

# Coexistence of Sleep and Feeding Disturbances in Young Children

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## KEY WORDS

sleep, infancy, insomnia, feeding, children

## ABBREVIATIONS

BISQ—Brief Infant Sleep Questionnaire

ES—effect size

OR—odds ratio

CI—confidence interval

Dr Tauman had substantial contribution to the conception and design, acquisition of data, analysis and interpretation of data, and drafting the article, and she approved the final version of the manuscript; Dr Levine had substantial contribution to the conception and design, acquisition of data, and analysis and interpretation of data, and he revised the manuscript for important intellectual content and approved its final version; Dr Avni had substantial contribution to the conception and design, acquisition of data, and analysis and interpretation of data, and he revised the manuscript for important intellectual content and approved its final version; Dr Nehama had substantial contribution to study design and acquisition and interpretation of data, and he revised the manuscript for important intellectual content and approved its final version; Dr Greenfeld had substantial contribution to the conception and design, and acquisition and interpretation of data, and she revised the manuscript for important intellectual content and approved its final version; and Dr Sivan had substantial contribution to the conception and design, acquisition of data, and analysis and interpretation of data, and he revised the manuscript for important intellectual content and approved its final version.

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**WHAT'S KNOWN ON THIS SUBJECT:** Behavioral insomnia and problematic feeding behaviors are 2 prevalent conditions in young children. Interaction between caregiver characteristics, child temperament, and parent-child interaction factors substantially contribute to both behavioral insomnia and problematic feeding behaviors.



**WHAT THIS STUDY ADDS:** Problematic sleep and feeding behaviors tend to coexist in early childhood. Increased awareness of clinicians involved in the treatment of pediatric sleep or feeding disorders to this coexistence may allow early intervention and improve outcome.

## abstract

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**OBJECTIVE:** Behavioral insomnia and feeding difficulties are 2 prevalent conditions in healthy young children. Despite similarities in nature, etiology, prevalence, and age distribution, the association between these 2 common disorders in young children has not been examined thus far.

**PATIENTS AND METHODS:** Children aged 6 to 36 months with either behavioral insomnia or feeding disorders were recruited. Children aged 6 to 36 months who attended the well-care clinics were recruited and served as controls. Sleep and feeding were evaluated by using a parental questionnaire.

**RESULTS:** Six hundred eighty-one children were recruited. Fifty-eight had behavioral insomnia, 76 had feeding disorders, and 547 were controls. The mean age was  $17.0 \pm 7.6$  months. Parents of children with feeding disorders considered their child's sleep problematic significantly more frequently compared with controls (37% vs 16%,  $P = .0001$  [effect size (ES): 0.66]). They reported shorter nocturnal sleep duration and delayed sleep time compared with controls ( $536 \pm 87$  vs  $578 \pm 88$  minutes,  $P = .0001$ ) and  $9:13 \pm 0.55$  PM vs  $8:26 \pm 1.31$  PM,  $P = .003$ ). Parents of children with behavioral insomnia described their child's feeding as "a problem" more frequently compared with controls (26% vs 9%,  $P = .001$  [ES: 0.69]). They reported being more concerned about their child's growth ( $2.85 \pm 1.1$  vs  $2.5 \pm 1.0$ ,  $P = .03$ ) and reported higher scores of food refusal compared with controls ( $3.38 \pm 0.54$  vs  $3.23 \pm 0.44$ ,  $P = .04$ ).

**CONCLUSIONS:** Problematic sleep and feeding behaviors tend to coexist in early childhood. Increased awareness of clinicians to this coexistence may allow early intervention and improve outcome. *Pediatrics* 2011;127:e615–e621

Behavioral insomnia of childhood is a prevalent condition, affecting 10% to 30% of children aged 6 to 36 months.<sup>1</sup> The clinical manifestations consist of difficulty falling asleep, staying asleep, or both. These difficulties usually reflect certain established patterns of interaction between parent and child at times of sleep transition.<sup>1,2</sup> Interaction between caregiver characteristics, child temperament, and parent-child interaction factors substantially contribute to this disorder.<sup>1,2</sup> If left untreated, bedtime problems and night awakenings can negatively impact the daytime functioning and behavior of the child, as well as the entire family. Behavioral insomnia can lead to increased irritability, temper tantrums, impaired emotion regulation, and behavior problems in the child. It can also shorten parental sleep leading to increased sleepiness, negative mood, and decreased daytime functioning of the parents.<sup>3</sup>

Feeding difficulties are common in pediatric practice and encompass a spectrum ranging from children with physiologic difficulties in ingesting food, through picky eaters to full-fledged infantile feeding disorders. These may include inappropriate/disruptive mealtime behaviors, food refusal, self-feeding inadequacy, excessive mealtime duration, and food selectivity.<sup>4-7</sup> The prevalence of problematic eating and feeding behaviors is 25% in infants and young children.<sup>4,7</sup> Problematic eating and feeding behaviors are sources of concern for parents, and if prolonged can lead to weight loss or failure to gain weight and cognitive and developmental delay.<sup>8-10</sup> Feeding difficulties in healthy children are linked to a variety of causes, including environmental disruption, parental incompetence, the child's temperament, and psychological factors. It has been shown that certain characteristics of the infant

combined with certain vulnerabilities in the parent lead to negative responses and conflict in their interactions.<sup>11</sup> Despite similarities in nature, etiology, prevalence and age distribution of behavioral insomnia of childhood and problematic eating and feeding behaviors, the associations between these 2 common disorders in young children have not been examined in a study thus far. Therefore, we aimed to investigate the frequency of sleep disturbances among children with feeding disorders and the frequency of feeding problems among children with sleep disorders and to examine the possibility of coexistence of pediatric sleep and feeding problems in young children.

## METHODS

### Study Participants

Children aged 6 to 36 months who were diagnosed as having behavioral insomnia of childhood on the basis of the International Classification of Sleep Disorders criteria<sup>1</sup> were recruited from the Pediatric Sleep Center at Dana Children's Hospital, Tel Aviv Medical Center. Children aged 6 to 36 months who were diagnosed as having feeding disorders on the basis of Chatoor criteria<sup>6</sup> were recruited from 2 clinics of feeding disorders at Wolfson Medical Center and Dana Children's Hospital. In addition, children aged 6 to 36 months who attended well-care clinics in the metropolitan of Tel Aviv for routine periodic medical examination were recruited and served as controls. Children with chronic medical conditions, congenital abnormalities, or developmental delay were excluded from the study.

### Parental Questionnaires

Sleep was evaluated using the Brief Infant Sleep Questionnaire (BISQ). The

BISQ is a validated sleep questionnaire that assesses the infant's typical sleep patterns on the basis of parental reports.<sup>12</sup>

No standard parental questionnaire uniformly used in the research of feeding disorders is currently available,<sup>13</sup> and the existing instruments have not been normed with samples at the age range of the current study. Therefore, we combined items from different available instruments,<sup>5,6,14-16</sup> and similar to a previous report,<sup>7</sup> created a parental questionnaire screening for problematic eating and feeding behaviors in children aged 6 to 36 months (Appendix). This questionnaire consisted of 23 items; 2 of them were yes/no questions, and 21 were a 4-point Likert-type scale (with a range of "never" to "usually"). Higher scores indicated more frequent behavior. The questionnaire focused on 4 general context areas related to feeding problems: 4 general items related to parental feeling/perception of their child's feeding; 11 items focused on mealtime behavior; 6 items focused on food refusal and struggle for control; and 2 items focused on neophobia. The latter was administered for 18 to 36 months, which is the relevant age for this problem (Appendix).

Parents of children with behavioral insomnia of childhood who were recruited from the sleep clinic completed the parental questionnaire for problematic eating and feeding behaviors. Parents of children with feeding disorders who were recruited from the clinics of feeding disorders completed the BISQ. Parents of children recruited from the well-care clinics completed both sleep and feeding questionnaires.

### Statistical Analysis

Analyses were performed with SPSS 15.0 (SPSS Inc, Chicago, IL). Comparisons of variables according to group

assignment (behavioral insomnia group, feeding disorders group, and control group) were performed with independent *t* tests or analysis of variance followed by posthoc comparisons, with *P* values adjusted for unequal variances when appropriate (Levene's test for equality of variances), or  $\chi^2$  analyses with Fisher's exact test (dichotomous outcomes). Comparisons of variables that were not normally distributed were performed with the Wilcoxon Mann-Whitney nonparametric test. All *P* values reported are 2-tailed, with statistical significance set at  $<.05$ . Effect size (ES) was calculated by Cohen's *d* ( $\delta$ ) for means and SDs and by *d* (Probit method) for dichotomous proportions/percentages.

Initial analyses were conducted between children with feeding or sleep problems and the entire group of controls. After these analyses and to better understand the association between problematic feeding and problematic sleep, we subdivided the control group into controls whose parents perceived their child to have problematic feeding (Control A) and controls whose parents did not perceive any problems with feeding (Control B) on the basis of the answer to the question: "Do you consider your child's feeding as a problem?" This subdivision of the control group was applied for analysis of frequency of problematic sleep.

Similarly, we subdivided the control group into controls whose parents perceived their child's sleep as problematic (Control C) and controls whose parents did not perceive any problems with sleep (Control D), on the basis of the answer to the question: "Do you consider your child's sleep as a problem?" This subdivision of the control group was applied for analysis of frequency of problematic feeding.

**TABLE 1** Characteristics of Children With Behavioral Insomnia of Childhood ( $n = 58$ ), Children With Feeding Disorders ( $n = 76$ ), and Controls ( $n = 547$ )

	Behavioral Insomnia	Feeding Disorder	Controls	<i>P</i>
Mean age, mo	17.8 $\pm$ 7.9	18.5 $\pm$ 7.8	16.8 $\pm$ 7.6	NS
Male gender (%)	61	50	52	NS
Mean no. of children in the family	1.7 $\pm$ 0.8	2.0 $\pm$ 1.2	1.9 $\pm$ 1.1	NS
Mean birth order of child studied	1.6 $\pm$ 0.7	1.9 $\pm$ 1.2	1.9 $\pm$ 1.1	NS

NS indicates not significant.

## RESULTS

There were 681 children recruited; 58 with behavioral insomnia, 76 with feeding disorders, and 547 controls. Of the children, 53% were male, and the mean age was 17.0  $\pm$  7.6 months. The mean number of children in the family was 1.9  $\pm$  1.1, and 49% of children studied were the eldest in their family. No significant differences were found in age and gender distribution, number of children in the family, and birth order of the child among the 3 groups (Table 1).

### Parental Feeding Questionnaire Reliability

The new parental feeding questionnaire showed correlations between subscales ( $r = 0.36$ ,  $P < .001$ ) and internal consistency across subscales, which was demonstrated by Cronbach's  $\alpha$  at 0.50, thus demonstrating the reliability of this measure. Internal consistency was demonstrated for the food refusal and struggle for control subscale (Cronbach's  $\alpha = 0.57$ ).

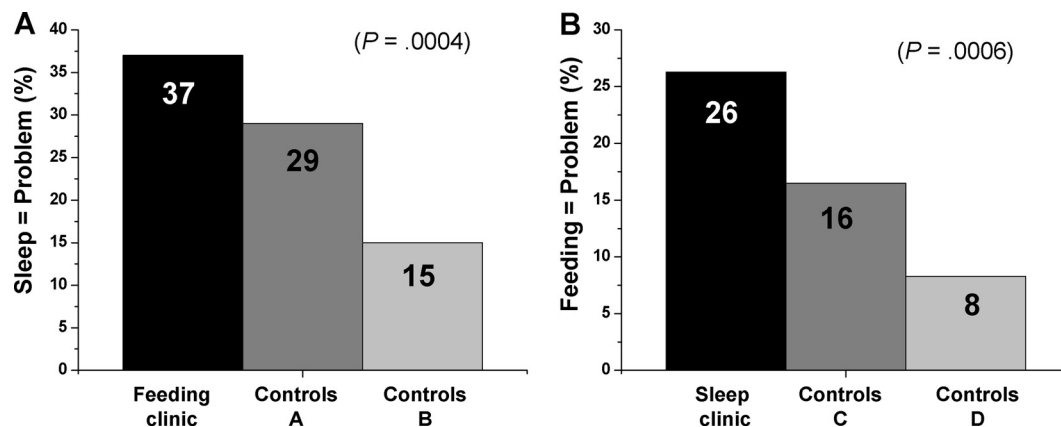
### Sleep in Children With Feeding Disorders

Parents of children with feeding disorders considered their child's sleep as a problem significantly more frequently compared with the entire group of controls (37% vs 16%,  $P = .0001$  [ES: 0.66]) on the basis of a yes/no answer to the question, "Do you consider your child's sleep as a problem?" They described their child sleep problem as "a very serious problem" more frequently compared with con-

trols (19% vs 3.5%,  $P = .0001$  [ES: 0.93]). Parents of children with feeding disorders reported shorter nocturnal sleep duration and delayed sleep time compared with controls (536  $\pm$  87 vs 578  $\pm$  88 minutes,  $P = .0001$  [ES:  $-0.48$ ]) and 9:13  $\pm$  0.55 PM vs 8:26  $\pm$  1.31 PM,  $P = .003$  [ES: 0.70]). They also reported a prolonged sleep latency, with 47% reporting a sleep latency longer than 30 minutes, compared with 17% in the control group (ES: 0.88), and only 19% reporting a sleep latency shorter than 15 minutes, compared with 35% in the controls ( $P = .0002$  [ES:  $-0.49$ ]). No differences were reported in daytime sleep duration, day/night sleep duration ratio, number of nocturnal awakenings, and time spent in wakefulness during the night. No differences were found in sleeping arrangement or sleep procedure ("How does your infant fall asleep?") between the groups. No differences were found for sleeping position.

### Feeding in Children With Behavioral Insomnia

Parents of children with behavioral insomnia described their child's feeding as "a problem" more frequently compared with the entire group of controls (26% vs 9%,  $P = .001$  [ES: 0.70]) on the basis of the answer to the question, "Do you consider your child's feeding as a problem?" They reported being concerned about their child's growth and being insecure about their child "getting enough to eat," compared with parents of controls (2.85  $\pm$  1.1 vs



**FIGURE 1**

A, percentage of children with problematic sleep in the feeding disorders group (“feeding clinic”; black), Control A group (controls whose parents perceived their feeding as problematic; dark gray), and Control B group (controls without problematic feeding; light gray). B, percentage of children with problematic feeding in behavioral insomnia group (“sleep clinic”; black), Control C group (controls whose parents perceived their sleep as problematic; dark gray), and Control D group (controls without problematic sleep; light gray).

$2.5 \pm 1.0$ , respectively;  $P = .03$  [ES: 0.35] and  $3.1 \pm 1.0$  vs  $2.7 \pm 1.1$ , respectively;  $P = .02$  [ES: 0.37]).

Parents of children with behavioral insomnia reported higher scores for food refusal compared with controls ( $3.38 \pm 0.54$  vs  $3.23 \pm 0.44$ ,  $P = .04$  [ES: 0.33]). In addition, parents of children with behavioral insomnia between the ages of 18 and 36 months reported more rejection to new foods compared with controls ( $3.01 \pm 0.93$  vs  $2.55 \pm 1.06$ ,  $P = .03$  [ES: 0.44]). No differences were found in birth weight or weight at the time of the study between children with childhood insomnia and controls.

### Coexistence

Among children diagnosed with feeding disorders (feeding disorders; “feeding clinic” group), 37% reported problematic sleep, compared with 29% of controls whose parents perceived their child to have problematic feeding (Control A group; “control problematic feeding”) and 15% of controls whose parents did not perceive any problems with feeding (Control B group; “control normal feeding”) (Fig 1A;  $P = .0004$ ).

Similarly, 26% of children with behavioral insomnia of childhood (“sleep

clinic” group) reported problematic feeding, compared with 16% of controls whose parents perceived problematic sleep (Control C group; “control problematic sleep”) and 8% of controls without problematic sleep (Control D group; “control normal sleep”) (Fig 1B;  $P = .0006$ ).

Using binary logistic regression analysis, we found increased risk for problematic feeding on the basis of the question, “Do you consider your child’s feeding/eating as a problem?” in children with behavioral insomnia (odds ratio [OR]:4.0 [confidence interval (CI): 2–7.8]). Increased risk for problematic sleep on the basis of the question, “Do you consider your child’s sleep as a problem?” was found in children with feeding disorders (OR:3.38 [CI: 2–5.8]). In addition, we found an increased risk for 1 behavioral problem (sleep or feeding) among parents who described their child’s other behavior (feeding or sleep, respectively) as problematic (OR: 2.33 [CI:1.2–4.5]).

### DISCUSSION

This study reveals for the first time that feeding and eating difficulties are more prevalent among children with behavioral insomnia of childhood and

that sleep problems are more frequent in children with feeding disorders. Specifically, compared with controls, parents of children with feeding disorders considered their child’s sleep as a problem significantly more frequently. They reported shorter nocturnal sleep duration, delayed sleep time, and prolonged sleep latency. Parents of children with behavioral insomnia described their child’s feeding as a problem more frequently compared with controls. They reported being concerned about their child’s growth and ranked higher scores on food refusal items and rejection of new foods compared with controls. Our results suggest that behavioral insomnia of childhood increases the risk of problematic feeding and eating and that feeding disorders in infancy increase the risk of sleep problems.

There are several plausible explanations for the coexistence of these 2 common conditions. First, because parental and child’s behavior patterns were recognized as playing a major role in the development of both disorders, it is possible that sleep and feeding disorders share common parental and/or child’s characteristics. It is possible that common psychological



or psychopathological factors increase the likelihood of the 2 problems to cluster in the same family. One example could be parental anxiety or the inability to consistently enforce or encourage children's behavior because of parenting skills. These parental characteristics have major influence on parent-child daily interactions including bedtime and mealtime interactions. Moreover, parents of children with feeding disorders may be more sensitive to their children's other problems, including sleep difficulties and vice versa. They may overreact to these difficulties compared with parents of children with no other problem. Another possibility is that problematic feeding or sleep occur in children with certain types of temperament that lead to the development of sleep difficulties, feeding difficulties, or both in early childhood. As in the case of parental characteristics, child's temperament, which is the other arm in this equilibrium, may affect parent-child daily interactions including bedtime and mealtime interactions.

Second, it is possible that each of these disorders precipitates/triggers the development of the other or magnifies its severity. When a parent is tired and sleep deprived because of his child's insomnia, it may affect his daytime interactions with his child including mealtime interactions and vice versa. When a parent has bad mealtime interactions with his child in the evening, it may consequently impact his interactions with the child during bedtime. A third possibility may reflect the fact that children with infantile feeding disorders and food refusal often eat less during the day, and may awaken because of thirst or hunger, leading to abnormal night waking or difficulties in falling asleep, and thus would be an epiphenomena. Indeed, nocturnal feeding is common in infantile feeding disorders.<sup>17</sup>

Last, because sleep and feeding are 2 physiologic processes regulated by the brain and based on evidence derived from the research on sleep duration and obesity, most likely interact with each other,<sup>18,19</sup> it might theoretically be possible that these biological interactions lead to the coexistence found in our study. Moreover, it is possible that circadian factors affect the timing of both sleep and hunger, leading to this coexistence. Yet, our current understanding is that the basis of both childhood insomnia and feeding disorders is behavioral, and this concept is supported by the fact that most cases respond to behavioral intervention.<sup>3,20</sup> Biological interactions may, nevertheless, contribute to the coexistence of the 2 conditions.

Feeding and sleep problems in early childhood are more prevalent in children than recognized by professionals and the general public. Child feeding and sleeping through the night are the 2 most pressing concerns for which parents most often seek advice.<sup>21,22</sup> More importantly, these problems have a wide-ranging impact on children's mood, behavior, and family life.<sup>21,22</sup> Our findings reveal that these problems may tend to cluster in the same family and thus increase the effect on family wellbeing/quality of life. One interesting direction that was not investigated in the current study is family functioning and maternal depression. Associations between family stress or maternal depression and early childhood sleep problems have been reported.<sup>25-26</sup> These issues may be part of the interrelated set of factors involved in both sleep and feeding disorders such as the perception of the infant's temperament as difficult or marital conflicts.

There are several limitations of the current study that need to be recognized. One, the lack of information regarding parental age or socioeco-

omic status of the families investigated. Although background factors such as socioeconomic status, ethnicity, and education have not been found to be related to either sleep problems or feeding disorders, it is possible that these factors play a role in the equilibrium. Another limitation is the lack of information regarding symptoms of sleep-disordered breathing. Upper airway obstruction may affect sleep continuity leading to nocturnal frequent awakenings and may also affect feeding in infants and young children. Additional studies that account for symptoms of sleep-disordered breathing are needed. The third limitation is the lack of measures for family functioning and parental mood. As mentioned before, these issues may be involved in the development of both sleep and feeding problems and additional studies that include such assessments are needed. In the current study, we used a new parental questionnaire for feeding difficulties because of the lack of standard parental questionnaire uniformly used in the research of feeding disorders for this age group. Nevertheless, it is important to note that all items in our questionnaire derived from existing instruments.

Several clinical implications emerge from the results of the current study. First, it is possible that intervention in 1 arm will have an impact on the other arm. For example, behavioral intervention in childhood insomnia may improve child's feeding behavior or intervention in the feeding arm may affect child's sleep. In addition, it is likely that combined intervention for both arms will facilitate the process, improve outcome, and shorten therapy duration. Intervention studies are required to examine this speculation. Increased awareness of pediatricians and other professionals involved in the treatment of pediatric sleep or feeding disorders to this coexistence will facilitate early diagnosis and intervention. These are of par-

ticular importance because they may also be the first manifestations of parental psychopathology and parent-child interaction problems.

In summary, our findings reveal that problematic sleep and feeding behaviors tend to coexist in early childhood. Increased awareness of pediatricians

and other professionals involved in the treatment of pediatric sleep or feeding disorders to this coexistence may allow early intervention and improve outcome.

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**APPENDIX** Parental Feeding Questionnaire

	Usually	Sometimes	Rarely	Never
I feel insecure about my child getting enough to eat				
I am concerned about my child's growth				
Does your child drink primarily breast milk?				
Does your child drink primarily formula?				
Does your child eat a ground/strained/soft food?				
Does your child feed himself/herself with fingers?				
Does your child get fed by a caretaker?				
Does your child eat independently?				
Do you force bottle/food into your child's mouth during sleep?				
It takes longer than 20 min to finish a meal				
My child comes readily to mealtime				
Does your child need to be distracted during feeding?				
Does your child fall asleep while eating?				
Does your child turn away from food?				
Does your child whine/cry at feeding?				
Does your child get up from table during mealtime?				
Does your child accept food from some caretakers while refusing it from others?				
Do you force food into his/her mouth?				
Does your child have tantrums at mealtimes?				
<sup>a</sup> Does your child eat a big variety of foods?				
<sup>a</sup> Does your child reject new foods?				
Do you consider your child's feeding/eating as a problem?	Yes			No
Are you overengaged with your child eating during the day?	Yes			No
Birth weight		Current weight		
Birth length, cm		Current length/height, cm		

<sup>a</sup> Please complete only if your child is older than 18 months.

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