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Things that Go Bump in the Night: Frequency and Predictors of Nightmares in Anxious and Non-anxious Children

Katharine C. Reynolds, Candice A. Alfano

Sleep and Anxiety Center of Houston, Department of Psychology, University of Houston

Abstract

Frequency and predictors of nightmares among children 7 - 11 years old with generalized anxiety disorder (n=42) and no diagnosis (n=44) were examined using both prospective and retrospective child and parent reports. Both children with GAD and their parents reported significantly more nightmares than controls based on retrospective reports but the groups did not differ when nightmares were assessed daily across a one-week prospective period. Females reported more nightmares than males according to prospective assessment only. Controlling for sex and group, child sleep anxiety and pre-sleep somatic arousal predicted parent but not child report of nightmares. Results suggest both clinically-anxious youth and their parents overestimate the occurrence of nightmares yet factors influencing retrospective accounts appear to differ across informants.

Keywords

nightmares; children; sleep; anxiety; pre-sleep arousal

Introduction

Up to 50% of pre-school and school-aged children experience occasional nightmares, typically defined as episodes of awakening from sleep with recall of intensely disturbing dream mentation, usually involving fear or anxiety, anger, sadness, or other dysphoric emotions (American Academy of Sleep Medicine, 2005). These occasional yet potentially frightening events are developmentally normative in childhood but approximately 3-5% of youth experience nightmares on a frequent basis (i.e., at least once per week; Hublin, Kaprio, Partinen, & Koskenvuo, 1999; Nevéus, Cnattingius, Olsson, & Hetta, 2001). In addition to temporary feelings of distress, nightmares are associated with changes in sleep architecture and diminished sleep quality in adults (Krakow, Tandberg, Scriggins, & Barey, 1995; Simor, Horváth, Gombos, Takács, & Bódizs, 2012). Persistent nightmares also increase risk of adult psychiatric disorders and suicide (Nielsen & Levin, 2007; Schredl, 2003). Adults with frequent and chronic nightmares report that onset typically occurs in childhood, around age 10 (Cirignotta, Zucconi, Mondini, Lenzi, & Lugaresi, 1983; Hartmann, 1984; Kales et al., 1980; Sandoval, Krakow, Schrader, & Tandberg, 1997). Thus,

the presence of persistent nightmares in childhood may be a marker of poor sleep as well as a harbinger of more severe problems to come.

Several studies have found significant relationships between generalized anxiety/fearfulness and nightmares in childhood. In addition to a positive correlation between trait anxiety and nightmare/bad dream frequency in school-aged children (Mindell & Barrett, 2002; Schredl, Pallmer, & Montasser, 1996), children who rate their nightmares as most distressing also have the highest trait anxiety scores (Mindell & Barrett, 2002). Anxiety at three years of age is predictive of bad dreams at age five (Simard, Nielsen, Tremblay, Boivin, & Montplaisir, 2008) and recall of “disturbing dreams” in early adolescence (i.e. around 13 years of age) is associated with clinically-significant anxiety symptoms at age 16 (Nielsen et al., 2000). In both children and adults, nightmares also are a hallmark feature of post-traumatic stress disorder (PTSD; Carrion, Weems, Ray, & Reiss, 2002; Kilpatrick & Williams, 1998; Neylan et al., 1998; Spoomaker & Montgomery, 2008) and occurrence of nightmares following a traumatic event confers increased vulnerability for the subsequent development of PTSD (Harvey & Bryant, 1998; Mellman, David, Bustamante, Torres, & Fins, 2001; Mellman, David, Kulick-Bell, Hebding, & Nolan, 1995). Together, findings denote the presence of bidirectional relationships between nightmares and problematic anxiety beginning early in life.

Among children with anxiety disorders (other than PTSD), nightmares are commonly reported (Alfano, Beidel, Turner, & Lewin, 2006; Alfano, Ginsburg, & Kingery, 2007). According to parents, up to 80% of children and teens (ages 6-18 years) with generalized and other anxiety disorders experience nightmares (Alfano et al., 2006; Alfano et al., 2007; Chase & Pincus, 2011). Data based on child reports are more rare but complaints of sleep-related problems, overall, are frequent among anxious youth (i.e., youth 7-14 years of age; Alfano, Pina, Zerr, & Villalta, 2010). Previous studies have identified the presence of several sleep-related difficulties including problems initiating/maintaining sleep, delayed bedtimes, bedtime resistance/conflict, avoidance of/refusal of sleeping independently and nighttime awakenings (Alfano et al., 2007; Alfano et al., 2010; Chase & Pincus, 2011; Hudson, Gradisar, Gamble, Schniering, & Rebelo, 2009).

Although frequent nightmares in clinically-anxious youth may reflect primary anxiety pathology or pose an additive risk factor for more severe or alternative forms of psychopathology, the common presence of sleep-related problems and behaviors in this population might also serve to influence (i.e., bias) parental perception of child nightmares. That is, parents may overestimate nightmare occurrence when children display other avoidant/fearful behaviors prior to the actual sleep period. In addition to child-based reports of nightmare frequency, evaluation of nightmares over prospective periods are needed to provide a more precise understanding of their occurrence in anxiety-disordered children.

In conjunction with child reports and prospective data, understanding of unique factors associated with the occurrence of nightmares is needed to direct both mechanistic and intervention research in anxious youth. In the absence of evidence for a shared genetic vulnerability between generalized anxiety and nightmares in children ages 4-17 (Coolidge, Segal, Coolidge, Spinath, & Gottschling, 2010), behavioral processes represent key variables

for investigation. Anxiety-disordered youth often struggle at bedtime, both prior to actual lights out and while lying in bed attempting to fall asleep. Sleep-related anxiety, bedtime resistance, and higher rates of both cognitive and somatic pre-sleep arousal have been found in anxious compared to non-anxious children between the ages of 7-14 years (Alfano et al., 2010). Sex-based differences among both anxious and non-anxious youth also may exist. In general, nightmares are more prevalent in women than in men (Hublin et al., 1999; Levin, 1994; Muris, Merckelbach, Gadet, & Moulart, 2000; Nielsen et al., 2000; Schredl & Pallmer, 1998; Simard et al., 2008), but examinations in girls versus boys are more limited. One study found girls with anxiety disorders to experience significantly more nightmares than boys (Alfano et al., 2007) but reports were provided by parents only.

Current Study

Several notable gaps in existing research form a basis for the current study. First, available data documenting frequent nightmares in clinically-anxious child samples are based exclusively on parent (retrospective) reports. Child reports and prospective data are needed to more precisely understand the frequency of nightmares in this population, including potential differences between anxious boys and girls. We therefore examined rates of nightmares in children with a primary diagnosis of generalized anxiety disorder (GAD) in comparison to a healthy, control sample of children based on: 1) parental retrospective reports; 2) child retrospective reports; and 3) child prospective reports across a one-week period (Aim 1). In line with available data, we expected children with GAD and girls to experience more nightmares than controls and boys, respectively, across all three measures. Second, we examined avoidant/fearful nighttime behaviors (sleep anxiety, bedtime resistance) and levels of pre-sleep arousal (cognitive and somatic) as possible predictors of child nightmares (Aim 2). Based on evidence of reciprocal relationships between nightmares and anxiety, we expected all four variables would predict increased nightmare frequency in all children. We focus on school-aged children specifically, because peak incidence of nightmares occurs between the ages of 7 to 9 years (e.g., Muris, Merckelbach, Mayer, & Prins, 2000), and because children with anxiety disorders have been reported to experience significantly more nightmares than anxious adolescents (Alfano et al., 2007).

Method

Sample

Participants (N=86) were between 7 to 11 years of age with either a primary DSM-IV-TR diagnosis of GAD (n=42) or no DSM-IV-TR diagnosis (n=44). All participants were enrolled in a prospective study examining sleep in children. Data were collected at two pediatric anxiety clinics in large metropolitan areas (Washington, DC and Houston, TX). Community flyers and print advertisements were used to recruit both anxious and healthy participants for a study on “child behavior and emotion.” No mention of sleep was made in any recruitment materials to ensure recruitment of a representative sample.

All participants lived with a primary caretaker and were enrolled in regular classroom settings. Exclusion criteria were: 1) current/lifetime history of a depressive, psychotic, pervasive developmental, bipolar, eating or conduct disorder; 2) use of medications known

to impact sleep or anxiety; 3) $IQ < 80$; 4) chronic medical condition requiring a daily medication regimen; 5) diagnosis, evidence or indicators of sleep-disordered breathing; and 6) current treatment services for an emotional, behavioral, or sleep problem, including treatment of GAD. Anxious children were required to have a primary diagnosis of GAD and eligible healthy controls had no diagnoses or behavioral and emotional problems based on comprehensive, clinical evaluation (detailed below).

Measures

General Information Form.—Demographic information was collected from the primary caretaker via a brief questionnaire that assessed age, sex, race, and ethnicity of the participant, as well as family information including marital status, household income, and parental psychiatric history.

Anxiety Disorders Interview Schedule for Children (ADIS-C/P; Silverman & Albano, 1996).—The ADIS – C/P is a semi-structured interview designed to assess DSM-IV anxiety and other psychiatric disorders. A clinical severity rating (CSR; range of 0-8) of 4 or higher (indicating at least moderate severity/impairment) is required for assigning a diagnosis. High inter-rater reliability for the ADIS-C/P anxiety disorder categories has been reported (Silverman, Saavedra, & Pina, 2001). All interviews were administered to parents and children separately by a trained graduate student or Ph.D. level clinical psychologist. All cases were reviewed with a licensed clinical psychologist prior to assigning final diagnoses.

Sleep Self Report (SSR; Owens, Maxim, Nobile, McGuinn, & Msall, 2000).—This 26-item child-report measure was developed to assess sleep problems in school-aged children. Children were asked to endorse the frequency of different sleep-related problems on a 3-point, likert-type scale (i.e., 3=usually, 2=sometimes, 1=rarely/never). Validity and reliability for the SSR have been established (Owens, Maxim, et al., 2000). For the current study, item #20, “Do you have nightmares?” was examined.

Child Behavior Checklist (CBCL; Achenbach, Howell, Quay, & Conners, 1991).—The CBCL is a widely used parent-report measure of social competence and problem behavior in children between 4-18 years of age (Achenbach et al., 1991). The 113-item measure assesses the frequency of different child behaviors occurring “now or within the last 6 months.” Parents rated items on a 3-point likert-type scale (0=not true of the child; 1 = sometimes true; 2 = very true of the child). The CBCL is a highly reliable and internally consistent measure (Achenbach et al., 1991), and yields broad-band scales of internalizing and externalizing problems and narrow band scales of behavior (i.e., social problems, aggression, attention problems, anxiety/withdrawn). For the current study, item #47, “nightmares” was examined.

Prospective Nightmare Assessment.—As part of study participation, children completed brief phone interviews (and wore wrist actigraphs) for 7 consecutive days. Each day children answered a standard series of questions about their sleep on the prior night including whether or not the child experienced a nightmare. Child responses were coded as

yes or no and the total number of nightmares experienced was summed for each participant across all 7 nights (range 0-7 nightmares).

Child Sleep Habits Questionnaire (CHSQ; Owens, Spirito, & McGuinn, 2000).—

The CSHQ is a validated measure of parent-reported sleep problems that has demonstrated acceptable sensitivity and specificity in identifying children with and without clinical sleep problems (Owens, Spirito, et al., 2000). Parents were asked to endorse the frequency of particular child sleep problems on a 3-point, likert-type scale (i.e., 3=usually, 2=sometimes, 1=rarely/never). This 38-item measure yields 7 subscales and a total sleep problems score. For the current study, the bedtime resistance and sleep anxiety subscales were examined. The CSHQ and its subscales have shown adequate internal consistency (0.68 in community samples and 0.78 in clinical samples) and test-retest reliability (Owens, Spirito, et al., 2000).

Pre Sleep Arousal Survey for Children (PSAS-C; Nicassio, Mendlowitz, Fussell, & Petras, 1985).—

This 16-item measure originally developed for adults was used to assess child-reported physiological arousal during the pre-sleep period. Children rated cognitive and somatic symptoms of arousal prior to falling asleep at night based on a 5-point likert-type scale (e.g., 1=not at all, 5= all the time). As no measure has been validated for children, the PSAS-C is based on the adult version of the PSAS. It yields a total score, and cognitive and somatic subscales. The PSAS has acceptable reliability and validity (Nicassio et al., 1985).

Actigraphy.—Micro Motionlogger Sleep Watches (Ambulatory Monitoring, Inc., Ardsley, NY, USA) were used to provide an objective measure of children's sleep. The device is an accelerometer-based sleep monitor that collects and stores movement data continuously. Seven consecutive nights of actigraphy were collected corresponding with the prospective assessment of nightmares. The reliable sleep algorithm developed by Sadeh and colleagues (1989) was used to score actigraphy data. For the current study, average total sleep time (TST) and average number of wake episodes during the night (WEP) were examined across the 7 days.

Procedure

The current study was approved by all appropriate institutional review boards and all families provided informed consent to participate. Measures of psychosocial functioning and sleep-related problems were administered to child and parent upon the initial visit to the lab, during which eligibility was confirmed based on ADIS-C/P diagnoses. Seven days of prospective sleep monitoring (including actigraphy and daily-phone calls) followed the initial assessment. Participants were compensated \$5 for each phone call completed.

Statistical Approach

Missing data were analyzed and although data were not missing completely at random (MCAR; Little's MCAR [$\chi^2_{(26)} = 44.78, p = .012$]), data were assumed to be missing at random as t-tests did not demonstrate meaningful patterns in missing data. Expectation Maximization imputation was used to account for missing data on continuous variables (Peugh & Enders, 2004). Multivariate analyses of variance (MANOVAs) were used to test

for differences in nightmare frequency between GAD and healthy control groups. Nightmare frequency was based on parent retrospective, child retrospective and child prospective report. Sex was also entered into the model to test the interaction between group and sex in predicting nightmares. Differences in demographic variables also were examined in order to identify possible covariates to be included the multivariate model. Hierarchical linear regression models were used to examine pre-sleep arousal levels and behaviors prior to bedtime as predictors of child nightmares. All analyses were completed in SPSS version 21.

Results

Sample Characteristics

Of the total sample ($N=86$), 51.2% of participants were female and the mean age was 8.81 years ($SD=1.39$). Sex and age did not significantly differ between groups. Other demographic information by group is presented in Table 1. Potential group differences based on marital status, parent internalizing problems, child race, parental education, and household income also were explored. As shown in Table 1, the groups significantly differed on parent internalizing problems ($\chi^2=4.67, p<.05$), maternal education ($\chi^2=13.112, p<.05$), and paternal education ($\chi^2=9.282, p<.05$). Parent internalizing problems (dummy coded as present/absent) and parental education (dummy coded as at least one parent completed college or not) were therefore entered as a covariate in all remaining analyses.

We also examined possible differences in actigraphy-assessed total sleep time and number of nighttime awakenings between diagnostic or gender groups during the 7-day prospective assessment. Specifically, because nightmares typically occur during rapid eye movement (REM) sleep, which dominates the second half of the sleep period, duration of sleep and proportion of REM sleep may related directly to dreaming activity and nightmares. Nighttime awakenings also commonly co-occur with the presence of nightmares. Children with GAD did not differ from controls in terms of TST ($t = .696, p = .48$) or WEP after sleep onset ($t = 1.666, p = .09$). Females did experience significantly longer TST than did males ($t = 2.391, p = .019$), but there were no sex differences observed for WEP after sleep onset ($t = -1.081, p = .28$). We therefore included total sleep time as a covariate in all models.

Group and Sex-Based Differences in Nightmares—To minimize possible error rates due to multiple tests, a MANCOVA was used to examine possible differences in nightmares across diagnostic groups and sex. Group and sex were entered as independent variables, total sleep time, parental education and internalizing problems were entered as covariates, and the three nightmare measures (parent retrospective, child retrospective, and child prospective reports of nightmares) were entered as multivariate outcomes. There was a significant main effect for group ($Wilks' \Lambda = 0.866, F = 3.968, p = 0.01$) and sex ($Wilks' \Lambda = 0.861, F = 4.154, p < .01$) but the interaction between sex and group was not significant. Follow up univariate test results and means by group and sex are presented in Tables 2 and 3, respectively. As expected, parents of children with GAD reported more frequent nightmares than parents of controls ($F = 11.716, p < .01$). A similar result for child retrospective reports also was detected ($F = 4.148, p = .04$). The two groups did not significantly differ on child prospective reports of nightmares. In terms of sex, females and males differed based on child

prospective report of nightmares only ($F = 4.714, p = .03$); girls reported more nightmares than boys during the one-week assessment.

Bedtime and Sleep-Related Behavioral Predictors of Nightmares—Hierarchical regression models were used to examine whether child pre-sleep arousal and child nighttime behavior predicted nightmare frequency. Due to low base rates for nightmares reported during the prospective assessment period (in both groups), regression models were conducted with retrospective reports as criterion outcome variables. Separate models with child and parent-reported nightmares were examined. In both models TST, parent internalizing problems and parental education were entered in step 1, group status and sex were entered in step 2, and bedtime resistance (from the CSHQ), sleep anxiety (from the CSHQ), and cognitive and somatic pre-sleep arousal (from the PSAS-C) were entered as step 3 predictors. Collinearity diagnostics were evaluated and found to be acceptable.

The model predicting parent-reported nightmares was significant ($F = 4.725, p < .01; \text{adj}R^2 = 0.293$). The addition of variables included in step 3 accounted for a significantly greater proportion of the variance in nightmares than group and sex alone ($R^2\text{change} = .172, p < .01$). Examination of regression coefficients revealed sleep anxiety ($t = 2.966, p < .01$) and somatic pre-sleep arousal ($t = 2.112, p = .03$) contributed significantly to the variance in parent reported nightmares. Regression coefficients are presented in Table 4. The model predicting child-reported nightmares was not significant ($F = 1.532, p = .153; \text{adj}R^2 = 0.056$).

Discussion

Robust relationships between early sleep disturbances and anxiety exist (Gregory et al., 2005; Gregory, Eley, O'Connor, & Plomin, 2004; Gregory & O'Connor, 2002) yet certain types of childhood sleep problems, like nightmares, have received limited empirical attention in the context of anxiety. Generally considered benign and developmentally-appropriate phenomena during childhood, frequent nightmares have been less studied in spite of associations with poor sleep quality and increased psychiatric and suicide risk (Nielsen & Levin, 2007; Schredl, 2003). Findings in both clinical and non-clinical samples of children also suggests a specific link between generalized anxiety and nightmares (Alfano et al., 2006; Nielsen & Levin, 2007). The current study therefore examined the frequency of nightmares among children with a primary diagnosis of GAD and a healthy, control group according to parent retrospective, child retrospective, and child prospective (i.e., across one week) reports of nightmares.

Consistent with prior research among clinical samples of anxious youth (Alfano et al., 2006; Alfano et al., 2007; Chase & Pincus, 2011), parents of children with GAD reported more frequent nightmares than parents of controls. Results based on child (retrospective) reports revealed a significant group difference as well. Approximately 17% of children with GAD and 7% of their parents endorsed the presence of frequent (i.e., usual) nightmares in comparison to 5% and 0% in the control group, respectively. Thus, in addition to reports of more frequent nightmares among anxious children, we found largely concordant parent and child reports in both groups. These results suggest that, at least as compared to child (retrospective) reports, parents of anxious children do not provide inflated estimates of child

nightmare frequency. Prospective assessment of nightmares nonetheless revealed a different picture. We failed to find a significant difference between the groups when nightmares were assessed daily for 7 consecutive days. Similar estimates of actigraphy-derived total sleep time and nighttime awakenings between the groups support this result. In view of previous findings revealing up to 80% of anxiety-disordered children to experience (at least occasional) nightmares (Alfano et al., 2006; Alfano et al., 2007; Chase & Pincus, 2011) the latter finding was unexpected. Because this is the first study that we are aware of to utilize prospective assessment of nightmares in either healthy or anxious children, these results await replication.

Prospective versus retrospective reports of nightmares have been found to be discrepant in prior studies as well. However, contrary to the current set of results, retrospective reports more commonly underestimate prospective nightmare frequency (Nielsen et al., 2000; Wood & Bootzin, 1990; Zadra & Donderi, 2000). It may be of relevance that previous research has primarily focused on adults and/or relied on community-based samples. Clinical levels of childhood anxiety might directly influence children's perception/memory of nightmares such that dreams are recalled as more frightening/disturbing and more frequent over time, in turn shaping both child and parent accounts. This thesis is supported by a prior findings showing a positive association between trait anxiety and nightmare distress ratings in children (Mindell & Barrett, 2002). Rather than actual dream mentation, endorsement of frequent nightmares might therefore represent an epiphenomenon of childhood anxiety disorders rooted in established cognitive-affective biases. For example, because clinically-anxious youth underestimate their ability to cope with dangerous situations (e.g., Bögels & Zigterman, 2000) dreams with threatening content might be perceived to occur more frequently than in actuality. Since parent and child questionnaires were administered prior to prospective assessment in the current study, the extent to which tracking actual nightmares might differentially influence subsequent parent and child reports, both acutely and over time, remains to be examined. One might nonetheless postulate both informants to endorse fewer nightmares had assessment procedures been reversed.

An additional potential explanation for discrepancies observed across assessment methods is that anxious children complain of frequent nightmares in an attempt to avoid/delay bedtime or solicit parent involvement at night. Anxious children indeed experience elevated levels of sleep anxiety, bedtime resistance, and pre-sleep arousal (Alfano et al., 2010). We therefore examined these variables as possible predictors of both parent and child (retrospective) reports of nightmares. Sleep anxiety and pre-sleep somatic arousal emerged as significant predictors of parent-reported nightmares in the entire sample, lending support to the latter conclusion. It remains unclear however, whether children explicitly complain of bad dreams or parents may be apt to assume that nightmares give rise to pre-sleep anxiety. This remains a question for future studies.

When child reports of nightmares were examined as the criterion variable, none of the predictors examined emerged as significant; indicative that different factors serve to shape parent versus child report/recall of nightmares. For example, whereas anxiety and avoidant behaviors surrounding bedtime may contribute to parental reports, a broader range of predictors may be relevant for child report of nightmares, including general levels of stress

(Schredl, Biemelt, Roos, Dunkel, & Harris, 2008) and/or nightmare distress (i.e., to the extent to which nightmares have a negative waking effect). Level of distress evoked by nightmares, more so than their frequency, might also serve as a potent stimulus for child reports. Several studies confirm distress associated with nightmares rather than frequency to predict elevated levels of anxiety and neuroticism (Mindell & Barrett, 2002; Schredl, 2003; Schredl, Landgraf, & Zeiler, 2003). Other factors including whether children awakening during the night (i.e., as compared to recalling their dreams upon waking in the morning), experience thematic nightmares, and/or specific emotions evoked by nightmares could also contribute to child recall of bad dreams.

Differences based on prospective child reports of nightmares were found based on sex. Consistent with most prior research (Hublin et al., 1999; Levin, 1994; Nielsen et al., 2000; Schredl & Pallmer, 1998), we found girls to experience a greater number of nightmares than boys irrespective of group status. A difference in nightmare frequency among girls may be influenced by a number of factors including an increased sleep need in females (Tonetti, Fabbri, & Natale, 2008) and/or established differences in reactivity to stress (Rudolph, 2002). Specifically, prior research shows females to be more emotionally reactive to stress than males (Rudolph, 2002; Rudolph & Hammen, 1999) and females with sleep problems experience increased levels of stress (i.e., higher cortisol) across the day and during stressful situations (Pesonen et al., 2012). In children, general levels of stress correlate with the occurrence of nightmares (Schredl et al., 2008). Our results are therefore consistent with previous findings revealing sex-based differences in nightmares (Hublin et al., 1999; Nielsen et al., 2000) and extend documented differences to anxious youth.

Limitations of the Current Study

These findings should be considered in light of several limitations. Data were collected as part of a larger study and nightmares were not explicitly defined for children or parents. It is possible that understanding of the term “nightmares” differed across participants since different definitions of nightmares indeed exist. For example, even among sleep researchers, the awakening criterion of nightmares has been disputed (Zadra & Donderi, 2000). It is also possible that parasomnias (e.g., night terrors) and/or other nighttime phenomena may have been mistaken for nightmares by parents. Unfortunately, we did not assess the occurrence of parasomnias during the prospective assessment. A one-week period could have been inadequate to capture differences in the typical occurrence of nightmares between the diagnostic groups. Parent and child report measures of nightmares also differed in terms of time frame (i.e., CBCL questions are assessed during “the last 6 months” whereas the SSR does not specify a time frame) limiting our ability to make direct comparisons. We also acknowledge that our groups were relatively small, though comparisons were adequately powered to detect small effects. Lastly, because none of the children with GAD included in the current study were receiving intervention services, results may not be generalizable to treatment-seeking youth.

Implications and Conclusions

Children with GAD and their parents report more frequent nightmares than healthy controls despite no differences observed during a prospective one-week assessment. The absence of a significant group difference in nighttime awakenings (based on actigraphy) during the same 7-night period reinforces this result. Several factors may account for the discrepancy observed in anxious children's reports, including levels of nightmare-related distress, established cognitive-affective biases associated with anxiety disorders, or possible differences in sympathetic arousal (e.g., heart rate variability) during dreaming activity (Nielsen & Zadra, 2005) which could affect dream recall. For parents, greater levels of bedtime anxiety and somatic arousal in children predict (retrospective) report of more frequent nightmares. Collectively, these results suggest that focusing on nightmares/distressing dreams during treatment may offer benefit for anxious youth. For example, having children track their nightmares prospectively and comparing estimates to pre-treatment retrospective reports may facilitate understanding and identification of cognitive-affective biases. Imagery Rehearsal Therapy (IRT; St. Onge, Mercier, & De Koninck, 2009), a short-term cognitive behavioral intervention that includes recalling a nightmare and changing its theme/ending to a more positive one, also may be beneficial for anxious children in reducing nightmare-distress, bedtime anxiety, and/or pre-sleep arousal. Prospective studies, including treatment studies that investigate these relationships further are needed to better understand causal links between nightmares, anxiety, and trajectories of clinical anxiety in children.

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Table 1.

Demographic Variables by Group

Variable	GAD	Control	Chi-Square/t-test	p value
Marital status			4.178	0.524
Married to other parent	81% (34)	86.4% (38)		
Married to another partner	2.4% (1)	-		
Single	7.1% (2)	6.8% (3)		
Divorced	4.8% (2)	4.5% (2)		
Separated	4.8% (2)	-		
Widowed	n/a	2.3% (1)		
Race/Ethnicity			6.089	0.193
Caucasian	64.3% (27)	50% (22)		
African-American	4.8% (2)	9.1% (4)		
Asian	2.4% (1)	2.3% (1)		
Hispanic	7.1% (3)	22.7% (10)		
Other	21.4% (9)	11.4% (5)		
Maternal Education			13.112	0.022
Some grade school	-	4.5% (2)		
High school degree	-	11.4% (5)		
Some college	14.3% (6)	13.6% (6)		
College degree	31% (13)	45.5% (20)		
Advanced degree	52.4% (22)	25% (11)		
Paternal Education			9.282	0.026
Some grade school	-	-		
High school degree	9.5% (4)	6.8% (3)		
Some college	11.9% (5)	38.6% (17)		
College degree	35.7% (15)	29.5% (13)		
Advanced degree	40.5% (17)	20.5% (9)		
Income			11.383	0.077
<10K	-	4.5% (2)		
10-20K	4.8% (2)	2.3% (1)		
20-40K	2.4% (1)	13.6% (6)		
40-60K	4.8% (2)	9.1% (4)		
60-80K	7.1% (3)	15.9% (7)		
80-100K	11.9% (5)	13.6% (6)		
>100K	69% (29)	38.6% (17)		
Age – M(SD)	M=8.74, SD = 1.49	M=8.86, SD = 1.30	-0.392	0.696
Female Sex	50% (21)	52.3% (23)	0.044	0.833

Table 2.

Nightmare Frequency by Group

Variable	GAD	Control	F value	p value
Child Retrospective Report of Nightmares (SSR)				
<i>"Do you have nightmares?"</i>			4.148	0.045
Usually	16.7% (7)	4.5% (2)		
Sometimes	38.1% (16)	40.9% (18)		
Rarely	40.5% (17)	54.5% (24)		
Parent Retrospective Report of Nightmares (CBCL)				
<i>"[My Child has] nightmares"</i>			11.716	0.001
Very True	7.1% (4)	0% (0)		
Somewhat true	42.9% (18)	20.5% (9)		
Not True	45.2% (19)	79.5% (35)		
Child Prospective Report of Nightmares (across 7 nights)				
	M=0.29, SD=0.51	M=0.18, SD = 0.54	0.551	0.460
2 Nightmares	2.4% (1)	6.8% (3)		
1 Nightmare	23.8% (10)	4.5% (2)		
0 Nightmares	71.4% (30)	88.6% (39)		

Table 3.

Nightmare Frequency by Sex

Variable	Females	Males	F value	p value
Child Retrospective Nightmares (SSR)				
<i>"Do you have nightmares?"</i>			2.670	0.106
Usually	11.4% (5)	9.5% (4)		
Sometimes	45.5% (20)	33.3% (14)		
Rarely	38.6% (17)	57.1% (24)		
Parent Retrospective Nightmares (CBCL)				
<i>"[My Child has] nightmares"</i>			2.739	0.102
Very True	-	7.1% (3)		
Somewhat true	29.5% (13)	33.3% (14)		
Not True	68.2% (30)	57.1% (24)		
Child Prospective Nightmares (across 7 nights)				
	M=0.38, SD=0.67	M=0.08, SD = 0.27	4.714	0.033
2 Nightmares	9.1% (4)	-		
1 Nightmare	18.2% (8)	9.5% (4)		
0 Nightmares	70.5% (31)	90.5% (38)		

Table 4.

Hierarchical Regression Coefficients for Parent Reported Nightmares

Model		Unstandardized Coefficients		Standardized Coefficients	t value	p value
		B	Std. Error	Beta		
Step 1	Parental Internalizing	.100	.153	.074	.656	.514
	Parental Education	-.116	.170	-.077	-.681	.498
	Total Sleep Time	.002	.002	.109	.955	.342
Step 2	GAD or Control	.450	.122	.399	3.679	.000
	Female Sex	-.178	.123	-.157	-1.447	.152
Step 3	Bedtime Resistance (CHSQ)	-.024	.036	-.114	-.664	.509
	Sleep Anxiety (CHSQ)	.126	.042	.550	2.966	.004
	PSAS Somatic Subscale	.030	.014	.252	2.112	.038
	PSAS Cognitive Subscale	-.010	.010	-.119	-.975	.333