S., & Bernat, J. A. (1999). Risk recognitions and trauma-related symptoms among sexually revictimized women. *Journal of consulting and clinical psychology*, 67(5), 705–710.
- Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development*, 69(4), 875–887.