



Sleep patterns in children with and without autism spectrum disorders: Developmental comparisons



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ABSTRACT

The present study examined age-related changes in the sleep of children with autism spectrum disorders (ASD) compared to age-related changes in the sleep of typically developing (TD) children. Participants were 108 mothers of children with ASD and 108 mothers of TD children. Participants completed a questionnaire on children's overall sleep quality that also tapped specific sleep-domains (i.e., bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, disordered breathing, daytime sleepiness). Results confirm significantly poorer sleep quantity and quality in children with ASD, particularly children age 6–9 years. Unlike TD children, the sleep problems of children with ASD were unlikely to diminish with age. Our findings suggest that it is important to exam specific domains of sleep as well as overall sleep patterns. Finding of significant age-related interactions suggests that the practice of combining children from wide age-ranges into a single category obfuscates potentially important developmental differences.

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Sleep problems are common in childhood, occurring in 25–40% of typically developing (TD) children (Ivanenko & Gururaj, 2009). Difficulties with sleep are particularly widespread in children with autism spectrum disorders (ASD), occurring in about two-thirds of this population (Johnson, 1996; Richdale & Schreck, 2009; Richdale, 2001; Stores & Wiggs, 1998). Although research in the area has increased in recent years (e.g., Goldman, Richdale, Clemons, & Mallow, 2012; Hodge, Hoffman, Sweeney, & Riggs, 2013; Hoffman, Sweeney, Gilliam, & Lopez-Wagner, 2006; Mayes & Calhoun, 2009; Sivertsen, Posserud, Gillberg, Lundervold, & Hysing, 2012), little is known about the exact nature of sleep problems in children with ASD. As noted by Richdale and Schreck (2009) in their biopsychosocial model, it is a mistake to assume that what is true for TD children will hold for children with ASD. It may be the case that factors contributing to sleep difficulties in children with ASD are a function of atypical, rather than typical, development.

Age-related, developmental changes in the sleep of children with ASD is a particularly understudied area. Although, sleep problems in TD children have been found to lessen with age (Gregory & O'Connor, 2002; Sivertsen et al., 2012), as noted by Richdale and Schreck (2009) it would be a mistake to assume this same developmental pattern holds for children with ASD. For instance, research indicates that autistic symptomology is linked to children's sleep problems (Hoffman et al., 2005;

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Schreck, Milick, & Smith, 2004) and the symptomology of ASD may change over time (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). It is, therefore, possible that the sleep problems of children with ASD will fluctuate with age as their symptomology either increases or decreases. Nevertheless, few researchers have considered age-related changes in the sleep of children with ASD. In a recent review by Hollway and Aman (2011), 13 of 17 studies on sleep in children with ASD acknowledged the possibility of a relationship between age and sleep by either controlling for or matching participants on age; however, only three of these studies actually reported on age-related patterns in the sleep of children with ASD.

Complicating the understanding of age-related changes in the sleep of children with ASD is the fact that findings in the scant existing literature are mixed. Some studies on sleep in children with ASD report no significant differences across age groups (Goldman et al., 2012; Mayes & Calhoun, 2009; Patzold, Richdale & Tonge, 1998; Schreck & Mulick, 2000; Wiggs & Stores, 2004; Williams, Sears, & Allard, 2004). Others have found that older children with ASD have more sleep problems than younger children with ASD (Honomichl, Goodlin-Jones, Burnham, Hansen, & Anders, 2002; Inanuma, 1984; Sivertsen et al., 2012). Others still, report more sleep problems in younger children with ASD (Richdale & Prior, 1995). To address this inconsistency in the literature, the present investigation was designed to examine age-related changes in the sleep of children with ASD and to compare age-related changes in the sleep of children with ASD to the sleep of TD children.

One potential explanation for the discrepant findings in the existing literature relates to the way in which sleep problems are conceptualized. By examining the overall pattern of sleep (e.g., a generalized or generic sleep problem), important age-related changes related to specific aspects of sleep may be obscured. That is, children's sleep may improve in one or two sleep domains but worsen or remain the same in others, thereby, resulting in no apparently significant overall changes. For instance, Goldman et al. (2012) reported on 1859 children with ASD (ages 3–18) and found significant differences across age groups (i.e., age 7 and younger versus age 11 and older) on all subscales of the Children's Sleep Habits Questionnaire (CSHQ; Owens, Spirito, & McGuinn, 2000) except disordered breathing, but found no significant age-related differences overall. Older children, compared to younger children, were reported to have significantly fewer problems related to bedtime resistance, sleep anxiety, night waking and parasomnias (e.g., sleepwalking, sleep talking, night terrors, enuresis). However, older children in the study also exhibited significantly more problems than younger children for sleep onset, sleep duration, and daytime sleepiness. Thus, despite significant age-related differences on seven of the eight sleep domains examined, there were no developmental differences in total sleep disturbance scores. Other researchers have also noted age-related differences on one or two domains of sleep in the absence of age-related differences in overall sleep (e.g., Hoffman et al., 2006; Williams et al., 2004). These findings highlight the need to examine developmental changes in specific domains of sleep as well as in the overall pattern of sleep.

A second goal of this research was to clarify age-related changes in the sleep of children with ASD relative to age-related changes in the sleep of TD children. Some studies indicate that the development of sleep in children with and without ASD follows a similar pattern in terms of sleep timing (Schreck & Mulick, 2000), sleep quantity (Allik, Larsson, & Smedje, 2008; Schreck & Mulick, 2000), bedtime resistance and sleep anxiety (Hoffman et al., 2006). Other studies have found interactions across age and group type (i.e., ASD versus TD) which indicate that sleep problems in TD children decline with age and that age-related declines were not evidenced in children with ASD (Allik et al., 2008; Richdale & Prior, 1995). This is consistent with longitudinal research by Sivertsen et al. (2012), which concluded that sleep problems improved with age for TD children and were likely to persist in children with ASD.

The objectives of the present study were to identify age-related changes in multiple domains of the sleep of children with ASD and to compare these changes to those obtained for TD children. Three hypotheses were tested. Hypothesis One predicted differences across groups where children with ASD would have poorer sleep than TD children. Hypothesis Two predicted significant within group, age-related, changes in children's sleep. It was expected that the sleep of TD children would improve over time. Due to inconsistencies in the existing literature, no predictions were made with regard to overall sleep or the specific domains of sleep on which younger versus older children with ASD would differ. Hypothesis Three predicted that the sleep problems of children with ASD would be more likely to persist than would the sleep problems of TD children. That is, we predicted interactions such that the sleep of children with ASD would show less improvement over time compared to the sleep of TD children. No predictions were made with regard to the specific individual domains of sleep for which interactions might be found.

1. Method

1.1. Participants

Mother–child dyads were 108 mothers of children with ASD and 108 mothers of typically developing children. Mothers were selected from a dataset of families participating in a program of research on parent and child functioning at a university in inland southern California. Mothers of children with ASD were selected for inclusion if their children were between the ages of 3 and 18 years, had an ASD diagnosis (based on either a maternal, clinician, or physician report), and received a score of 85 or greater on the Autism Index (AI) of the Gilliam Autism Rating Scale-2 (GARS-2; Gilliam, 2005). According to Gilliam, an overall AI score of 85 or greater denotes a high probability of autism, thus supporting the report of an ASD diagnosis. AI scores for children with an ASD in this study ranged from 85 to 143 ($M = 102.25$, $SD = 12.07$). Mothers of TD children were eligible for inclusion if they reported that their child had no diagnosed conditions (e.g., ADHD, physical disability, mental retardation) and matched a child with ASD on age and gender.

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