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Journal of Anxiety Disorders 22 (2008) 877–885

Journal of Anxiety Disorders

Sleep-related problems in pediatric obsessive-compulsive disorder

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Received 23 April 2007; received in revised form 11 September 2007; accepted 11 September 2007

Abstract

Although attention has been given to presence of sleep related problems (SRPs) in children with psychiatric conditions, little has been reported on SRPs in youth with obsessive-compulsive disorder (OCD). Sixty-six children and adolescents with OCD were administered the Children's Yale Brown Obsessive-Compulsive Scale and completed the Children's Depression Inventory and Multidimensional Anxiety Scale. Their parents completed the Child Behavior Checklist and Children's Obsessive-Compulsive Impact Scale. A subset of youth ($n = 41$) completed a trial of cognitive-behavioral therapy. Frequency of eight specific SRPs was examined in relation to age, gender, OCD symptom severity, child-rated symptoms of depression and anxiety, parent-proxy ratings of internalizing and externalizing problems, and functional impairment. Ninety-two percent of youth experienced at least one SRP, with 27.3% reporting five or more SRPs. Total SRPs were positively associated with OCD symptom severity, child-rated anxiety, and parent-proxy ratings of internalizing problems. Total and several specific SRPs were reduced following cognitive-behavioral treatment. These results suggest that SRPs are relatively common in youth with OCD, are associated with symptom severity, and warrant attention during assessment and treatment.
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Keywords: Obsessive-compulsive disorder; Sleep related problems; Children; Treatment; Assessment

Sleep related problems (SRPs) are a relatively common occurrence among adults (National Sleep Foundation, 1991) and children (Anders & Eiben, 1997; Meltzer & Mindell, 2006). Slightly different from their presentation in adults, SRPs among children encompass a wide range of problems including nightmares, difficulty falling asleep, sleeping away from home, refusal to sleep alone, and general nighttime fears (Alfano, Ginsburg, & Kingery, 2007; Fallone, Owens, & Deane, 2002). Not surprisingly, SRPs among youth are concurrently associated with impaired academic, interpersonal, and psychosocial functioning (Beebe et al., 2004; Mindell, Owens, & Carskadon, 1999) and may later contribute to poor emotional adjustment (Gregory & O'Connor, 2002; Gregory et al., 2005; Ong, Wickramaratne, Tang, & Weissman, 2006).

Recently, attention has been given to the relationship between SRPs and psychiatric disorders among children and adolescents. Generally speaking, this literature indicates that children with significant emotional and behavioral problems are more likely to experience SRPs (see Ivanenko, Crabtree, & Gozal, 2004 for a review). However, examination of several specific disorders,

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0887-6185/$ – see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.janxdis.2007.09.003

including obsessive-compulsive disorder (OCD), remains limited. Intuitively, youth with OCD may be more likely than healthy peers to experience SRPs for several reasons, including heightened levels of OCD-related and general anxiety, engagement in rituals before or during the bedtime routine that interferes with sleep onset, remaining asleep or ability to sleep alone, and an inability to stay at others' home (e.g., friends, other family members) due to embarrassment about or impairment related to symptoms.

Despite the above reasons and preliminary evidence suggesting impairments in the sleep processes of OCD patients, little is known about SRPs in youth with OCD. In the most rigorous study in pediatric OCD patients ($n = 18$ adolescents, nine with OCD and nine matched healthy controls), Rapoport et al. (1981) reported that adolescents with OCD exhibited a number of SRPs including reduced sleep efficiency, and increased sleep latency and sleep onset. In a study examining OCD-related impairment across multiple domains, Piacentini, Bergman, Keller, and McCracken (2003) reported that 66% and 56% of parents noted that OCD interfered with their child ''getting ready for bed night'' and ''sleeping at night.'' Among adults with OCD, evidence suggests a number of sleep related problems including altered nocturnal growth hormone secretion (Kluge et al., 2006; Kluge, Schussler, Dresler, Yassouridis, & Steiger, 2007a), disturbed sleep continuity (Volderhozer et al., 2006), and rapid eye movement sleep abnormalities (Insel, Roy, Cohen, & Murphy, 1982; Kluge, Schussler, Kunzel, et al., 2007b; see Hohagen et al., 1994 and Robinson, Wasleben, Pollack, & Lerner, 1998 for exceptions). Bobdey, Fineberg, Gale, Patel, and Davies (2002) found that adult patients with OCD exhibited worse sleep quality, latency, and daytime dysfunction relative to healthy controls. Within this literature, information about the frequency of SRPs in a large sample of pediatric OCD patients has yet to be reported, nor data on associations with symptom severity and impairment.

Evidence from non-clinical and clinically anxious pediatric samples suggests that SRPs may be prevalent and related to anxiety severity. Several studies examining the clinical presentation of pediatric generalized anxiety disorder have found rates of sleep disturbances to range from 42% to 66% (Kendall & Pimentel, 2003; Masi et al., 2004; Pina, Silverman, Fuentes, Kurtines, & Weems, 2003). In the most rigorous published study of clinically anxious youth ($n = 128$ youth with generalized anxiety disorder, social phobia, and/or separation anxiety disorder), Alfano et al. (2007) found that 88% of youth experienced at least one SRP, with over 55% experiencing more than three SRPs. Of eight SRPs, insomnia was reported most often (66.6%), followed by nightmares (54.5%), refusal to sleep alone (47.9%), being overtired without good reason (43.2%), refusal to sleep away from home (40.9%), decreased sleep (36.9%), sleep walking/talking (22.7%), and increased sleep (15.1%). SRPs were positively related to two measures of anxiety severity ($r = .34$ and .54) and home-specific impairment ($r = .39$). Among non-clinical pediatric samples, Mindell and Barret (2002) found a positive relationship between nightmares and trait anxiety, with more than three nightmares per week being related to parent proxy reports of clinically significant anxiety levels. In a prospective study, Gregory and O'Connor (2002) showed that sleep problems at age 4 years predicted anxiety and depressive symptoms at ages 13–15 years. Gregory et al. (2005) showed that SRPs at ages 5, 7, and 9 years were related to the development of an anxiety disorder at ages 21 and 26 years.

Clearly, data from non-OCD pediatric anxiety samples and adult OCD patients are suggestive of the presence of sleep disorders. The present study expands results of Alfano et al. (2007) to a large sample of children and adolescents with OCD and was designed to answer three research questions. First, what is the frequency of eight SRPs in youth with OCD and are SRPs related to age and gender? Consistent with Alfano et al. (2007), we expected to find that SRPs were frequent in pediatric OCD patients. Additionally, we hypothesized that younger children and females would endorse more SRPs. Second, what are the associations between SRPs, OCD symptom severity, and OCD related impairment? We hypothesized that SRPs would be modestly and positively related to OCD symptom severity and impairment. Finally, we were interested in the impact that cognitive-behavioral therapy (CBT) might have on reducing SRPs and hypothesized an overall reduction. We expected that CBT would be associated with reductions SRPs.

1. Method

1.1. Participants

Participants were 66 children and adolescents with OCD (34 males) recruited from two completed studies: (1) a prospective observational research study of childhood OCD to assess for infection-triggered symptoms ($n = 25$); and (2) a comparative clinical trial of intensive versus weekly CBT ($n = 41$; Storch et al., 2007). Only data from the baseline assessment of each study were used to examine cross-sectional associations among study variables, while data from the Baseline

and Post-treatment assessments were used to examine the impact of CBT on SRPs. At the time of study entry, participants ranged in age from 8 to 17 years ($M = 12.4 \pm 3.0$ years). Most of the youth were Caucasian (92%), with the remaining 4% and 4% being Hispanic and Asian American. Youth had to be stable on their medications for at least 8 weeks before their assessment. Of the sample, 48 were taking seretonergic medication for their OCD, 17 were not taking medication, and data about medication status was not available for 1 child.

1.2. Measures

1.2.1. Children's Yale-Brown Obsessive Compulsive Scale

The Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS; Scahill et al., 1997) is a clinician-administered, 10-item semi-structured measure of obsession and compulsion severity over the past week. In addition to a symptom checklist, the CY-BOCS has an Obsessions Severity Scale (five items) and Compulsions Severity Scale (five items), which are summed to create a Total Score. Items assess the distress, frequency, interference, resistance, and symptom control of obsessions and compulsions, with higher scores corresponding to greater symptom severity. Widely used, the CY-BOCS has excellent reliability (α = .87–.90), 6-week stability (Storch et al., 2004), construct validity (Scahill et al., 1997; Storch et al., 2004), and treatment sensitivity (Pediatric OCD Study Team [POTS], 2004; Storch et al., 2007).

1.2.2. Child Behavior Checklist

The Child Behavior Checklist (CBCL; Achenbach, 1991) is a 113-item parent report form used to assess a wide range of child internalizing and externalizing symptoms over the past 6 months. Items are rated on a three-point scale (0: never true, 1: sometimes true, 2: often or always true). The CBCL has eight individual subscales, Internalizing and Externalizing Scales, and a Total Score that is derived by summing the Internalizing and Externalizing Scales. Although an updated version of the CBCL exists, numerous studies have supported the psychometric properties of the 1991 version of the CBCL (Achenbach, 1991; Aschenbrand, Angelosante, & Kendall, 2005; Heubeck, 2000).

1.2.3. Child Obsessive Compulsive Impact Scale-Parent Version (COIS-P)

The COIS-P (Piacentini & Jaffer, 1999) is a 58-item, parent-rated measure about the extent to which pediatric OCD causes impairment in school activities (16 items), social activities (19 items), and home/family activities (17 items) over the previous month. Four questions assess global impairment related to school, social activities, going places, and home/family activities. The COIS-P has demonstrated adequate psychometric properties (Piacentini et al., 2003; Valderhaug & Ivarsson, 2005) and treatment sensitivity (Storch et al., 2007).

1.2.4. Multidimensional Anxiety Scale for Children

The Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, & Conners, 1997) is a 39-item child-report measure of anxiety symptoms. Items are rated on a four-point Likert scale (0: never true about me, 1: rarely true about me, 2: sometimes true about me, 3: often true about me) with higher scores corresponding to greater anxiety. The MASC has demonstrated strong psychometric properties (Baldwin & Dadds, 2007; March et al., 1997; March & Sullivan, 1999).

1.2.5. Children's Depression Inventory

The Children's Depression Inventory (CDI; Kovacs, 1992) was used to assess child-reports of the presence and severity of cognitive, affective, or behavioral symptoms of depression during the previous 2 weeks. Widely used, the CDI has good internal consistency, test–retest reliability, and construct validity (Kovacs, 1992; Timbremont, Braet, & Dreessen, 2004).

1.2.6. Sleep Composite Measure

Similar to Alfano et al. (2007), we formed a composite measure of SRPs by combining items about SRPs from the CBCL (six items), MASC (one item), and CDI (one item). Given that the item from the MASC differs in response format from that of the CBCL and CDI, responses were recoded so that any positive endorsement of a SRP (i.e., rating of "1" or "2" on the CBCL or CDI, rating of "1," "2," or "3" on the MASC) was recoded as "1." "0" ratings were not recoded. These eight items were summed to create a composite SRP score. Cronbach's alpha for this index was .63.

1.3. Procedures

The University of Florida institutional review board provided appropriate human subjects ethical approval of this project. Thereafter, the PI or second author obtained parental consent and child assent. Participants had a principal diagnosis of OCD derived from the

Schedule for Affective Disorders and Schizophrenia for School-Age Children-Lifetime and Present versions (K-SADS-PL; Kaufman et al., 1997) or Anxiety Disorders Interview Schedule for Children (ADIS-C; Albano & Silverman, 1996). Determination of the principal diagnosis was based on current symptom severity and impairment. Following administration of the K-SADS-PL or ADIS-C, the interviewing clinician administered the Children's Yale-Brown Obsessive-Compulsive Disorder Scale (CY-BOCS; Scahill et al., 1997) to the parent(s) and child jointly. Following administration of the K-SADS-PL/ADIS-C and CY-BOCS, children completed the MASC and CDI, while parents completed the CBCL and COIS-P. All diagnoses generated from the K-SADS-PL/ADIS-C (e.g., OCD and comorbid conditions) were confirmed by an experienced clinical psychologist (EAS) or board certified child psychiatrist (TKM) after an unstructured clinical interview with the child and parent and review of all available information (e.g., diagnostic test results, CY-BOCS, scores on other measures).

Procedures for the CY-BOCS interviewer training are described in Scahill et al. (1997). Procedures for the K-SADS-PL and ADIS-C are described in Kaufman et al. (1997) and Albano and Silverman (1996), respectively. Clinicians were a psychiatric nurse or clinical psychology doctoral candidate, both of whom had prior clinical experience working with pediatric OCD patients. Training consisted of an instructional meeting about the instrument content and structure with the first or second author of this study (EAS or TKM), at least four mock practice interviews, and four interviews observed by the first or second author. The first author re-administered the CY-BOCS to 20 children and their parents at the baseline assessment to evaluate inter-rater reliability; kappa was .96 for the CY-BOCS Total Score.

For the subset of youth receiving treatment, CBT consisted of 14 90-minute sessions delivered in a weekly or intensive format that was based on the POTS protocol (2004). Briefly, this treatment manual includes psychoeducation, cognitive training, and exposure with response prevention that was adapted by the first author to be delivered in a ''family based'' format, with at least one parent attending all sessions and considerable focus on family interactions and accommodation. Further information about the treatment provided can be found in Storch et al. (2007).

1.4. Data analysis

Data were analyzed using SPSS 14.0 statistical software. Chi-square and paired sample *t*-tests were used to examine possible differences in SRPs based on age and gender. Pearson's correlation coefficients were used to examine the relationship between SRPs and study variables (e.g., CY-BOCS, CBCL scores, COIS-P, MASC, CDI). Given the preliminary nature of this study, no statistical correction was used to minimize the chance of obscuring potentially important relationships. A repeated measures analysis of variance was used to test for significant changes in total SRPs from before to after CBT, with follow-up χ^2 tests used to examine changes in individual SRPs.

2. Results

2.1. Age and gender effects

Table 1 presents the frequencies of sleep items for the sample by age group and gender. Only 7.6% of the children did not have a report of sleep-related problems, with 27.3% of the sample reporting five or more SRPs.

Table 1
Percentage of reported sleep-related problems by gender and age

Sleep related problems	Total ($N = 66$)	Male ($n = 34$)	Female ($n = 32$)	Ages 8–11 ($n = 27$)	Ages 12–17 ($n = 36$)
Nightmares	42.4	50.0	34.4	63.0*	30.6
Overtired	56.1	44.1	68.8*	48.1	63.9
Sleeps less than most kids	33.3	29.4	37.5	37.0	30.6
Sleeps more than most kids	24.2	11.8	37.5*	11.1	33.3*
Talks or walks in sleep	22.7	20.6	25.0	29.6	19.4
Has trouble sleeping[a]	56.1	61.8	50.0	63.0	50.0
Sleeps next to someone in family	50.0	41.2	59.4	59.3	38.9
Has trouble sleeping[b]	43.9	35.3	53.1	48.1	41.7
Mean no. SRPs (S.D.)	3.29 (1.79)	2.94 (1.63)	3.66** (1.91)	3.59** (1.80)	3.08 (1.81)

[a] Parent reported.
[b] Child reported.
* $p < .05$.
** $p < .001$.

Table 2
Correlations for sleep-related problems, psychological functioning, and impairment

	1	2	3	4	5	6	7
1. Total SRP	–						
2. CY-BOCS	.33**	–					
3. MASC	.31*	.26*	–				
4. CDI	.16	.13	.44***	–			
5. CBCL INT	.44***	.32*	.60***	.40***	–		
6. CBCL EXT	.26*	.23	.08	.25*	.35**	–	
7. COIS-P	.20	.45***	−.07	.32**	.34**	.53***	–
Mean (S.D.)	3.29 (1.80)	25.53 (5.12)	46.30 (19.50)	12.52 (9.14)	19.95 (9.52)	12.76 (9.34)	40.71 (31.86)

Note. SRP: Sleep-related problems, CY-BOCS: Children's Yale-Brown Obsessive Compulsive Scale, MASC: Multidimensional Anxiety Scale for Children, CDI: Children's Depression Inventory, CBCL INT: Child Behavior Checklist Internalizing, CBCL EXT: Child Behavior Checklist Externalizing, COIS-P: Child Obsessive Compulsive Impact Scale-Parent Version, S.D.: standard deviation.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

The most commonly reported problems were being overtired and having trouble sleeping.

2.2. Gender

The difference between the mean number of SRPs for males and females was statistically significant ($t(1, 65)$: 8.31, $p < .001$), with females having more reported sleep problems. On individual types of SRPs, being overtired ($\chi^2(66) = 4.06$, $p = .044$) and sleeping more than most kids ($\chi^2(66) = 5.95$, $p = .015$) were found with greater frequency in females.

2.3. Age

The difference for the mean number of SRPs between age groups was found to be statistically significant ($t(1, 63) = 7.06$, $p < .001$), with younger children (ages 8–11) having more reported sleep problems than older children (ages 12–17). Younger children had higher rates of nightmares ($\chi^2(63) = 6.56$, $p = .01$), while older children had higher rates of sleeping more than most kids ($\chi^2(63) = 4.20$, $p = .04$).

2.4. OCD severity and impairment

Pearson's r correlation coefficients are reported for the relationship between total reported SRPs and measures of OCD severity, anxiety, depression, internalizing and externalizing behaviors, and impairment in Table 2. As shown, total number of SRPs was positively and statistically significantly related to CY-BOCS, MASC, and CBCL internalizing and externalizing scores, but were not related to measures of depression or OCD-related functional impairment. It should be noted that the items that compose the SRP total score were drawn from the MASC, CBLC, and CDI, which may inflate correlations to a degree (e.g., that 1 of the 39 MASC items was accounted for in the SRP index). Four of the individual items are significantly correlated with their parent scales at $p < .05$ (range of .27–.36), while three were not significantly related to them (range .03–.22).

2.5. Impact of cognitive-behavioral treatment

A total of 41 of the 66 children in the sample received a full course of family based CBT. These children displayed a statistically significant reduction in total number of reported SRPs from pre-treatment ($M = 3.29$, S.D. = 1.90) to post-treatment ($M = 2.29$, S.D. = 1.78), $F(1, 40) = 3.38$, $p = .008$. In terms of specific symptom

Table 3
Mean scores and percentages for sleep-related problems before and after cognitive-behavioral therapy

Sleep related problems	Baseline (%)	After treatment (%)
Nightmares	42.4	13.2*
Overtired	56.1	34.1**
Sleeps less than most kids	33.3	23.8**
Sleeps more than most kids	24.2	21.4*
Talks or walks in sleep	22.7	11.9
Has trouble sleeping[a]	56.1	31.0*
Sleeps next to someone in family	50.0	38.8*
Has trouble sleeping[b]	43.9	45.2
Total mean SRPs (S.D.)	3.29 (1.90)	2.29 (1.78)*

[a] Parent reported.
[b] Child reported.
* $p < .01$.
** $p < .001$.

reductions, nightmares ($\chi^2(41) = 10.86$, $p = .002$), being overtired ($\chi^2(41) = 14.75$, $p < .001$), sleeps less than most kids ($\chi^2(41) = 18.97$, $p < .001$), sleeps more than most kids ($\chi^2(41) = 8.15$, $p = .009$), has trouble sleeping ($\chi^2(41) = 10.71$, $p = .001$), and sleeps next to someone in family ($\chi^2(41) = 9.24$, $p = .003$) were all significantly reduced in the children receiving CBT (see Table 3). One SRP, child report of ''has trouble sleeping'' showed no statistically significant change from pre-treatment to post-treatment.

3. Discussion

Although methodologically rigorous data exist on SRPs in youth with other anxiety disorders, currently, there is little known about SRPs in youth with OCD. With this in mind, the purpose of this paper was to report on the prevalence, symptom correlates, and treatment sensitivity of SRPs in a large sample of pediatric OCD patients. Overall, SRPs were widely endorsed, with 92% of youth experiencing at least one SRP and 27.3% experiencing five or more. Consistent with Alfano et al. (2007), the most common SRPs included experiencing nightmares, being overtired, sleeping next to someone in family, and parent and child reports of having trouble sleeping. Significant gender differences were found, with females being rated as more frequently overtired and sleeping more than other kids. Younger children had more nightmares and overall SRPs than older youth, but older youth were more frequently rated as sleeping more than other kids. Our rates of SRPs in younger children are consistent with frequencies found in other young, clinical samples (e.g., DeVincent, Gadow, Delosh, & Geller, 2007) and higher than in non-clinical samples (Eitner et al., 2007; Spruyt, O'Brien, Cluydts, Verleye, & Ferri, 2005). Similar to data from clinically anxious youth (Alfano et al., 2007) and non-clinical controls (Mindell & Barret, 2002), it was found that anxiety severity, both OCD specific and general anxiety, was positively related to the presence of SRPs. Although the correlational nature of these data prevents the directionality of the relationships from being established, others (e.g., Alfano et al., 2007; Dahl, 1996) have suggested a cyclical relationship in which anxiety first contributes to SRPs, which then contributes to increased anxiety symptoms, which then contributes to more SRPs. Most concerning about this relationship are data highlighting childhood SRPs as a predictor of later psychosocial distress (Gregory et al., 2005). Somewhat surprisingly, no significant relationship was found between SRPs and depressive symptoms in youth, a finding that was unexpected given research linking pediatric sleep problems with depressive symptoms in non-clinical (Gregory, Rijsdijk, Dahl, McGuffin, & Eley, 2006) and clinically depressed pediatric patients (Robert et al., 2006). One possibility for these divergent findings is the reported low level of overall depressive symptoms in the current sample, as measured by the CDI. Sleep related problems were also not significantly related to OCD-related functional impairment, which may be because the COIS-P does not tap into the type of impairments that sleep difficulties cause in youth. Another reason for the non-significant association may be due to the large standard deviation of the COIS-P together with the leptokurtic distribution of the SRP variable.

As expected, rates of overall SRPs decreased following CBT. Significant reductions in individual SRPs were found for the following items: nightmares, overtired, sleeps more than most kids, sleeps less than most children, has trouble sleeping (by parent report), and sleeps next to someone in family. There are several possible explanations for this. First, improved anxiety and mood may be associated with reductions in certain SRPs such as having nightmares and sleeping more or less. Second, targeting family accommodation and parental anxiety, as was done in the Storch et al. (2007) study, may explain reductions in having a parent sleep next to their child. Clinically, this is suggestive of the need to include structured assessments of sleep problems in psychotherapeutic and pharmacological studies of pediatric OCD (Alfano et al., 2007). From a treatment perspective, it is reasonable to suggest that presence of SRPs may decrease modestly following a course of cognitive-behavioral therapy. This is consistent with findings that targeted CBT for OCD may also impact non-OCD symptoms such as depression or general anxiety (Storch et al., 2007). In addition, family-based cognitive-behavioral interventions may be particularly helpful in reducing symptoms that are maintained, in part, through family accommodation (i.e., refusal to sleep alone).

Several limitations of the present study should be noted. First, although the methodology was similar to that used by Alfano et al. (2007), our measure of SRPs was not standardized and represented a composite of child and parent responses. On balance, internal consistency for the SRP score was adequate, and the present findings provide construct validity support (i.e., correlations with measures of anxiety, treatment sensitivity). Additional studies incorporating objective, physiological sleep assessments (i.e., polysomnography) are warranted in order to determine the prevalence

of actual sleep disorders (rather than only SRPs), particularly since endorsed items may have been reflective of the child's OCD and, when present, comorbid diagnoses. Second, although our assessment of SRPs was fairly comprehensive, there are other SRPs that were not assessed (e.g., bedtime resistance). Third, as SRPs were taken from three measures that were ultimately used in correlational analyses (CBCL, MASC, CDI), the chance of slightly inflated associations exists. Fourth, the majority of our youth was on stable doses of medication for their OCD. Side effects of seretonergic medications often include impacted sleep (Safer & Zito, 2006) and thus, it is difficult to tease out the degree to which SRPs are related to medication use.[1] Finally, as subjects were presenting for evaluation and treatment at an OCD specialty clinic and were primarily Caucasian, results may be limited in generalizability.

Within these limitations, present findings have clinical implications for working with pediatric OCD patients. First, given the high rate with which SRPs were endorsed, clinicians would be well advised to assess for the presence of SRPs during the initial assessment and periodically throughout treatment to gauge changes. Although measures such as the CBCL may have particular utility as sleep problems and co-occurring emotional and behavioral concerns can be concurrently assessed, it may be most relevant to include a well-validated index of sleep behavior such as the Children's Sleep Habits Questionnaire (Owens, Spirito, & McGuinn, 2000). Second, the present data suggest that CBT may be associated with modest reductions in SRPs. As noted, we suspect that this finding was due to decreased parental accommodation to their child's anxiety, as well as an overall decrease in child distress. Cognitive-behavioral interventions have shown promise for treating pediatric sleep problems (see Morgenthaler et al., 2002 for a review) and the present data suggest addressing anxiety may be one manner of achieving this goal. Alternatively, for youth with clinically significant comorbid sleep problems, targeting SRPs specifically through structured treatment protocols may be warranted.

Acknowledgments

The contributions of Gordon Brown and Emily Ricketts are gratefully acknowledged. Portions of this paper were supported by grants from the National Institutes of Health to the second (NIMH K23 MH01739) and final authors (NIMH R01 MH063914).

[1] Analyses of participants on and off medication revealed no significant differences in the rates of individual or total SRPs ($p > .05$).

References

Achenbach, T. M. (1991). *Manual for the CBCL/4-18 and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

Aschenbrand, S. G., Angelosante, A. G., & Kendall, P. C. (2005). Discriminant validity and clinical utility of the CBCL with anxiety-disordered youth. *Journal of Clinical Child and Adolescent Psychology, 34*, 735–746.

Albano, A. M., & Silverman, W. K. (1996). *Guide to the Anxiety Disorders Interview Schedule for Children (Child and Parent Versions)*. San Antonio, TX: Psychological Corporation.

Alfano, C. A., Ginsburg, G. S., & Kingery, J. N. (2007). Sleep-related problems among children and adolescents with anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*, 224–232.

Anders, T. F., & Eiben, L. A. (1997). Pediatric sleep disorders: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 9–20.

Baldwin, J. S., & Dadds, M. R. (2007). Reliability and validity of parent and child versions of the multidimensional anxiety scale for children in community samples. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*, 252–260.

Beebe, D. W., Wells, C. T., Jeffries, J., Chini, B., Kalra, M., & Amin, R. (2004). Neuropsychological effects of pediatric obstructive sleep apnea. *Journal of the International Neuropsychological Society, 10*, 962–975.

Bobdey, M., Fineberg, N., Gale, T. M., Patel, A., & Davies, H. A. (2002). Reported sleep patterns in obsessive-compulsive disorder. *International Journal of Psychiatry in Clinical Practice, 6*, 15–21.

Dahl, R. E. (1996). The regulation of sleep and arousal: Development and psychopathology. *Development and Psychopathology, 8*, 3–27.

DeVincent, C. J., Gadow, K. D., Delosh, D., & Geller, L. (2007). Sleep disturbance and its relation to DSM-IV psychiatric symptoms in preschool-age children with pervasive developmental disorder and community controls. *Journal of Child Neurology, 22*, 161–169.

Eitner, S., Urschitz, M. S., Guenther, A., Urschitz-Duprat, P. M., Bohnhorst, B., Schlaud, M., et al. (2007). Sleep problems and daytime somnolence in a German population-based sample of snoring school-aged children. *Journal of Sleep Research, 16*, 96–101.

Fallone, G., Owens, J. A., & Deane, J. (2002). Sleepiness in children and adolescents: Clinical implications. *Sleep Medicine Reviews, 6*, 287–306.

Gregory, A. M., Caspi, A., Eley, T. C., Moffitt, T. E., O'Connor, T. G., & Poulton, R. (2005). Prospective longitudinal associations between persistent sleep problems in childhood and anxiety and depression disorders in adulthood. *Journal of Abnormal Child Psychology, 33*, 157–163.

Gregory, A. M., & O'Connor, T. G. (2002). Sleep problems in childhood: A longitudinal study of developmental change and association with behavioral problems. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 964–971.

Gregory, A. M., Rijsdijk, F. V., Dahl, R. E., McGuffin, P., & Eley, T. C. (2006). Associations between sleep problems, anxiety, and depression in twins at 8 years of age. *Pediatrics, 118*, 1124–1132.

Heubeck, B. G. (2000). Cross-cultural generalizability of CBCL syndromes across three continents: From the USA and Holland to Australia. *Journal of Abnormal Child Psychology, 28*, 439–450.

Hohagen, F., Kappler, C., Schramm, E., Riemann, D., Weyerer, S., & Berger, M. (1994). Sleep onset insomnia, sleep maintaining insomnia and insomnia with early morning awakening-temporal stability of subtypes in a longitudinal study on general practice attenders. *Sleep, 17*, 551–554.

Insel, T. R., Roy, B. F., Cohen, R. M., & Murphy, D. L. (1982). Possible development of the serotonin syndrome in man. *American Journal of Psychiatry, 139*, 154–155.

Ivanenko, A., Crabtree, V. M., & Gozal, D. (2004). Sleep in children with psychiatric disorders. *Pediatric Clinics of North America, 51*, 51–68.

Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., et al. (1997). Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 980–988.

Kendall, P. C., & Pimentel, S. S. (2003). On the physiological symptom constellation in youth with Generalized Anxiety Disorder (GAD). *Journal of Anxiety Disorders, 17*, 211–221.

Kluge, M., Schussler, P., Dresler, M., Yassouridis, A., & Steiger, A. (2007a). Sleep onset REM periods in obsessive-compulsive disorder. *Psychiatry Research, 152*, 29–35.

Kluge, M., Schussler, P., Kunzel, H. E., Dresler, M., Yassouridis, A., & Steiger, A. (2007b). Increased nocturnal secretion of ACTH and cortisol in obsessive-compulsive disorder. *Journal of Psychiatric Research, 41*, 928–933.

Kluge, M., Schussler, P., Weikel, J., Dresler, M., Zuber, V., Querfurt, F., et al. (2006). Altered nocturnal growth hormone (GH) secretion in obsessive compulsive disorder. *Psychoneuroendocrinology, 31*, 1098–1104.

Kovacs, M. (1992). *The Children's Depression Inventory Manual*. Toronto, Ontario, Canada: Multi-Health Systems Inc.

March, J. S., Parker, J. D., Sullivan, K., Stallings, P., & Conners, C. K. (1997). The Multidimensional Anxiety Scale for Children (MASC): Factor structure, reliability, and validity. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 554–565.

March, J. S., & Sullivan, K. (1999). Test-retest reliability of the Multidimensional Anxiety Scale for Children. *Journal of Anxiety Disorders, 13*, 349–358.

Masi, G., Perugi, G., Toni, C., Millepiedi, S., Mucci, M., Bertini, N., et al. (2004). Obsessive-compulsive bipolar comorbidity: Focus on children and adolescents. *Journal of Affective Disorders, 78*, 175–183.

Meltzer, L. J., & Mindell, J. A. (2006). Sleep and sleep disorders in children and adolescents. *Psychiatry Clinics of North America, 29*, 1059–1076.

Mindell, J. A., & Barret, K. M. (2002). Nightmares and anxiety in elementary-aged children: Is there a relationship? *Child Care Health and Development, 28*, 317–322.

Mindell, J. A., Owens, J. A., & Carskadon, M. A. (1999). Developmental features of sleep. *Child and Adolescent Psychiatric Clinics of North America, 8*, 695–725.

Morgenthaler, T. I., Owens, J., Alessi, C., Boehlecke, B., Brown, T. M., Coleman, J, Jr. et al. (2002). Practice parameters for behavioral treatment of bedtime problems and night wakings in infants and young children. *Sleep, 29*, 1277–1281.

National Sleep Foundation. (1991). *Sleep in America: A national survey of U.S. adults*. Princeton, NJ: The Gallup Organization.

Ong, S. H., Wickramaratne, P., Tang, M., & Weissman, M. M. (2006). Early childhood sleep and eating problems as predictors of adolescent and adult mood and anxiety disorders. *Journal of Affective Disorders, 96*, 1–8.

Owens, J. A., Spirito, A., & McGuinn, M. (2000). The Children's Sleep Habits Questionnaire (CSHQ): Psychometric properties of a survey instrument for school-aged children. *Sleep, 23*, 1043–1051.

Pediatric OCD Treatment Study (POTS) Team. (2004). Cognitive-behavior therapy, sertraline, and their combination in children and adolescents with obsessive-compulsive disorder: Pediatric OCD Treatment Study (POTS) randomized controlled trial. *Journal of the American Medical Assocation*, *292*, 1969–1976.

Piacentini, J., Bergman, R. L., Keller, M., & McCracken, J. (2003). Functional impairment in children and adolescents with obsessive-compulsive disorder. *Journal of Child and Adolescent Psychopharmacology, 13*, S61–S69.

Piacentini, J., & Jaffer, M. (1999). *Measuring functional impairment in youngsters with OCD: Manual for the Child OCD Impact Scale (COIS)*. Los Angeles: UCLA Department of Psychiatry.

Pina, A. A., Silverman, W. K., Fuentes, R. M., Kurtines, W. M., & Weems, C. F. (2003). Exposure-based cognitive-behavioral treatment for phobic and anxiety disorders: Treatment effects and maintenance for Hispanic/Latino relative to European-American youths. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 1179–1187.

Rapoport, J., Elkins, R., Langer, D. H., Sceery, W., Buchsbaum, M. S., Gillin, J. C., et al. (1981). Childhood obsessive-compulsive disorder. *American Journal of Psychiatry, 138*, 1545–1554.

Robert, J. J., Hoffmann, R. F., Emslie, G. J., Hughes, C., Rintelmann, J., Moore, J., et al. (2006). Sex and age differences in sleep macroarchitecture in childhood and adolescent depression. *Sleep, 29*, 351–358.

Robinson, D., Wasleben, J., Pollack, S., & Lerner, G. (1998). Nocturnal polysomnography in obsessive-compulsive disorder. *Psychiatry Research, 80*, 257–263.

Safer, D. J., & Zito, J. M. (2006). Related treatment-emergent adverse events from selective serotonin reuptake inhibitors by age group: Children versus adolescents. *Journal of Child and Adolescent Psychopharmacogy, 16*, 159–169.

Scahill, L., Riddle, M. A., McSwiggin-Hardin, M., Sharon, I., King, R. A., Goodman, W. K., et al. (1997). Children's Yale-Brown Obsessive Compulsive Scale: Reliability and validity. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 844–852.

Spruyt, K., O'Brien, L. M., Cluydts, R., Verleye, G. B., & Ferri, R. (2005). Odds, prevalence and predictors of sleep problems in school-age normal children. *Journal of Sleep Research, 14*, 163–176.

Storch, E. A., Gefffken, G. R., Merlo, L. J., Mann, G., Duke, D., Munson, M., et al. (2007). Family-based cognitive-behavioral therapy for pediatric obsessive-compulsive disorder: Comparison of intensive and weekly approaches. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*, 469–478.

Storch, E. A., Murphy, T. K., Geffken, G. R., Soto, O., Sajid, M., Allen, P., et al. (2004). Psychometric evaluation of the Children's Yale-Brown Obsessive Compulsive Scale. *Journal of Psychiatry Research, 129*, 91–98.

Timbremont, B., Braet, C., & Dreessen, L. (2004). Assessing depression in youth: Relation between the Children's Depression Inven-

tory and a structured interview. *Journal of Clinical Child and Adolescent Psychology, 33*, 149–157.

Valderhaug, R., & Ivarsson, T. (2005). Functional impairment in clinical samples of Norwegian and Swedish children and adolescents with obsessive-compulsive disorder. *European Child and Adolescent Psychiatry, 14*, 164–173.

Volderhozer, U., Riemann, D., Huwig-Poppe, C., Kuelz, A. K., Kordon, A., Bruestle, K., et al. (2006). Sleep in obsessive compulsive disorder: Polysomnographic studies under baseline conditions and after experimentally induced serotonin deficiency. *European Archives of Psychiatry and Clinical Neuroscience, 257*, 173–182.