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ORIGINAL ARTICLE

Sleep Disturbances in Pediatric Body-Focused Repetitive Behaviors: A Preliminary Investigation

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Abstract
Body-focused repetitive behaviors (BFRBs) are repeated actions to one's body resulting in physical damage. Limited research has examined sleep, a known factor in psychological health, within the context of pediatric BFRBs. The current study sought to explore the connection between disordered sleep and BFRBs in a community sample. Aim 1 of the study was to determine the predictive power of group membership [control group (no BFRB symptoms reported), subthreshold BFRB group (mild BFRB symptoms reported; severity score of 2 or less out of 9), and those with symptoms characteristic of BFRBs (more than mild BFRB symptoms reported; severity score of 3 or higher out of 9)] for level of sleep disturbance. A hierarchical regression revealed that there was a significant effect of group membership after controlling for anxiety ($F(3, 410) = 152.976$, $p < .001$). Aim 2 of the study was to test whether there was a relationship between sleep disturbance and BFRB severity. The hierarchical regression revealed that at Step 1, anxiety accounted for 23.1% of the variance in BFRB severity ($\beta = 0.48$, $t = 8.87$, $p < 0.001$). At Step 2, sleep disturbance total score accounted for an additional 7.2% of the variance, suggesting this variable makes a unique contribution to overall BFRB severity (SDSC: $\beta = 0.40$, $t = 5.18$, $p < 0.001$). The findings of this study suggest that sleep could be a clinical factor to consider when conceptualizing a child with BFRBs.

Keywords Hair pulling · Skin picking · BFRBs · Sleep · Anxiety

Body-focused repetitive behaviors (BFRBs) are repeated actions to one's body, such as hair pulling, skin picking, and nail-biting resulting in physical damage (e.g., hair loss, scars). BFRBs can have a pervasive and negative impact on several domains of well-being including emotional (i.e., guilt, shame, embarrassment), interpersonal, and academic functioning [1–4]. Prevailing conceptualizations of BFRBs suggest that these behaviors function as maladaptive coping strategies to aversive internal states and may be triggered by stress, boredom, or emotional tension [5]. Episodes of hair pulling may also be followed by feelings of guilt, sadness, and anger [6]. BFRBs may be automatic (i.e., engaged in out of one's awareness) or emotion-driven (i.e., engaged in to relieve distress) and are often very difficult to control or stop despite repeated attempts [7]. Previous research suggests that BFRBs commonly co-occur and may share similar risk factors [8–10]. As compared to other clinical populations, relatively little research has examined the etiology, maintenance, or phenomenology of BFRBs. This is particularly the case with respect to child populations–a gap in the literature that this study seeks to address.

Given the levels of distress and impairment associated with BFRBs, it is important to explore risk factors that may contribute to the development or maintenance of these behaviors. Literature examining risk factors for pediatric BFBRs is in its infancy. One risk factor that has been understudied within the broader BFRB literature is sleep disturbance [11–14]. Sleep disturbance is known to negatively impact children's executive functioning and self-regulation abilities [15–17] Moreover, multiple studies have demonstrated that sleep problems significantly increase a child's risk for developing a host of psychological issues (e.g., anxious/depressed mood, aggression, symptoms of conduct disorder, social phobia, hyperactivity, and attention problems; [18–20]). In sum, sleep problems may be particularly relevant to BFRBs as they may exacerbate psychological symptoms.

Scant research has examined sleep problems within the context of BFRBs. However, the following studies have provided

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preliminary support for the relevance of sleep to BFRBs [11–14]. For example, Singareddy et al. (2003) found that adult dermatological patients with skin picking had poorer sleep, more anxiety, and more perceived stress compared to dermatological patients without skin picking and healthy controls [14]. Ricketts et al. (2017) compared sleep habits of adults with hair pulling disorder (HPD) and adults with skin picking disorder (SPD) to healthy controls. The researchers found that even after controlling for anxiety and depression symptoms, participants in both BFRB groups had significantly greater sleep disturbance compared to the control group [12]. Similarly, in a later study, Ricketts et al. (2019) found that adults with HPD, as well as those with SPD, reported significantly more sleep problems (i.e., sleep apnea, narcolepsy, restless leg syndrome/periodic limb movement disorder, circadian rhythms sleep disorder, and sleep-related affective disorder) compared to controls [13]. In a more recent study that examined sleep within the context of BFRBs, Cavic et al. (2021) found that adults with BFRBs had significantly poorer sleep quality compared to controls and that poorer sleep was associated with worse perceived stress, lower distress tolerance, greater impulsivity, and more severe hair pulling in this group [11]. Despite these significant findings, no studies have examined sleep problems among a population of children with BFRBs.

BFRBs are distressing conditions that can negatively impact everyday functioning. The association between sleep problems and other forms of psychopathology suggest that sleep problems may be particularly relevant to the study of BFRBs. To date, no such studies have been conducted within a pediatric population, and only four have been conducted within the broader (i.e., adult) BFRB literature. Additional research examining the relationship between sleep disturbance and BFRBs in youths is clearly warranted and necessary to develop a better understanding of potential risk factors that may be implicated in the development or exacerbation of pediatric BFRBs and which, ultimately, may inform more robust therapeutic interventions. Therefore, the aim of the current study was to conduct a preliminary exploration of the relationship between BFRB symptomatology and disordered sleep in a community sample of children. We hypothesized that, similar to adults, children with BFRBs would exhibit more sleep disturbance compared to controls. We also hypothesized that within the BFRB sample, those with more sleep disturbance would have more severe BFRB symptoms.

Method

Participants

The sample consisted of parents with a child between the ages of 7–17 years old. Participants were recruited online through Amazon Mechanical Turk (mTurk), Amazon's crowdsourcing platform. Data were collected as part of a larger study examining parenting practices which was approved by the University's Institutional Review Board. In order to be eligible, parents had to be 18 years or older, report English as their primary language, and be the caretaker/guardian of a child who lived with them at least 50% of the time. Participants who did not correctly answer all five validity check questions interspersed throughout the survey (e.g., Yes or No- "The earth rotates around the sun") were excluded from subsequent analyses (n = 126). In addition, participants with incomplete data on the sleep disturbance measure (n = 8) and participants who provided conflicting answers to the BFRB questions (n = 7) were excluded, resulting in a sample of 516 participants. Participants were then split into three groups [control group (n = 252), subthreshold BFRB group (n = 124), and those with symptoms characteristic of BFRBs (hereafter referred to as the BFRB group) (n = 140)] based on their responses to BFRB-related questions embedded within this study's assessment battery. See Statistical Analyses section for more information about these groups and their development. Due to the overrepresentation of the control group, a subset of participants (n = 150) was randomly selected to serve as a control comparison group [This was done by using the "select random sample of cases" function in SPSS and specifying an exact number of cases (150) to be selected from the pool of 252 control participants]. This resulted in a total sample of 414 participants for the purposes of examining Aim 1 (i.e., the relationship between sleep disturbance and group membership). Demographic characteristics for the sample utilized for Aim 1 can be found in Table 1.

To investigate Aim 2 (i.e., the relationship between sleep disturbance and BFRB severity), only those participants in the subthreshold BFRB and BFRB groups were included. Participants for which an overall BFRB severity score could not be calculated were excluded (n = 1), resulting in a sample of 263 participants for the purposes of examining Aim 2. Demographic characteristics for the sample utilized for Aim 2 can be found in Table 1.

Measures

Child Health and Anxiety Survey (CHAS; Murphy, Brennan, & Flessner, 2019)

The CHAS [21] is a broad survey consisting of validated measures: The Spence Children's Anxiety Scale (SCAS; [22]), The Depression Anxiety and Stress Scale (DASS-21; [23]), The Sleep Disturbance Scale for Children (SDSC; [24]), The Alabama Parenting Questionnaire (APQ; [25]), The Parenting Anxious Kids Ratings Scale-Parent Report (PAKRS-PR; [26]), as well as several demographic questions

Table 1 Sample characteristics

Parent Characteristics	Sample for Aim 1		Sample for Aim 2	
	n (%)	Mean (SD, range)	n (%)	Mean (SD, range)
Gender				
Male	135 (32.6)		88 (33.5)	
Female	**279 (67.4)**		**175 (66.5)**	
Age		37.6 (7.8, 18–70)		37.1 (7.7, 18–58)
Ethnicity				
White/Caucasian	**324 (78.3)**		**211 (80.2)**	
African American	33 (8.0)		18 (6.8)	
Hispanic-Latino	27 (6.5)		19 (7.2)	
Asian	13 (3.1)		3 (1.1)	
Native American	4 (1.0)		2 (0.8)	
Multi-racial	12 (2.9)		9 (3.4)	
Other	1 (0.2)		1 (0.4)	
Annual household income ($)				
< 9999	3 (0.7)		2 (0.8)	
10–19,999	31 (7.5)		23 (8.7)	
20–29,999	51 (12.3)		31(11.8)	
30–49,999	**127 (30.7)**		**89 (33.8)**	
50–74,999	97 (23.4)		64 (24.3)	
75,000 +	105 (25.4)		54 (20.5)	
Education (highest degree obtained)				
High School or GED equivalent	105 (25.4)		73 (27.8)	
Technical college degree/ Associate degree	91 (22.0)		61 (23.2)	
Bachelor's degree (BA/BS)	**162 (39.1)**		**96 (36.5)**	
Master's degree	48 (11.6)		30 (11.4)	
Doctoral degree	8 (1.9)		3 (1.1)	
Child Characteristics	n (%)	Mean (SD, range)	n (%)	Mean (SD, range)
Gender				
Male	**220 (53.1)**		**138 (52.5)**	
Female	194 (46.9)		125 (47.5)	
Age		11.1 (2.9, 7–17)		11.1 (2.9, 7–17)
Ethnicity				
White/Caucasian	**309 (74.6)**		**203 (77.2)**	
African American	30 (7.2)		17 (6.5)	
Hispanic-Latino	28 (6.8)		18 (6.8)	
Asian	11 (2.7)		3 (1.1)	
Native American	2 (0.5)		2 (0.8)	
Multi-racial	33(8.0)		19 (7.2)	
Other	1 (0.2)		1 (0.4)	

Bold values indicate highest percentage on each demographic variable

(e.g., ethnicity, gender, age) designed to gather self-report data concerning a wide range of parent and child functioning domains. Twelve questions on the CHAS were used to assess a child's potential BFRBs (nail-biting, hair pulling, skin picking, and lip/cheek biting). Parents were asked "Yes" or "No" questions to assess BFRB presence [i.e., "does your child frequently (pick at scabs, pull out his/her hair, bite his/her nails, bite his/her lips or cheeks) resulting in damage? (e.g., infection of the nail beds or tissue around nails, bleeding, etc.)"]. Parents were then asked to rate BFRB symptoms on a 1–9 scale ranging from mild to severe [i.e., "within the past week, how frequent, severe and distressing is your child's (BFRB)?"]. Finally, parents were asked to rate associated impairment on a 1–9 scale from mild to severe [i.e., "how much do you think your child's (BFRB) gets in the way of his/her ability to make friends, develop close relationships, complete job or school-related tasks and/or cause problems with the family?"]. All of the 9-point scales contained the following three anchors: 1 = mild, 5 = moderate, 9 = severe. The rest of the points on the scale were solely represented by numbers.

The Spence Child Anxiety Scale Parent Version (SCAS-P; Spence, 1998)

The SCAS-P is a 38-item parent-report measure assessing child anxiety symptoms. Subscales measure six subtypes: Separation, Social-phobia, Generalized anxiety, Physical injury fear, Panic/agoraphobia, and OCD. The SCAS-P has shown strong internal consistency ($\alpha = 0.89$; [27]), adequate convergent validity with the internalizing subscale of the Child Behavior Checklist ($r = 0.55$ for anxiety disorder group and $r = 0.50$ for normal control group; [27]), and is able to discriminate between anxiety disordered children and healthy controls with 80.5% accuracy [27]. The internal consistency of the overall scale for the current sample was excellent ($\alpha = 0.96$).

The Sleep Disturbance Scale for Children (SDSC; Bruni et al., 1996)

The SDSC is a 26-item parent-report scale assessing the presence of sleep difficulties in children aged 3–18 within the past six months. The measure assesses 6 sleep domains: Disorders of initiating and maintaining sleep, Sleep breathing disorders, Disorders of arousal/nightmares, Sleep–wake transition disorders, Disorders of excessive somnolence, and Sleep hyperhidrosis. Item 1 measures average hours of sleep and Item 2 measures average time to fall asleep. The remaining 24 items are rated on a 5-point Likert scale. The SDSC has demonstrated acceptable internal reliability and test–retest reliability [24] as well as appropriate convergent and discriminant validity in typically developing children [28]. Reliability analysis was carried out on the SDSC within the current sample and revealed excellent internal consistency, $\alpha = 0.93$.

Procedure

A Qualtrics survey was utilized to collect data via the online crowdsourcing platform, MTurk. Eligibility was determined via screener questions. Participants completed an electronic informed consent as part of the study. The survey took approximately 22 minutes to complete. All participants were compensated $1 for their time after completing the questionnaire battery. Data collected from the survey were stored on the Qualtrics server, which was password protected.

Statistical Analyses

The first step before conducting analyses was to differentiate between the control group, the subthreshold BFRB group, and the BFRB group. Individual BFRB items on the CHAS were used to categorize participants. Those with a response of "no" to all four items assessing the presence of BFRBs were categorized as controls. For those who responded "yes" to one or more of these same BFRB items, a composite "severity" score was calculated by computing the mean from the two items measuring frequency (on a 1–9 scale) and impairment (on a 1–9 scale). This resulted in a BFRB severity score ranging from 1 to 9 with higher scores indicating increasingly severe BFRB-related behaviors. Subsequently, parents whose child received a severity score of less than 3 for all reported BFRBs, were categorized within the subthreshold BFRB group. A similar methodology for score cutoffs has been implemented in prior research utilizing internet-sampling procedures for the assessment of BFRBs [29]. For the current study, participants scoring 3 or greater with respect to BFRB severity on at least one of the BFRB severity variables (e.g., nail-biting, skin picking, etc.) were placed within the BFRB group. We conducted an a priori power analysis using G*Power 3.1.9.6 [30] to calculate the ideal sample size for the hypothesized small effect in line with previous study findings [12]. The total sample size required was 485, calculated using the hypothesized small effect ($f = 0.02$), alpha level = 0.05, and power = 0.80. Our actual sample size was 414, suggesting that our analysis for Aim 1 may have been slightly underpowered.

Assumptions of normality were within the acceptable range. Equality of variance among groups was within the acceptable range. However, the homogeneity of regression slopes assumption that is required for an Analysis of Covariance was violated. For this reason, analyses were conducted using hierarchical linear regression. Initial Pearson correlations were conducted to identify potential covariates. Two variables, age and anxiety, were tested as potential covariates based on the literature [31, 32]. According to these preliminary analyses, only anxiety significantly correlated with total sleep disturbance at an alpha level of 0.05 ($r = 0.72$, $p < 0.001$). The groups to be compared were dummy coded into two variables: subthreshold BFRB group and BFRB group. These dummy variables were created by using the control group as the reference group. The control group was coded as a "0" for both variables; children with subthreshold BFRBs were coded as a "1" for the first variable and a "0" for the second variable; and children with more severe BFRBs were coded as a “0” for the first variable and a “1” for the second variable. A two-step hierarchical linear regression was conducted with anxiety (as measured by the SCAS-P), the covariate, in Step 1; group membership (dummy coded) in Step 2; and sleep disturbance as the dependent variable.

To examine this study’s secondary aim, a hierarchical regression was conducted within the sample of participants who reported any BFRBs to explore the relationship between sleep disturbance and overall BFRB severity while controlling for anxiety. All assumptions were met. Anxiety was entered into the first block and overall BFRB severity was entered into the second block. For the current study, we hypothesized a small effect size based on the small effect size found in a previous study with similar aims ($\eta^2/V = 0.039$; [12]). An a priori power analysis was conducted to estimate the number of participants necessary for the hypothesized small effect ($f = 0.02$), alpha level = 0.05, and power = 0.80. The total sample size required was 395, suggesting that our analysis for Aim 2 may have been underpowered given our sample size of 263.

Results

A two-step hierarchical linear regression was conducted to examine Aim 1. Anxiety was entered into Step 1. At this stage, the model was significant ($F(1, 412) = 447.42$, $p < 0.001$) and anxiety ($\beta = 0.72$) accounted for 52.1% of the variance in SDSC total score (sleep disturbance). Our dummy coded variables were entered into Step 2. The overall model was significant ($F(3, 410) = 152.98$, $p < 0.001$) and accounted for 52.8% of the variance in sleep disturbance. In examining the predictive ability of BFRB group status (subthreshold BFRB group or BFRB group) as compared to control group status, results revealed significant effects with respect to the BFRB group ($\beta = 0.10$, $p = 0.02$), but not the subthreshold BFRB group ($\beta = 0.005$, $p = 0.90$). In other words, belonging to the BFRB group significantly predicted greater sleep disturbance in children. And also, in line with our hypothesis, belonging to the subthreshold BFRB group did not significantly predict greater sleep disturbance (see Table 2).

To examine Aim 2, a two-step hierarchical linear regression was utilized to assess the unique contribution of sleep disturbance in predicting variance in overall BFRB severity, after controlling for anxiety. Anxiety as measured by the SCAS-P total score was entered in Step 1. The hierarchical regression revealed that at Step 1 the model was significant ($F(1, 261) = 78.59$, $p < 0.001$) and anxiety accounted for 23.1% of the variance in BFRB severity ($\beta = 0.48$, $t = 8.87$, $p < 0.001$). The SDSC (sleep disturbance) total score was entered into Step 2 of the model. The overall model with anxiety and sleep disturbance as predictors was significant ($F(2, 260) = 56.60$, $p < 0.001$) and accounted for 30.3% of the variance in BFRB severity. Sleep disturbance accounted for an additional 7.2% of the variance in overall BFRB severity scores ($\Delta F(1, 260) = 26.84$, $p < 0.001$), suggesting sleep disturbance makes a unique contribution to overall BFRB severity (SDSC: $\beta = 0.40$, $t = 5.18$) over and above the variance explained by child anxiety alone (see Table 3).

Discussion

The current study sought to examine whether group membership (control group, subthreshold BFRB group, and BFRB group) would predict level of sleep disturbance. Results indicated that the BFRB group exhibited significantly more sleep disturbance than controls, even when controlling for anxiety. Also as posited, membership within the subthreshold BFRB group did not significantly predict sleep disturbance compared to the control group. The results related to Aim 2 of the study demonstrated that for children who were reported to have BFRB symptoms, increased sleep disturbance was associated with more severe BFRB symptoms, while controlling for anxiety. Although BFRBs did not contribute a vast amount of additional variance to our model, the contribution of unique variance is still noteworthy. The

Table 2 Hierarchical regression analysis using the enter procedure predicting sleep disturbance from measures of anxiety and group membership

Variable	*B*	SE	β	R^2	*F*	ΔR^2
Step 1				0.52	447.42	0.52
Anxiety (SCAS-P)	0.53	0.03	0.72***			
Step 2				0.53	152.98	0.008
Anxiety (SCAS-P)	0.49	0.03	0.68***			
Control group vs. Subthreshold BFRB group	0.16	1.28	0.005			
Control group vs. BFRB group	3.22	1.37	0.10*			

SCAS-P The Spence Child Anxiety Scale Parent Version

*p < 0.05, **p < 0.01, ***p < 0.001

Table 3 Hierarchical regression analysis using the enter procedure predicting overall BFRB severity from measures of anxiety and sleep disturbance

Variable	*B*	SE	β	R^2	*F*	ΔR^2
Step 1				0.23	78.59	0.23
Anxiety (SCAS-P)	0.03	0.003	0.48***			
Step 2				0.30	56.60	0.07
Anxiety (SCAS-P)	0.01	0.004	0.19*			
Sleep disturbance (SDSC)	0.03	0.01	0.40***			

SCAS-P The Spence Child Anxiety Scale Parent Version; *SDSC* The Sleep Disturbance Scale for Children

*p < 0.05, **p < 0.01, ***p < 0.001

small effect sizes were not surprising, given our decision to enhance the rigor of our methodology by controlling for anxiety symptoms in our analyses. Anxiety and BFRBs are commonly intertwined; for example, 60% of adults with HPD have a co-occurring anxiety disorder [33]. In addition, anxiety alone is associated with several types of sleep problems (e.g., delayed sleep onset, reduced latency to REM sleep, and a high number of sleep arousals; [34]).

Overall, the findings of the current study are in line with adult literature which has shown that those with BFRBs exhibit poorer sleep quality compared to controls, while controlling for internalizing symptoms [11–13]. Moreover, a recent study also found that this diminished sleep quality is associated with increased hair pulling severity [11]. The current study is the first to examine the relationship between sleep and BFRB symptoms in a sample of children. Although sleep is a relatively novel variable of investigation within the BFRB literature, research on related conditions, such as OCD, may help elucidate the implications of the current study.

While there are notable differences between OCD and BFRB disorders, each involve ritualistic behaviors aimed at reducing distress, have similar genetic etiologies, and are highly comorbid [35, 36]. Therefore, a bidirectional relationship between sleep disturbance and BFRB symptoms may exist that mirrors the bidirectional relationship between sleep and emotion regulation in OCD. Researchers studying OCD have posited a model in which restricted sleep leads to reduced emotional inhibition which, in turn, increases obsessions during the day and results in more nighttime compulsions [37]. This chain of events causes more sleep problems, ultimately feeding the early stages of the cycle [37, 38]. Similarly, in the context of BFRBs, sleep problems may impair executive functioning and decrease emotion regulation, leading to increased engagement in BFRBs. This heightened engagement in BFRBs may interfere with sleep for many reasons (e.g., staying up late to pick, pulling hair while sleeping, feeling ashamed, pain from wounds), beginning the cycle again. Interestingly, bedtime is a commonly reported situation/context in which pulling is reported by both adults and children. Future studies should examine the impact of sleep disturbance on both executive functioning and emotion regulation in children with BFRBs, as well as determine the role of sleep in understanding this relationship. Research of this nature may lead to significant gains in not only science's understanding of BFRBs, but also ways in which existing interventions for these problematic behaviors can be improved.

Previous research has identified lack of sleep as a trigger for engaging in BFRBs [14, 39]. Sleep hygiene may be an important component to address when treating BFRBs and thus could be useful to assess during a BFRB intake. The impact of sleep on treatment outcomes for related disorders has been demonstrated by Ivarsson & Skarphedinsson (2015) who found that sleep problems interfered with CBT treatment efficacy in a sample of children with OCD [40]. Moreover, sleep interventions have been shown to successfully reduce symptom severity in other conditions characterized by emotion regulation difficulties, such as attention-deficit/hyperactivity disorder (ADHD; [41]). Furthermore, a pilot study showed the addition of a sleep intervention (i.e., cognitive-behavioral therapy for insomnia) to the treatment of depressed individuals with insomnia resulted in a trend towards better depression outcomes [42]. Although more replications are necessary, the findings of the current study as well as the findings of literature within related conditions suggest that sleep could be an important component to consider when assessing and treating pediatric BFRBs.

While the findings of this study provide valuable preliminary insight into the relationship between sleep and BFRBs, there are some limitations to consider. Given that sleep is a novel topic to explore within pediatric BFRBs, a cross-sectional study is an appropriate first step; however, future research should examine these variables longitudinally [43]. A longitudinal study of sleep disturbance within a BFRB sample would help ascertain whether sleep has a causal impact on the trajectory of BFRB symptomatology postulated above and similar to what is exhibited in youths with OCD. While the use of online samples is a common methodology within the field (e.g., [44–46]), there are some inherent limitations to this style of research. An online sample, rather than a clinical sample, may have made it more difficult to detect an effect. Parent-report measures could not be fully vetted for accuracy. However, the inclusion of multiple validity check items within our survey were embedded specifically to mitigate potential inaccuracy. In addition, the online format was conducive to parent-report measures, not objective sleep measures. Future research may want to build upon the current findings by employing a multimethod assessment of sleep disturbance.

Given that BFRBs have the ability to evolve into debilitating mental health conditions (i.e., excoriation disorder, hair pulling disorder) it is imperative to study BFRBs in youth samples. This study indicates that the relationship between sleep and BFRBs may be an important new direction to further investigate. Addressing sleep early in development may have important implications for the trajectory of BFRBs. Future research should expand on the preliminary findings of this study to further ascertain the role of sleep in BFRB symptomatology. It is only with continued research that we will be better able to combat this debilitating mental health condition.

Summary

This is the first study of its kind examining BFRBs and sleep disturbance in children. Results of this study demonstrated that group membership (control, subthreshold BFRBs, BFRBs) was predictive of degree of sleep disturbance and sleep disturbance predicted BFRB severity. The findings of this study mirror the relationship between sleep and BFRBs that has been demonstrated previously in the adult literature. Furthermore, sleep has been implicated in other conditions characterized by self-regulation difficulties (e.g., ADHD and OCD) and has been shown to affect treatment outcomes. Sleep hygiene may be an important component to address when treating BFRBs and thus could be useful to assess during a BFRB intake. Therefore, further research is necessary to better understand the impact of sleep on BFRBs as well as determine whether there are any treatment applications.

Author Contributions CF designed the larger study from which the data for this manuscript was collected. SBC conducted data analyses, drafted the manuscript, and incorporated co-authors' revisions. AL, TG, EW, and CF provided critical revisions. All authors contributed to and approved the final manuscript.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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