



The relation among sleep, routines, and externalizing behavior in children with an autism spectrum disorder

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ARTICLE INFO

Article history:

Received 26 August 2010

Accepted 4 September 2010

Keywords:

Autism

ASD

Sleep

Routines

Externalizing behaviors

ABSTRACT

The present study examined relations among sleep, routines, and externalizing behavior (based on parent report) in 115 children ages 6 to 12 years in two groups: 58 children with an autism spectrum disorder (age $M = 9.0$, $SD = 2.09$) and 57 non-ASD children (age $M = 8.25$, $SD = 1.98$). Within the ASD group, sleep hygiene and sleep quality were related to both routines and externalizing behaviors. In the combined sample, a significant interaction was found between diagnostic status and general routines in predicting externalizing behaviors. Specifically, lower levels of routines were related to higher levels of externalizing behaviors for both groups, whereas higher levels of routines were related to lower levels of externalizing behaviors for the non-ASD group. Further research among these constructs may focus on children with an ASD who experience less consistent routines or significant sleep disturbance.

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Children with an autism spectrum disorder (ASD), including autistic disorder, Asperger's disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS), often display a preference for routines (APA, 2000). Although their preference for routines may be maladaptive in terms of content and/or focus (APA, 2000), children with an ASD typically function best when in a structured environment (Hendriks, 1998). Based on the apparent preference for consistency, routines may be advantageous for children with an ASD, possibly relating to daily behaviors. Specifically, a lack of routines may be related to sleep disturbance (Richdale, 2001) and externalizing behavior problems (Bradley, Summers, Wood, & Bryson, 2004), both of which are more frequent and severe in children with an ASD than in typically-developing children. Thus, the present study examined the relation among routines, sleep, and externalizing behavior in children with an ASD and whether diagnostic group (ASD or non-ASD) moderated the relation between routines and sleep quality and between routines and externalizing behavior.

1. Routines, sleep, and externalizing behavioral problems

Routines are defined as “observable, repetitive behaviors which directly involve the child and at least one adult acting in an interactive or supervisory role, and which occur with predictable regularity in the daily or weekly life of the child” (Sytsma, Kelley, & Wymer, 2001, p. 243). Furthermore, “routines may occur at a regular time, in the presence of a regular adult, in a regular place, in a regular sequence, or a combination of these” (p. 243). Routines are important to study in children with an ASD because routines may relate to problems that are not definitive of an ASD but that are often associated

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with the disorder (e.g., sleep disturbance, externalizing behaviors). For example, sleep disturbance is correlated with severity of restrictive, repetitive, and stereotyped behaviors in individuals with an ASD based on parental report (Schreck, Mulick, & Smith, 2004). This is an important line of research given that children with developmental disorders are known to have high rates of sleep problems (up to 80%; Piazza, Fisher, & Kahng, 1996), and, among developmental disorders, children with an ASD reportedly have the highest rates of sleep disturbance (Cotton & Richdale, 2006; Richdale, 2001), with estimates ranging from 44% to 83% (Richdale, 1999). These findings hold across different raters. For example, sleep disturbance based on parent report is more prevalent in children with an ASD than typically-developing children (Allik, Larsson, & Smedje, 2006; Couturier et al., 2005; Hoffman, Sweeney, Gilliam, & Lopez-Wagner, 2006; Malow et al., 2006; Malow & McGrew, 2006; Paavonen et al., 2008; Polimeni, Richdale, & Francis, 2005; Richdale, 1999; Wiggs & Stores, 2004; Williams, Sears, & Allard, 2004). Likewise, children with an ASD report higher rates of sleep disturbance than typically-developing children using self-report measures (Paavonen et al., 2008). In addition, researchers indicated that reduced sleep quantity and poorer sleep quality in children are associated with more severe symptoms of ASD (Hoffman et al., 2005; Malow et al., 2006; Schreck et al., 2004).

1.1. Bedtime routines and sleep

Because routines, in general, may relate to sleep disturbance, it is also important to consider specific bedtime routines among children with an ASD when examining sleep problems. Bedtime routines are “a set of observable, repetitive behaviors which directly involve the child and at least one adult acting in an interactive or supervisory role in a consistent environment, and which occur with predictable regularity in the hour preceding bed each night” (Henderson & Jordan, 2010, p. 272) and are considered to be one component of sleep hygiene, which also includes other factors, such as caffeine consumption, daytime naps, and sleep environment (Durand, 1998).

Bedtime routines are frequently reported by parents, with one study indicating that 90.2% of the children with an intellectual disability and 80% of typically-developing children participated in a bedtime routine (Richdale, Francis, Gavidia-Payne, & Cotton, 2000). However, Patzold, Richdale, and Tonge (1998) found differences associated with an ASD in the activities comprising bedtime routines based on completion of a sleep diary inquiring about activities performed before bed each night. Specifically, children with an ASD reportedly followed more “unusual” bedtime routines. Importantly, failure to consistently follow the bedtime routine resulted in a decrease in sleep quality in children with an ASD, whereas the sleep quality of children in the control group was not similarly affected after not adhering to the bedtime routine. Unfortunately, in the literature, bedtime routines are often not specifically defined and are frequently determined by a single question (e.g., Patzold et al., 1998; Richdale et al., 2000). These methodological issues can lead to mixed findings or limited utility of findings (e.g., for those based on a single item). Methodological issues arise in studying sleep behavior as well. For example, although physiological measures of sleep can be beneficial for studying actual differences in sleep among diagnostic groups, such methods are timely and cost prohibitive. In addition, physiological measures are more difficult to use in children with an ASD than in typical children, as many children with an ASD do not tolerate contact of experimental devices (e.g., Christodulu & Durand, 2004; Hering, Epstein, Elroy, Iancu, & Zelnik, 1999). Parent report using questionnaires is more efficient, economical, and allows for a larger number of participants. Although parent report may measure perceived behavior rather than actual behavior, perceived behavior may be of greater importance in determining related family and parental stress than actual behavior. For example, children with an ASD may not wake more frequently during the night, but these children may exhibit behaviors while awake that result in greater disruption of sleep for others in the home (Hering et al., 1999). Therefore, it is important to examine relations between perceived sleep quality and other variables related to sleep (e.g., bedtime routines, sleep hygiene) in children with an ASD using detailed parental questionnaires, such as in the present study.

1.2. Externalizing behavioral problems and sleep

In addition to sleep disturbance (Hoffman et al., 2006; Malow & McGrew, 2006; Richdale, 1999), other behaviors that are not specifically diagnostic symptoms of ASDs are often associated with ASDs, such as aggression and tantrums (Bradley et al., 2004). Indeed, several studies have examined sleep itself as it relates to externalizing behavior among typical children and adolescents. For example, sleep quality measured by actigraphy has been shown to relate to externalizing behaviors among children (Sadeh, Gruber, & Raviv, 2002), less night sleep and less 24-h sleep have both been associated with more externalizing behaviors among preschoolers (Lavigne et al., 1999), sleep duration and difficulties have both been linked to behavior problems in young elementary school-aged children (Paavonen, Porkka-Heiskanen, & Lahikainen, 2009), and childhood sleep problems have been prospectively associated with early onset externalizing behavior and associated substance use in adolescents (Wong, Brower, & Zucker, 2009). Whereas the preponderance of evidence suggests that disordered sleep affects behavioral functioning (e.g., Malow & McGrew, 2006), some research suggests that the association between sleep problems and externalizing behaviors may only occur under certain circumstances, suggesting possible moderators of the link. For example, a longitudinal study indicated that the association between sleep problems and the development of externalizing behaviors over a 5-year period was found only for those children who exhibited specific temperamental characteristics (e.g., resistance; Goodnight et al., 2007). Furthermore, these relations have been demonstrated in a community sample of children but have yet to be explored in children with an ASD. Given that children

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