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The Sleep Patterns and Problems of Clinically Anxious Children

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Abstract

Childhood sleep problems have been associated with a range of adverse cognitive and academic outcomes, as well as increased impulsivity and emotional disorders such as anxiety and depression. The aim of the study was to examine subjective reports of sleep-related problems in children with anxiety disorders during school and weekend nights. Thirty-seven children with clinically-diagnosed anxiety disorders and 26 non-clinical children aged 7-12 years completed an on-line sleep diary to track sleep patterns across school nights and weekend nights. Anxious children reported going to bed significantly later (p = .03) and had significantly less sleep (p = .006) on school nights compared to non-anxious children. No significant differences in sleep onset latency, number of awakenings or time awake during the night, daytime sleepiness, or fatigue were found between the two groups. On the weekends, anxious children fell asleep quicker and were less awake during the night than on weeknights. School-aged anxiety disordered children showed a sleep pattern that differs from their non-anxious peers. Although the mean 30 minutes less sleep experienced by anxious children may initially seem small, the potential consequences on daytime performance from an accumulation of such a sleep deficit may be significant, and further investigation is warranted.

Keywords: Sleep problems, sleep patterns, anxiety disorders, sleepiness, fatigue, children.
School-aged children’s (7-12 years) sleep is crucial for their overall quality of life. Sleep disturbances in children are associated with a range of adverse outcomes in terms of cognitive functioning (e.g., reaction times, attention/concentration; Fallone et al., 2005; Sadeh et al., 2002; 2003), school performance (BaHamman et al., 2006; Fallone et al., 2005; Meijer & van den Wittenboer, 2004; Smaldone et al., 2007), poor daytime behaviour and functioning (Carskadon et al., 1980; Fallone et al., 2001; 2005; Gau, 2006; Sadeh et al., 2002), mental health (Meijer et al., 2001; Sadeh et al., 2002; Smaldone et al., 2007), and family well-being (Smaldone et al., 2007). Sleep-related problems (SRPs) can be conceptualized as those disturbances which interrupt the sleep cycle and include difficulties such as delayed sleep onset, nighttime fears and difficulty sleeping alone. Taken together, these sleep difficulties disrupt sleep continuity and quality (Alfano, Ginsburg, Kingery, 2007). Typically school-aged children obtain approximately 10 hours of sleep (Iglowstein et al., 2003). However, sleep problems such as lengthy sleep latency, insufficient sleep, and/or nighttime awakenings are also common, with up to a third of school children experiencing these (National Sleep Foundation, 2004; Smaldone et al., 2007). Of concern is that childrens’ sleep problems persists (Meltzer & Mindell, 2006), and have been shown to develop alongside other mental health problems in children (Gregory et al., 2005).

Specifically, sleep problems have been associated with poor emotional regulation and with behaviour problems such as impulsivity (Fallone, Owens, Dean, 2002; Mindell et al., 1999; Sadeh & Gruber, 1998). In line with adult studies showing insomnia may be a causative factor in the development of anxiety disorders (e.g., Ford & Kamerow, 1989; Neckelmann, Mykletun & Dahl, 2007), emerging evidence suggests that sleep problems
in children predict the onset of behavioural problems, as well as depression and anxiety (Gregory et al., 2002; 2004). For example, sleep problems at age 3-4 years have been shown to predict anxiety, conduct disorder, and hyperactivity at age 7 (Gregory et al., 2004), and sleep problems in childhood are a risk indicator for anxiety and depression in adulthood (Gregory et al., 2005). In addition, some studies have shown a possible pathway from anxiety to sleep disorder and subsequent depression (Dahl & Harvey, 2007; Johnson, Roth, Breslau, 2006). The relationship between sleep disturbance and internalising disorders is likely to be complex, and the direction of risk is not entirely clear. With past research mainly focusing on adults (e.g., Breslau et al., 1996; Riemann & Voderholzer, 2003), studies on the role of sleep disturbance in childhood internalizing problems are sparse to date.

This is despite the fact that anxiety is one of the most commonly diagnosed disorders in young people, with 3.7% to 9.9% of children and adolescents meeting criteria for an anxiety disorder at any given point in time (Ford, Goodman & Meltzer, 2003). Anxiety is also associated with impairment in a number of areas of functioning including sleep. A recent study found 83% clinically anxious children experienced at least one sleep complaint based on parent report (Alfano, Beidel, Turner, & Lewin, 2006). Compared with non-anxious youth, anxious children and adolescents may also be more prone to nighttime disturbances such as sleep terrors and sleep walking (Gau & Soong, 1999), nightmares and problematic behaviours, such as greater reluctance or refusal to sleep alone or away from home (Alfano et al, 2006). Indeed, sleep-related problems are listed as symptomatic of several of the anxiety disorders in the DSM-IV-R.
such as difficulty initiating sleep in generalized anxiety disorder and nightmares in separation anxiety disorder.

Only a handful of recent studies have directly examined the nature of sleep disturbances in clinically anxious children, and the impact of sleep problems on daily functioning. Using objective polysomnography techniques as well as self-report measures, Forbes et al. (2008) compared sleep patterns of anxious children, depressed children and healthy controls. Anxious children experienced the greatest degree of sleep difficulties, with both objective and subjective measures showing longer sleep latency for anxious children compared with depressed children and healthy controls. This study demonstrated that anxious children have unique sleep problems compared to healthy and clinical controls. In one of the only studies to examine daytime functioning, Alfano et al. (2007) investigated the relationship between sleep problems and aspects of daily functioning in the home/family environment as well as in non-family/peer settings, in anxious youth. The data showed a robust relationship between sleep-related problems and adverse impacts on daytime functioning in these domains.

The evidence to date on the role of sleep-related problems in childhood anxiety disorders is sparse and is limited for various reasons. Studies examining sleep in childhood anxiety disorders have been limited by small sample sizes, and high rates of comorbid disorders such as depression (e.g., Forbes et al., 2008), making it difficult to examine the unique impact of anxiety. Data also indicate that the sleep patterns of anxious youth may be particularly sensitive to the sleep laboratory context (Forbes et al., 2008), and therefore results from laboratory based research may not represent the typical nighttime experience. More naturalistic assessment measures may be needed to examine
sleep problems in anxious youth. Minor limitations include low internal consistency (i.e., alpha < .70) on some sleep measures (e.g., Alfano et al., 2006), and lack of clinical or community control populations. Finally, although one study has examined daytime functioning (Alfano et al. 2006), standardized indicators of daytime impairment including daytime sleepiness and fatigue (see Buysse et al., 2006) have yet to be examined in anxious children.

The aim of the current study is to examine the sleep-related problems in clinically anxious children, compared to non-clinical controls. The current study addresses a number of limitations of previous research. First, use of an online, 7-day sleep diary will capture more complete quantitative information about sleep disturbances in children’s typical sleeping environment (i.e., sleep onset latency, number and duration of awakenings, total sleep time). Completed each day, a sleep diary has the advantage of quantitatively assessing the severity and variability of sleep problems with less recall bias than retrospective scales (Buysse et al., 2006) used in previous studies (e.g. Alfano et al., 2006). The online format also allows for validity checks of compliance with instructions, and ensures that the data is time locked to ensure the diary is completed on a daily basis (Buysse et al., 2006). Further, complementary measures of typical daytime functioning (i.e., daytime sleepiness and fatigue) allow for the assessment of sleep-related impairments not obtained from sleep diaries (Buysse et al., 2006). Taken together, these measures will provide a more complete picture of SRPs.

The current study also seeks to address an issue that has not yet been explored in anxious children, namely, whether their sleep patterns differ on weekdays versus weekends. In a recent survey of adolescents from the general community, Wolfson et al
(2003) found important discrepancies between weekday and weekend sleep patterns. Adolescents tended to sleep for longer, and arise later on weekends than on weekdays, most likely due to the flexibility of weekend schedules. Assessment of such weekday/weekend variation may be particularly relevant in anxious populations where clinical observation shows that anxious children often report heightened anxiety on school nights due to worries about tests, bullying and separation from parents.

It was expected that clinically anxious children would have a significantly higher number of sleep-related problems during weekends and weekdays compared to controls. Specifically, it was expected that anxious children would go to bed later, take a longer time to get to sleep, sleep less, spend more time awake during the night, awake more often during the night, wake up later, and report more daytime sleepiness and fatigue than controls. Based on previous research by Wolfson, it was also expected that all children would sleep for longer and wake up later on weekends than on weekdays. Finally, it was predicted that anxious children would have significantly greater sleep difficulties on school nights compared to weekend nights.

**METHOD**

*Participants*

The sample consisted of 67 children: 37 children with anxiety disorders, and 30 non-clinical children. All children were aged between 7 and 12 years. Children from the anxious sample presented for assessment and treatment at the Macquarie University Centre for Emotional Health. The non-clinical group consisted of children recruited from the community who had never sought treatment from a mental health professional. All
children and parents were interviewed by a clinician using the Anxiety Disorders Interview Schedule for DSM-IV, Parent and Child Versions (ADIS-IV-C/P: Silverman & Albano, 1996). Diagnoses and clinical severity ratings were assigned by qualified clinical psychologists or graduate students in clinical psychology and were reviewed during supervision by qualified clinical psychologists. In the anxious sample, diagnoses were based on interviews with both parents and children. In the non-clinical group, diagnoses were based on interviews with mothers (due to limited resources). Previous research at our clinic has shown excellent inter-rater reliability using the ADIS-IV-C/P (Lyneham, Abbott & Rapee, 2007). The principal diagnoses of the children in the anxious group were as follows: separation anxiety disorder (SAD) 15.8%, generalized anxiety disorder (GAD) 50%, social phobia (SOC) 18.4%, Specific Phobia 10.5%, Panic Disorder 2.6%, and Post-Traumatic Stress Disorder 2.6%. Of the anxious children, 94.7% were diagnosed with more than one anxiety disorder, while 15.8% had an additional mood disorder and 21.1% had an additional behaviour disorder (Attention Deficit Hyperactivity Disorder or Oppositional Defiant Disorder). The sample exhibited high rates of comorbidity among the anxiety disorders with 89% of clinical children meeting criteria for a diagnosis of GAD anywhere in the child’s diagnostic profile (n = 33). Similarly, 68% (n = 25) met criteria for SOC and 46% (n = 17) met criteria for SAD.

Children were included in the non-clinical sample if they did not meet criteria for any psychological disorder assessed by the ADIS. No children were excluded on this basis. Four children reported clinical levels of symptoms on questionnaires measures of symptoms and given the absence of an ADIS-IV-C for non-clinical children, a decision
was made to exclude these children to be sure that the control group were not symptomatic. A total of 26 children were included in the final non-clinical sample.

**Measures**

*Sleep diary.* An online version of a 7-day sleep/wake diary was used to assess children’s’ sleep patterns. Children accessed on-line diaries via a secure, password protected website, and completed daily information on various sleep parameters (i.e., go to bed time, lights off time, sleep latency, number of awakenings, length of awakenings, final wake up time, and out of bed time). Formulae were used to calculate total sleep time. Sleep diaries provide reliable and valid estimates of subjective sleep patterns (Buysse et al., 2006; Wolfson et al., 2003), and the online format allowed for validity checks (i.e., that participants completed daily entries each day). Only 2% of participants entered data on the same day. *Pediatric Daytime Sleepiness Scale (PDSS).* The PDSS is an 8-item Likert response scale that measures childrens’ daytime sleepiness levels over the past 2 weeks. Response items range from *Never* (0) to *Always* (4), with total scores ranging from 0 to 32. The PDSS is reported to be a valid and reliable subjective measure of daytime sleepiness (Drake et al., 2003).

*Flinders’ Fatigue Scale (FFS).* The FFS is a 7-item scale that measures daytime fatigue experienced over the past 2 weeks. The FFS consists of six Likert items (e.g., *How often did you suffer from fatigue?*), and one multiple checklist item (i.e., *At what time(s) of the day did you typically experience fatigue?*). Responses range from 0 to 4, with higher scores indicating greater fatigue. Total scores range from 0 to 31. The FFS has been reported as a reliable and valid measure in adult samples (Gradisar et al., 2007).
The reliability of the FFS on the current sample was adequate (internal consistency = 0.78).

*Spence Children’s Anxiety Scale (SCAS).* The SCAS assessed child’s self reported and mother-reported anxiety symptoms (Spence, 1998; Nauta et al., 2004). This measure contains 28 items that all load on a single higher order scale, with a range from 0 to 114. The scale has good internal consistency (.92) and 6-month retest reliability (.60: Nauta et al., 2004). The measure distinguishes clinically anxious and nonclinical groups of children.

*Strengths and Difficulties Questionnaire (SDQ).* To assess child internalizing symptoms, children and mothers completed the SDQ (Goodman, 1997). The SDQ has demonstrated very good psychometric properties (Goodman, 2001).

**Procedure**

The procedures in this study were approved by the Macquarie University Human Ethics Committee. Before completing the measures, informed written consent was obtained from parents and children. Diagnostic assessments and symptom questionnaires were completed at the University. Children accessed on-line sleep diaries at home via a secure, password protected website. After completion of the study, clinical children participated in a randomized clinical trial of cognitive-behavioral therapy. Non-clinical children were given $50 for participation in the study.

**Statistical Analyses**

A series of one-way analysis of covariance (ANCOVA) were performed to test differences between the two groups on various sleep and daytime functioning parameters. The covariate used was ‘age’ due to a significant difference between the two groups (see
Results). Between-group effect sizes (Cohen’s $d$) were reported regardless of significance found, according to Mathey (1998) where a small effect size $\geq 0.15$, a medium effect size $\geq 0.40$, and a large effect size $\geq 0.75$. Paired t-tests were performed for within-subjects comparisons of school week and weekend sleep patterns.

RESULTS

Descriptive statistics

Table 1 provides the demographic and symptom measures for the clinical and non-clinical groups. There were significant differences between the ages of the children in the clinically anxious and non-clinical groups, $t(61) = 2.66, p < .05$. Chi squared analyses showed no significant differences between the two groups on the children’s gender, $\chi^2(1, N = 63) = 1.8, p > .05$, parent marital status, $\chi^2(2, N = 63) = .69, p > .05$ or ethnicity, $\chi^2(5, N = 62) = 12.13, p > .05$. As expected clinically anxious children scored higher on anxiety symptom measures for both child-, and mother-report compared to non-clinical children (See Table 1).

Schoolweek vs. weekend sleep patterns

Means and standard deviations for the sleep parameters derived from the sleep diary are presented in Table 2. For sleep-related problems during school nights, both the mean sleep latency and wake after sleep onset for both groups fell below the cut-off of 30 minutes indicative of a sleep problem (Buysse et al., 2006). However, the mean values for total sleep time for the anxious children is below the mean for this age group, yet non-clinical children obtained the mean amount of nighttime sleep (i.e., ~10 hours: Iglowstein et al., 2003). Analysis of the number of children in each group reporting a mean sleep
latency 30 minutes or more, showed that twice as many anxious children suffered a sleep-onset problem than their non-anxious peers, (32.4% clinical vs. 15.4% controls), however this difference was not significant, $\chi^2(1, N = 63) = 2.34, p > .05$. No real difference in sleep-maintenance problems [i.e., wake after sleep onset (WASO)] were found: 2.7% clinical vs. 0% controls, $\chi^2(1, N = 63) = 0.71, p > .05$. However, more clinically-anxious children obtained sub-normative (i.e., insufficient) total sleep (81.1%) compared to controls (57.7%), $\chi^2(1, N = 63) = 4.10, p < .05$.

Compared to their non-anxious peers, clinically-anxious children went to bed later on school nights, $F(1, 60) = 4.76, p = .03, d = 0.39$, yet were out of bed around the same time, $F(1,60) = 0.24, p > .05$. Surprisingly, anxious children did not spend extra time awake in bed, either at the start of the night, [sleep latency], $F(1, 60) = 0.77, p > .05$, or during the night, [number of awakenings] $F(1,60) = 2.20, p > .05$, [wake after sleep onset] $F(1,60) = 2.24, p > .05$. However, anxious children obtained significantly less sleep on school nights, $F(1,60) = 8.27, p = .006, d = 0.53$. With regard to childrens’ weekend sleep patterns, these were strikingly similar between both groups, with no significant differences found on any measure (all $F \leq 1.61$, all $p \geq .21$).

Differences between school week and weekend sleep patterns within each group were investigated. On the weekend, both groups went to bed significantly later (both $t \geq 2.47, p < .05$), but only the clinical group fell asleep faster, $t(36) = 2.66, p = .01$. Neither group showed a difference in the number of awakenings on weekends versus weekdays (both $t \leq 1.56, p \geq .13$), however the clinically-anxious children experienced less time awake during the night on weekends, $t(36) = 2.32, p = .03$. Both groups got out of bed
later (both $t \geq 2.94, p \leq .008$) on weekends, yet both obtained a similar amount of sleep on weekends (both $t \leq 1.53, p \geq .14$).

**Daytime functioning and feelings**

Despite clinically anxious children experiencing less total sleep time during the school week, analyses indicated their level of daytime sleepiness ($M = 21.26, SD = 5.05$) was not significantly different to that of non-anxious children ($M = 22.04, SD = 5.02$), $F(1,54) = 0.11, p > .05, d = 0.16$. Similarly, there was no significant difference in reported levels of fatigue between anxious ($M = 5.48, SD = 4.44$) and non-anxious children ($M = 4.69, SD = 3.30$), $F(1,54) = 0.60, p > .05, d = 0.20$.

**DISCUSSION**

Anxiety disorders result in significant impairments in children’s lives. The present study investigated sleep-related problems in anxious and non-anxious children using subjective sleep diary reports of weekday and weekend sleep experienced in their home environment. School-aged children experiencing an anxiety disorder showed a sleep pattern that differs from their non-anxious peers. However, differences were only present during the school week. Specifically, anxious children reported going to bed later on school nights (approximately 9 pm). Although significant, this only equated to a mean difference of about a quarter of an hour later. Why anxious children go to bed later on school nights is undetermined from the present study’s data. Anxious children are known to refuse sleeping alone which could result in bedtime resistance (Alfano et al., 2007).
As such, parents of anxious children may not possess appropriate limit-setting skills to enforce a regular and early bedtime, resulting in a later bedtime. It also may be the case that anxious children live within a disorganized family environment, which may involve poor sleep hygiene (i.e., consistent and early bedtime) enforced by parents (Gregory et al., 2005). If this were the case though, one may expect these differences to be present on both weekend and school nights.

One possible explanation for the difference between anxious and non-anxious children on school nights is that clinically anxious children may experience greater stress and arousal on school nights due to school-based fears (e.g., worries about grades, social fears, separation fears), and that this may play a role in putting off going to bed. Greater anxiety on school nights may also potentiate the occurrence of other problematic behaviors (Alfano et al., 2007). When combined with increased stress on school nights, it may be more difficult for parents of anxious children to enforce a regular and early bedtime, resulting in a later bedtime on school nights.

Surprisingly, anxious children did not take longer to fall asleep than their non-anxious peers. It may be that as a result of a later bedtime, anxious children are going to bed at a time that is more conducive to sleep for them, resulting in a shorter sleep latency. Nonetheless, this finding contradicts previous research of anxious children demonstrating a lengthened objective and subjective sleep latency compared to control children (Forbes et al., 2008). It should be noted that Forbes and colleagues investigated the sleep patterns of anxious children in a laboratory environment as opposed to the home environment in which the present study was conducted. Interestingly, the mean subjective sleep latency of night 1 for anxious children in the Forbes et al. study (22.4 min) was comparable to the
school week mean sleep latency found in the present study (22.3 min). Furthermore, other studies have not found anxious children have difficulty falling asleep (Forbes, Williamson, Ryan & Dahl, 2006). The mean school night sleep latency was just over 20 minutes in the present study. This value is not considered to be clinically meaningful, with values over 30 minutes indicative of problematic sleep onset (Buysse et al., 2006); however, it should be noted that this cut-off has been validated in adults, but not yet with children. Finally, although 1 in 3 anxious children had difficulty initiating sleep (i.e., SOL > 30 minutes), this was not significantly more than non-clinical children (15%).

Anxious children did not report significantly more awakenings, nor time awake during the night compared to controls. In fact once asleep, children from both groups experience less than one awakening during the night over the course of the school week, with the mean duration of time spent awake being less than a few minutes. This is further supported by a low incidence of children reporting problematic sleep-maintenance. That is, less than 3% of anxious children report being awake more than 30 minutes on average during the week, with no control children reporting such a problem. This supports previous studies that have found subjectively, that anxious children experience a similar number of awakenings and time awake as those without an anxiety disorder (Forbes et al., 2008). Of note, is that objective polysomnographic measurement of sleep in anxious children suggests they experience less time awake during the night than control children (Forbes et al., 2008) suggesting potential discrepancies in objective verses subjective sleep perception for anxious children.

Due to childrens’ requirements to attend school during the week, they are required to get up at a consistent time. The present study found no differences in the ‘out of bed’
time for anxious and non-anxious children, most likely due to their forced awakening on 
school mornings. The combination of this forced awakening with a later bedtime is likely 
to have contributed to anxious children experiencing significantly less sleep on school 
nights. Anxious children obtained approximately 30 minutes less sleep than their non-
anxious peers (9.5 hours vs. 10 hours), with the anxious group’s weekly average total 
sleep time comparable to that in previous studies (e.g., 9.6 hours: Forbes et al., 2008).
Analysis of individual children’s total sleep time showed that 8 out of 10 anxious 
children obtained insufficient sleep, which was significantly more than the nearly 6 out of 
10 non-anxious children who experienced insufficient sleep.

So what does a sleep deficit of 30-min mean for anxious children? Although a 30-
min sleep deficit during the week measured in the present study is modest, the potential 
for an ongoing, accumulating sleep loss still exists. In adults, chronic sleep restriction of 
4 and 6 hrs per night over 14 days leads to significant deficits in waking behaviour (van 
Dongen, Rogers, & Dinges, 2003). In healthy children, experimental sleep restriction of 
near 3 hrs over 3 weeks leads to problems in attention, daytime sleepiness and academic 
performance (Fallone et al., 2005). However, more modest sleep restriction of at least 30 
min over 3 days has been shown to lead to daytime deficits in reaction times and 
concentration in healthy children (Sadeh et al., 2003). As these studies excluded children 
with an anxiety disorder, it is not yet known how anxious children respond to chronic 
sleep restriction.

The present study found that despite anxious children obtaining less nocturnal 
sleep during the school week, they did not experience significantly different levels of 
daytime sleepiness from non-anxious children. On reflection, this may be expected, as
anxious children’s anxiety levels could lead to hyperarousal (Hossain et al., 2005) which could override any excess daytime sleepiness experienced by reduced nocturnal sleep. As sleepiness has been shown to be distinctive from other forms of daytime impairment (Hossain et al., 2005) instead one may expect anxious children to express their impairment in another form. The present study also measured childrens’ level of daytime fatigue. However, similar to daytime sleepiness, no significant differences were found between the two groups, although the direction of the means may indicate that the present study captured these feelings too early, and that differences may emerge later (e.g., adolescence). Nonetheless, as demonstrated in sleep restriction studies of children, it may be that anxious children display a different set of associated daytime impairments that were not measured in the present study (e.g., reaction times, attention/concentration, school performance).

Exploration of childrens’ weekend sleep patterns indicated no differences between anxious and non-anxious children. However, discrepancies were found between each group’s schoolweek and weekend sleep patterns. Specifically, both groups went to bed later and got out of bed later on weekends. However, these differences did not lead to a greater amount of sleep on weekends compared to the school week. In essence, their sleep timing simply shifts to a later time. Yet, the two notable differences were that on weekends anxious children fell asleep quicker and were less awake during the night than on weeknights. No such results were found for non-clinical children. Nevertheless, an investigation of sleep in children is but one part of the problem, and as such, investigations should have a dual focus, namely, the exploration of nocturnal sleep patterns and daytime functioning and feelings.
Limitations

Children with internalizing problems vary markedly in the extent to which they disclose information about their distress, and it has been suggested that children who score low may not necessarily be asymptomatic (Joiner, Schmidt & Schmidt, 1996). Anxious children may in fact have under-reported sleep-related problems in an effort to “fake good” (Dadds, Perrin & Yule, 1998). Although the present study was novel in using sleep diaries to investigate children’s sleep patterns across the school week and weekend, sleep diary data could have been validated with multiple measurements of sleep (e.g., objective: wrist actigraphy; parental reports). However, obtaining quantitative data does not necessarily measure the negative impact of sleep problems experienced by children and their families. More qualitative indices such as bedtime refusal and problematic sleep-onset associations (e.g., need for parental presence) would also provide further valuable information on the burden sleep problems of anxious children have on families’ lives (Mindell, Kuhn, Lewin, Meltzer, Sadeh, 2006).

Finally, the sample focused on sleep problems in anxious children aged 7-12 years. Previous research has included both child and adolescent samples. While the current study provides a more specific look at sleep problems in anxious children, there is likely to be an increase in sleep problems after the onset of puberty (Carskadon et al., 1980) resulting in greater differences between anxious and non-anxious adolescents. Indeed, in the present sample some children may have already begun puberty, however this was not assessed. Future research would benefit from examining pubertal status and sleep patterns in older anxious children.
Conclusion

As in adult populations, anxious children show sleep-related problems that warrant consideration in treatment. Specifically, anxious children tend to go to bed later, but arise at the same time as non-anxious children, resulting in significantly less sleep. Indeed, almost one fifth of anxious children obtained insufficient sleep, and 1 in 3 anxious children had difficulty initiating sleep. These sleep disturbances appear to be limited to school nights and do not occur on weekends. Interestingly, despite having less sleep, anxious children do not experience excessive sleepiness or fatigue. This study has identified important avenues for future research examining sleep-related problems in anxiety disordered children.
References


Table 1.

*Demographic Data Across Groups (SDs in Parentheses)*

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<thead>
<tr>
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<th>Clinically</th>
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<td>9.5 (1.5)&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
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<td>37</td>
<td>1.42 (1.5)&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td>• Emotional symptoms</td>
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<td>• Total Score</td>
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<td>SDQ (father report)</td>
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<td>• Emotional</td>
<td>5.68 (2.3)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>34</td>
<td>.81 (0.98)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>26</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Total Score</td>
<td>SCAS (Total Score)</td>
<td></td>
<td></td>
</tr>
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<td>----------</td>
<td>-------------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.85(6.0)\textsubscript{a}</td>
<td>5.35(3.7)\textsubscript{b}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother report</td>
<td>37.3(14.9)\textsubscript{a}</td>
<td>6.68(3.2)\textsubscript{b}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father report</td>
<td>33.21(13.7)\textsubscript{a}</td>
<td>8.92(5.1)\textsubscript{b}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child report</td>
<td>29.86(15.9)\textsubscript{a}</td>
<td>12.88(5.9)\textsubscript{b}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>25</td>
<td></td>
<td></td>
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<td>26</td>
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</tr>
<tr>
<td></td>
<td>36</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Means with different subscripts differ significantly at p<.05 level.
Table 2.

*Mean (SD) and between-group effect sizes for schoolweek and weekend sleep patterns of clinically-anxious children and controls.*

<table>
<thead>
<tr>
<th></th>
<th>Anxious Children</th>
<th>Controls</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schoolweek</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTB(time)</td>
<td>8:54pm(67min)#</td>
<td>8:38pm(37min)#</td>
<td>0.39**</td>
</tr>
<tr>
<td>SOL(min)</td>
<td>22.3(18.4)#</td>
<td>19.6(19.6)</td>
<td>0.16</td>
</tr>
<tr>
<td>TST(hours)</td>
<td>9.5(0.8)</td>
<td>10.0(0.7)</td>
<td>0.53**</td>
</tr>
<tr>
<td>WASO(min)</td>
<td>4.4(5.5)#</td>
<td>2.8(4.7)</td>
<td>0.31</td>
</tr>
<tr>
<td>NAWAK</td>
<td>0.4(0.5)</td>
<td>0.3(0.4)</td>
<td>0.32</td>
</tr>
<tr>
<td>OOB(time)</td>
<td>7:15am(94min)#</td>
<td>7:23am(77min)#</td>
<td>0.07</td>
</tr>
<tr>
<td><strong>Weekend</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTB(time)</td>
<td>9:12pm(99min)#</td>
<td>9:16pm(84min)#</td>
<td>0.24</td>
</tr>
<tr>
<td>SOL(min)</td>
<td>16.1(16.3)#</td>
<td>13.4(11.4)</td>
<td>0.27</td>
</tr>
<tr>
<td>TST(hours)</td>
<td>9.8(1.1)</td>
<td>9.8(0.8)</td>
<td>0.25</td>
</tr>
<tr>
<td>WASO(min)</td>
<td>2.3(3.6)#</td>
<td>1.5(2.7)</td>
<td>0.16</td>
</tr>
<tr>
<td>NAWAK</td>
<td>0.3(0.5)</td>
<td>0.3(0.4)</td>
<td>0.21</td>
</tr>
<tr>
<td>OOB(time)</td>
<td>7:39am(107min)#</td>
<td>7:43am(88min)#</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Note:** **=significant between-groups difference ***(p < .05); # =significant within-groups difference (p<.05); GTB=go to bed time; SOL=sleep onset latency; TST=total sleep time; WASO=wake after sleep onset; NAWAK=number of awakenings; OOB=out of bed time.