



Sleep problems are more frequent and associated with problematic behaviors in preschoolers with autism spectrum disorder



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ABSTRACT

Background: Children with autism spectrum disorder (ASD) often suffer from sleep problems that in turn correlate with behavioral problems. However, in Japan, there have been few studies of sleep problems in children with ASD.

Aims: This study compared sleep problems in preschoolers from the community and preschoolers with ASD in Japan, and examined whether sleep problems were related to problematic behaviors in ASD preschoolers.

Methods and procedures: Sleep problems were assessed in 965 community and 193 ASD preschoolers using the Japanese Sleep Questionnaire for Preschoolers, which was developed to assess sleep problems in Japanese preschoolers. Behavioral problems were assessed in 107 ASD preschoolers using the Child Behavior Checklist.

Outcomes and results: Compared with community preschoolers, ASD preschoolers experienced significantly more sleep problems, including obstructive sleep apnea and parasomnias. ASD preschoolers with sleep problems exhibited more behavioral problems than those without sleep problems. The severity of sleep problems, especially insomnia, was significantly correlated with behavioral problems in ASD preschoolers.

Conclusions and implications: The present study suggests that sleep problems, especially obstructive sleep apnea, are more common in ASD preschoolers than in community preschoolers. The study also shows that sleep problems, especially insomnia, are related to problematic behavior in ASD preschoolers.

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What this paper adds?:

Children with autism spectrum disorder (ASD) sometimes show a high prevalence of sleep problems. However, sleep patterns are highly influenced by an individual's sociocultural and genetic background, and whether children with ASD in Japan experience sleep problems is unknown. In the current study, we obtained sleep data from a relatively large sample using the Japanese Sleep Questionnaire for Preschoolers, which we have developed to assess sleep problems in Japanese preschoolers. We found that preschoolers with ASD demonstrated a higher prevalence of sleep problems than preschoolers in the community. Specifically, to the best of our knowledge, this is the first study to suggest that obstructive sleep apnea is more common in preschoolers with ASD than in community preschoolers, although the reason remains to be clarified. The present study also showed that sleep problems, especially insomnia, are related to problematic behaviors in preschoolers with ASD. These results highlight the importance of routine assessment and treatment of sleep problems that should greatly help children with ASD and their families.

1. Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social interaction and communication that are associated with restricted, repetitive, and stereotyped activities, behaviors and interests ([American Psychiatric Association, 2013](#)).

Children with ASD often suffer from sleep problems. Parental surveys indicate that the prevalence of sleep problems ranges from 40% to 80% in children with ASD, but only between 9% and 50% in typically developing children ([Giannotti et al., 2008](#); [Johnson, Giannotti, & Cortesi, 2009](#)). In particular, children with ASD often have sleep-onset and maintenance insomnia, irregular sleep–wake rhythms, and poor sleep routines ([Giannotti et al., 2008](#); [Miano et al., 2007](#); [Sikora, Johnson, Clemons, & Katz, 2012](#); [Taylor, Schreck, & Mulick, 2012](#)).

Several studies of children with ASD have described an association between insufficient sleep and behavioral and affective disorders. Sleep problems were reported to correlate with aggravated autistic symptoms such as hyperactivity, mood variability, aggression ([Mayes & Calhoun, 2009](#)), affective abnormalities ([Malow, McGrew, Harvey, Henderson, & Stone, 2006](#)), behavioral problems, and adaptive skill maldevelopment ([Sikora et al., 2012](#)). Additionally, preliminary studies suggest that insufficient sleep is correlated with deficits in nonverbal intelligence ([Gabriels, Cuccaro, Hill, Ivers, & Goldson, 2005](#)), communication ([Schreck, Mulick, & Smith, 2004](#)), and poor academic performance ([Taylor et al., 2012](#)).

Furthermore, several studies have suggested that successful intervention for sleep problems might improve daytime behavior in children with ASD. For example, adenotonsillectomy improved daytime behavior in a 5-year-old with ASD and obstructive sleep apnea (OSA) ([Malow et al., 2006](#)), a successful intervention improved self-injurious behavior in a 4-year-old with ASD and night waking ([DeLeon, Fisher, & Marhefka, 2004](#)), and teacher reports indicated improvement in both behavior and school performance in children with Asperger syndrome after treating insomnia with melatonin ([Paavonen, Nieminen-von Wendt, Vanhala, Aronen, & von Wendt, 2003](#)). Therefore, early identification and management of sleep problems in children with ASD might prevent future functional impairment.

Studies have also reported a high prevalence of sleep problems in Japanese children with ASD ([Hoshino, Watanabe, Yashima, Kaneko, & Kumashiro, 1984](#); [Taira, Takase, & Sasaki, 1998](#)). [Takase, Taira, and Sasaki \(1998\)](#) reported that Japanese children with ASD showed irregular sleep–wake rhythms. Using Actiwatch[®] (Cambridge Neurotechnology Ltd., Cambridge, UK), we also reported poor sleep quality in preschoolers with ASD, including lower sleep percentages and longer snooze durations, which was defined as the time from the last epoch of the last 10-min period of persistent sleep until getting out of bed ([Tatsumi et al., 2014](#)). However, sample sizes in these studies were small and the relationship between sleep and behavioral problems was not clear.

To screen for sleep problems, several questionnaires including the Children's Sleep Habit Questionnaire (CSHQ; [Owens, Spirito, & McGuinn, 2000](#)) and the Sleep Problem Scale for Children (SDSC; [Bruni et al., 1996](#)) have been designed and widely used in Western countries. However, sleep is influenced by both biological and cultural determinants ([Jenni & O'Connor, 2005](#)). These questionnaires, which were originally developed based on Western sleep culture, are not completely appropriate in Japan, where more than 70% of children sleep in the same room as their families and 90% of children do not have their own bedrooms ([Mindell, Sadeh, Kwon, & Goh, 2013](#); [Mindell, Sadeh, Wiegand, How, & Goh, 2010](#)).

Therefore, we have developed and standardized the Japanese Sleep Questionnaire for Preschoolers (JSQ-P), which is appropriate for Japanese sleeping conditions and culture ([Shimizu et al., 2013](#)). In the current study, we used the JSQ-P to obtain sleep data from a relatively large number of children in the Japanese community and from those with ASD. We then compared the prevalence of several sleep problems between the two groups, and clarified the relationship between sleep and behavioral problems in the children with ASD.

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