

Recommendations for Identifying Sleep Problems and Treatment Resources for Children with Autism Spectrum Disorder

Emily Abel¹ · So Yeon Kim¹ · Ashleigh M. Kellerman¹ · Matthew T. Brodhead²

Published online: 21 November 2016
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Abstract Many young children experience sleep problems that may influence their daytime functioning. These sleep problems are especially prevalent in young children with autism spectrum disorder (ASD). Therefore, general recommendations for identifying and treating sleep problems in children with ASD are needed for behavior analysts to identify potential sleep problems and make empirically informed decisions regarding treatment options. The current paper seeks to provide behavior analysts, who work with children with ASD, with informative research on pediatric sleep problems, sleep measures, and options for behavioral sleep treatment.

Keywords Sleep problems · Autism spectrum disorder

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Children diagnosed with autism spectrum disorder (ASD) are at higher risk for sleep problems (Tilford, Payakachat, Kuhlthau, Pyne, Kovacs, Bellando, & Frye, 2015), such as difficulties initiating and maintaining sleep (Giannotti et al., 2008; Goodlin-Jones, Sitnick, Tang, Liu, & Anders, 2008). Though the prevalence of sleep problems among children with ASD varies, 50–80% of these children experience sleep-related difficulties compared to only 25% of their typically

developing peers (Kotagal & Broomall, 2012). Given the prevalence of sleep problems in children with ASD (Goodlin-Jones, Schwichtenberg, Iosif, Tang, Liu, & Anders, 2009), it is critical for behavior analysts (hereafter referred to as clinicians) providing services to children with ASD to evaluate whether sleep problems are contributing to daytime problem behaviors or interfering with a child's treatment progress.

Children with ASD may be more vulnerable to the impact of maladaptive sleep than their typically developing peers (Souders, Mason, Valladares, Bucan, Levy, Mandell, & Pinto–Martin, 2009). Specifically, research suggests that sleep problems may exacerbate core symptoms of ASD, including decreased social communication skills (e.g., poor attention; Malow & McGrew, 2008) and increased restricted and repetitive behaviors (e.g., preservative interests; De Vincent, Gadow, Delosh, & Geller, 2007; Goldman et al., 2011; Richdale, Francis, Gavidia-Payne, & Cotton, 2000). In addition, sleep problems may contribute to the rate of comorbid daytime problem behaviors in children with ASD, including aggression and self-injury (Fadini et al., 2015; Malow, Marzec, McGrew, Wang, Henderson and Stone, 2006; Maski & Kothare, 2013). Overall, poor sleep has a negative impact on children's well-being (Giallo, Wood, Jellett, & Porter, 2013) and it is critical for clinicians to be well-informed on the identification and treatment of sleep problems in children with ASD.

Recently, the National Sleep Foundation prioritized research pertaining to neuropsychiatric disorders in children (Mindell, Emslie, Blumer, Genel, Glaze, Ivanenko, & Banas, 2006). This prioritization resulted in research aimed to explore correlates of sleep problems in children with ASD in order to inform interventions for improving behavior (e.g., Moon, Corkum, & Smith, 2011). Because of the growth of such research, there is a need to summarize general research findings

✉ Matthew T. Brodhead
mtb@msu.edu

¹ Purdue University, West Lafayette, IN 47907, USA

² Department of Counseling, Educational Psychology, and Special Education, Michigan State University, East Lansing, MI 48824, USA

and recommendations for clinicians providing services to children with ASD. Such recommendations may help clinicians to appropriately identify and adequately respond to sleep problems in the children they serve.

Clinicians providing services to children with ASD may benefit from a general knowledge of sleep for several reasons. First, recommendations may provide clinicians with available resources for sleep monitoring if a parent, guardian, or healthcare professional indicates concerns about a child's sleep. Second, an increased awareness of sleep problems and their corresponding treatment options may encourage a clinician to provide thorough and accurate recommendations to parents or guardians raising a child with ASD. Finally, an understanding of how sleep may impact daytime functioning for children with ASD will help clinicians develop comprehensive treatment models that encompass proper sleep hygiene and promote healthy sleep behaviors.

The goal of this paper, therefore, is to provide general recommendations for identifying and responding appropriately to sleep problems in children with ASD who are receiving behavior-analytic services. Overall, we aim to assist clinicians in how to (a) assess and monitor children's sleep, (b) identify potential sleep problems, and (c) identify, recommend, and/or implement behavioral and research-supported sleep interventions.

Common Sleep Problems in Children with ASD

Prior to identifying sleep problems and treatment options, clinicians should be knowledgeable about the nature of sleep in children with ASD, including commonly reported sleep difficulties. Children with ASD experience elevated sleep problems (i.e., parent-reported sleep difficulties), such as prolonged sleep onset latency, frequent night awakenings, short sleep duration, and early rise times (Allik, Larsson, & Smedje, 2006; Humphreys et al., 2013; Richdale & Schreck, 2009; Souders et al., 2009; Wiggs & Stores, 2004). Below, we further discuss these common sleep problems in children with ASD, including examples of how they occur.

Sleep onset latency refers to the time it takes a child to fall asleep at night, and as mentioned previously, initiating sleep is a common problem among children with ASD. Consider a child who is placed in bed at 7:00 p.m., yet does not fall asleep until 10:00 p.m. Instead of falling asleep, the child may get out of bed to play with toys, talk to him/herself, or engage in other sleepless activities (with or without parental knowledge). Difficulty initiating sleep has implications for short sleep duration, daytime sleepiness, and subsequent daytime problem behaviors (Krakowiak, Goodlin-Jones, Hertz-Picciotto, Croen & Hansen, 2008; Malow et al., 2006).

Another common sleep problem in young children is fragmented sleep. Fragmented sleep refers to the quality of

the child's sleep and is often measured by the number and duration of the child's night awakenings (Richdale, 1999; Wiggs & Stores, 2004). For example, a child who wakes multiple times throughout the night may also experience prolonged night awakenings, resulting in short sleep duration and/or daytime recovery sleep. In this case, the child may also experience prolonged night awakenings, potentially resulting in short sleep duration and/or daytime recovery sleep.

Many children with ASD also wake early in the morning, ready to engage in their daily routine (Richdale & Prior, 1995). Some children may wake as early 4:00 a.m. and remain awake for the rest of the day (Richdale & Prior, 1995). Thus, early waking may result in inadequate sleep duration and ultimately has negative implications for daytime functioning. Overall, children with ASD often sleep for fewer hours per night than their typically developing peers (Malow et al., 2006).

Recommendations for Assessing Sleep Problems in Children with ASD

Sleep Questionnaires

It is necessary for clinicians to understand the nature of sleep problems in children with ASD and how they may be described or reported by parents in behavior-analytic settings. However, clinicians may also utilize available resources to identify a child's specific sleep problem and further understand options for treatment. For example, clinicians can play a key role in improving a child's sleep by first gathering information about the child's sleep patterns. Fortunately, there are several validated methods to easily gain information about a child's sleep. Sleep questionnaires are often used by pediatricians and other healthcare providers to initially screen if a child is indeed experiencing a sleep problem. Common measures that are supported by research include the Children's Sleep Habits Questionnaire (CSHQ; Owens, Spirito, & McGuinn, 2000), the Family Inventory of Sleep Habits (FISH; Malow, Crowe, Henderson, McGrew, Wang, Song, & Stone, 2009), and the Albany Sleep Problems Scale (ASPS; Durand, Gernert-Dott, & Mapstone, 1996). These questionnaires, which are described in detail below, are designed to identify problems related to falling asleep, staying asleep, daytime sleepiness, and overall sleep health, which may provide a useful starting point for assessing the nature and occurrence of sleep problems.

The CSHQ is a 33-item parent-reported questionnaire with eight empirical subscales, including bedtime resistance, sleep onset delay, sleep anxiety, nighttime waking, parasomnias, sleep disordered breathing, and daytime sleepiness (Owens, et al., 2000; Owens, Spirito, McGuinn, & Nobile, 2000). If elevated, these subscales provide helpful information about a

child's specific sleep problem. A total score is computed from these eight subscales, with a cutoff of 41 indicating clinically significant sleep problems in school-aged children (Owens et al., 2000). Goodlin-Jones et al. (2008) assessed these subscales in typically developing children and children with developmental delays, aged 2 to 5.5 years, and found that this measure maintains its clinical significance in younger populations. Sneddon, Peacock, and Crowley (2013) also developed subscales specific to toddlers in order to account for questions that are not applicable to very young children (e.g., gets in and out of bed). These subscales include sleep initiation, sleep distress, sleep transition, and sleep duration and are useful in identifying the type of sleep problem in order to inform the appropriate treatment. For example, a child with an elevated sleep disordered breathing score may be referred to a medical provider, while a child with elevated bedtime resistance may be an ideal candidate for a behavioral sleep intervention. Overall, the CSHQ is a valid and reliable screening tool for identifying children's sleep problems and determining integral next steps for treatment (e.g., referring children for a medical evaluation, further monitoring the child's sleep, and/or providing resources for parents for behavioral treatment options).

The FISH may be used in conjunction with the CSHQ to examine elements of the child's daytime behaviors, evening habits, sleep environment, and bedtime routine. This survey may provide important information regarding contributing causes of the child's sleep problem (Malow et al., 2009). For example, the FISH asks whether the child drinks caffeinated beverages before bed. This questionnaire also addresses elements of the child's bedtime routine and sleeping environment that are not conducive to falling asleep or getting a good night's rest (e.g., whether the child sleeps in a dimly lit environment). These are important questions to consider when identifying sleep problems and choosing appropriate treatment methods. In some cases, simply removing caffeine before bedtime, making the bedtime routine consistent (e.g., reading a book, saying good night, closing the blinds, and turning on a sound machine in the same order every night), or adjusting the child's sleeping environment (e.g., removing televisions from the sleeping environment, eliminating bright lights, and adjusting the room temperature) may begin to improve the child's sleep (see the section on behavioral sleep interventions and sleep hygiene for additional information).

Each of these questionnaires is publicly available and can be accessed online at www.woodbinehouse.com/solvingsleepproblems.asp. While the CSHQ and FISH are commonly used to assess childhood sleep problems, our discussion is not exhaustive. There are many measures available for use with special needs populations, and clinicians may consider whichever validated form best fits their needs. See Lewandowski, Toliver-Sokol, and Palermo (2011) for a comprehensive

review of subjective pediatric sleep measures. Hodge, Parnell, Hoffman, and Sweeney (2012) also provide a helpful overview of methods for assessing sleep in children with ASD.

Sleep Diaries

A sleep diary is a parent-report tool often used to document basic information about time in bed, approximate sleep onset, night waking, and morning rise time. Generally, sleep diaries are used to assess children's sleep quality across multiple days (2 weeks is the standard time of administration). Although this tool is not diagnostic in nature, it is a cost-effective method to obtain estimates of average sleep duration, sleep onset latency, and variation in the child's sleep across several days. A free sleep diary can be found online (through the National Sleep Foundation) at <https://sleepfoundation.org/sleep-diary/SleepDiaryv6.pdf>.

Sleep diaries can also be complemented by behavior logs to determine if the child engages in challenging behaviors at bedtime (and how the parent responds to these challenging behaviors, which may reinforce bedtime resistance or other maladaptive sleep habits; Durand, 2008). Though parent-reported measures, such as sleep questionnaires and diaries, are often useful to obtain overall sleep estimates, parents may unknowingly overreport or underreport their children's sleep. Therefore, sleep diaries are only a starting point for gathering more thorough information using systematic and objective methods.

Actigraphy

Children's sleep may also be monitored with an actigraph, which is a small sensor that uses accelerometry to provide a minute-by-minute recording of motion (Acebo et al., 1999). The actigraph can provide similar information to what may be gleaned from the sleep diary. However, data from an actigraph provides objective and minimally invasive sleep estimates (e.g., sleep-onset, sleep-offset, and quality of sleep). If the sensor is worn 24 h per day for multiple days, it can also provide information about daytime naps and variation in sleep per 24-h period.

Actigraphy is a valid and reliable approach to measure sleep/wake patterns in children and adolescents (Meltzer, Montgomery-Downs, Insana, & Walsh, 2012; Sadeh, 2011), and researchers offer practical considerations for using actigraphy in children with ASD (Fawkes et al., 2015). While this method is not recommended for use by clinicians without explicit training, it is an important consideration when assessing sleep, referring families to medical providers, and preparing to treat sleep problems (Meltzer & Crabtree, 2015).

Recommendations for Treating Behavioral Sleep Problems in Children with ASD

Before behavioral treatments for sleep problems are discussed, it is important to emphasize that clinicians should rule out sleep disorders that require medical attention (Durand, 2014). Prior to treating sleep problems, Board Certified Behavior Analysts must adhere to the Professional and Ethical Compliance Code (Behavior Analyst Certification Board, 2016) which states that “behavior analysts recommend seeking a medical consultation if there is any reasonable possibility that a referred behavior is influenced by medical or biological variables” (p. 11). The recommendations in this paper focus primarily on behavioral approaches to treating sleep problems in children with ASD and should only be pursued once a medical cause of the target sleep problem is ruled out.

An in-depth discussion of pharmacological (medically based) sleep treatment is beyond the scope of this paper. However, medications (e.g., melatonin) may be effective in combination with behavioral approaches for children who are unresponsive to a purely behavioral approach. We recommend that clinicians collaborate with a child’s pediatrician (and/or refer for further evaluation) prior to recommending medication as part of a child’s early treatment plan. See Miano, Gianotti, and Cortesi (2016) for additional information on medical approaches to sleep treatment. Below, we describe empirically supported behavioral interventions that clinicians may find beneficial when targeting sleep problems with children enrolled in ABA programs.

General Behavioral Treatments

After assessing the child’s sleep, identifying the nature of the child’s sleep problem, and ruling out a medical cause, the next step is to evaluate and choose an appropriate behavioral sleep treatment, specific to the child’s sleep problem. Empirically based intervention methods for children with ASD include improving sleep hygiene (e.g., standardized and positive bedtime routines), parent education, graduated extinction, and faded bedtime (Mindell et al., 2006; Tan, Healey, Gray & Galland, 2012). It is also important to understand how environmental variables, such as setting events, may influence sleep and daytime behavior. Additionally, several of these methods have acknowledged the influence of parent training on child sleep. For example, studies using parent-education programs have improved child sleep through increasing total sleep time and decreasing sleep fragmentation (e.g., number of night awakenings; Mindell et al., 2006; Malow, Adkins, Reynolds, Weiss, Loh, Fawkes, & Clemons, 2014). See Meltzer and Crabtree (2015) for a more exhaustive discussion of behavioral sleep interventions. Clinicians may also reference Vriend, Corkum, Moon, and Smith (2011) for a thorough

overview of behavioral sleep interventions for children with ASD. The following recommendations describe general behavioral strategies for improving sleep, which include sleep hygiene and parent training. Then, we discuss strategies for addressing sleep onset insomnia, which is the most common form of sleep problem in children with ASD. General interventions may also be tailored for sleep onset insomnia.

Sleep Hygiene This method of addressing sleep problems involves developing healthy bedtime routines that involve activities the child enjoys. Ultimately, these activities should relax the child and prepare him/her for sleep. Additionally, sleep hygiene interventions should help families develop a regular bedtime, establish a regular exercise routine (if possible), develop and implement good eating habits, minimize light in the bedroom, and keep the temperature comfortable, while also keeping the sleeping area quiet (Durand, 2008). For example, parents should limit caffeinated beverages throughout the day (especially close to bedtime). Relaxing and soothing activities should also be implemented prior to bedtime (e.g., looking at books or doing a puzzle in a quiet environment), and the child should begin winding down approximately 1 h before bedtime (Jan, Owens, Weiss, Johnson, & Ipsiroglu, 2008; Katz & Malow, 2014).

Caregivers should determine which events are calming and which events are stimulating for their child (e.g., a bath may be stimulating rather than relaxing for some children). In general, activities such as loud music, jumping, and running should be avoided close to the child’s bedtime. Routines are important and should be simple enough for the child to follow (e.g., three to six activities). Visual supports might also be helpful for a child with ASD to understand and implement each step in the bedtime routine (Meadan, Ostrosky, Triplett, Michna, & Fettig, 2011). Though helpful in improving sleep, sleep hygiene alone may not be sufficient to eliminate severe sleep problems. In these cases, we recommend incorporating sleep hygiene (as an integral component) with other intensive behavioral sleep treatments, described below.

Parent Training As mentioned above, parent training, including parent education programs, is designed to teach parents strategies to improve their child’s sleep. For example, these programs may teach parents to develop bedtime routines, implement sleep schedules, and respond to night awakenings. Studies using parent-education programs (e.g., group or individualized training) have improved child sleep through increasing total sleep time and decreasing sleep fragmentation (e.g., number of night awakenings; Mindell et al., 2006; Malow et al., 2014). Successful parent-based intervention programs may also provide an overview of healthy sleep habits such as recommended sleep estimates, timing of bedtime, and causes of sleep problems in children with ASD. Intervention programs may also equip parents to

help their child engage in adaptive behaviors at bedtime (e.g., through visual activity schedules) and/or implement behavioral sleep interventions in the home environment (e.g., extinction; Malow et al., 2014).

The National Sleep Foundation recently updated research-based sleep recommendations, which can be shared with parents and used to evaluate whether a child is receiving adequate sleep each night (see Table 1). Clinicians could also implement parent interventions through providing informational pamphlets, hosting educational workshops, and/or providing information for parents in an online format. Pre-existing parent workbooks, such as Durand's (2008) *When Children Don't Sleep Well: Interventions for Pediatric Sleep Disorders Parent Guide*, are great resources for families raising children with ASD (Meltzer & Crabtree, 2015). Dr. Pat Friman is also a leading expert in behavioral sleep treatments, and parents may benefit from his book titled *Good Night, Sweet Dreams, I love you: How Tired Parents Can Solve their Children's Bedtime Problems*.

Behavioral Treatments for Sleep Onset Insomnia

Sleep onset insomnia is perhaps the most common sleep difficulty, stemming from several potential causes (e.g., neurotransmitter dysfunction; Reynolds & Malow, 2011). The effects of insomnia include difficulties falling asleep, staying asleep, and waking early. The behavioral mechanisms of insomnia (e.g., poor sleep hygiene) are not well understood. For example, children with ASD may exhibit challenging behaviors and/or anxiety related to bedtime (Goodlin-Jones et al., 2009; Malow et al., 2014). Children with ASD may also struggle to transition from daily activities to sleep and to understand parental expectations regarding nighttime practices (e.g., preparing for bed). Given this information, parents raising children with ASD may face challenges in establishing an effective bedtime routine, particularly one that sets explicit behavioral expectations and promotes healthy sleep habits. The following behavioral sleep strategies are used to treat insomnia, which involves altering the child's routine and environment to improve sleep.

Graduated Extinction Graduated extinction is a method where parents are directed to spend increasingly longer amounts of time ignoring the cries or demands of a child who wakes during the night or has difficulty falling asleep (Friman, 2005). Graduated extinction (and other forms of extinction) is based on withholding a reinforcer when a specific behavior occurs (Stevens, 2015). For example, a common reinforcer for bedtime resistance and insomnia is caregiver attention. Caregivers can therefore use this method to help their child develop independent sleeping skills through limiting (and eventually entirely withholding) social reinforcement. Assuming bedtime resistance occurs because it

produces access to caregiver attention, this method is used to fade the length of time the parent attends to the child during an awakening while also allowing parents to check on their child. Previous research suggests that this method may successfully teach the child to go back to sleep without parent involvement (Durand, 2008).

To implement graduated extinction, parents should identify an initial period of waiting before entering the room when the child wakes and cries (e.g., 5 min). On the first night when the child wakes, the parent will wait 5 min before entering the room to briefly check on the child. This interaction should be brief and boring. For example, the parent may enter the room for 15 s and say, "It's time to go back to bed." The parent will repeat this process on day 1 until the child is asleep (e.g., from 5 to 7 min on day 2, 7 to 9 min on day 3, 9–11 min on day 5) until the parent eventually does not enter the room when the child wakes or cries. It is worth noting that the waiting time can be fixed (e.g., every 10 min), variable, or progressive based on the child's individual needs (Honaker & Meltzer, 2014).

In summary, graduated extinction is useful for children who have difficulty initiating sleep when the parent leaves the room and for children who have difficulties transitioning back to sleep independently after a night waking. It is important to note that parents should remain consistent when entering the room each time—providing minimal interaction and soothing (Herrmann, 2016). For additional information on graduated extinction, see Turner and Johnson (2013). Finally, as discussed in Vriend et al. (2011), more rigorous studies are needed to determine the widespread utility of graduated extinction in children with ASD. Ideally, this research could be conducted through a randomized controlled trial in children receiving ABA services. In the meantime, we advise clinicians who use graduated extinction to monitor its effectiveness in order to determine whether or not it improves the child's target sleep problem.

Faded Bedtime Faded bedtime is another method used to target difficulties initiating sleep, including tantrums at bedtime. This method involves delaying the child's bedtime until he/she is ready for sleep. This method is based on the assumption that a later bedtime may help the child fall asleep because they are more tired. Bedtime is delayed to ensure rapid initiation of sleep and that appropriate cues for sleep onset are paired with positive events and interactions (Mindell et al., 2006). Additionally, a later bedtime may be better in line with when the child is biologically ready for sleep, for example, in the case of a child whose sleep is not aligned to a typical 24-h circadian pattern (Durand, 2014; Katz & Malow, 2014). Additional considerations for bedtime fading include establishing a bedtime when the child is likely to fall asleep within 15 min and keeping the child awake for the newly established

Table 1 Recommended sleep durations

Age	Recommended hours	May be appropriate	Not recommended
Newborns (0–3 months)	14–17	11–13, 18–19	Less than 10, more than 9
Infants (4–11 months)	12–15	10–11, 16–18	Less than 10, more than 18
Toddlers (1–2 years)	11–14	9–10, 15–16	Less than 9, more than 16
Preschoolers (3–5 years)	10–13	8–9, 14	Less than 8, more than 14
School-aged (6–13 years)	9–11	7–8, 12	Less than 7, more than 12
Teenagers (14–17 years)	8–10	7, 11	Less than 7, more than 11
Young Adults (18–25 years)	7–9	6, 10–11	Less than 6, more than 11
Adults (26–64 years)	7–9	6, 10	Less than 6, more than 10
Older adults (>65)	7–8	5–6, 9	Less than 5, more than 9

This table is replicated from Hirshkowitz, Whiton, Albert, Alessi, Bruni, DonCarlos, and Neubauer, (2015) and the National Sleep Foundation

bedtime even if he or she is sleepy. If the child does not fall asleep in 15 min, it may be helpful to have him/her leave the sleeping area and extend the bedtime for another hour. At this point, the parent may continue to move the bedtime forward until an appropriate bedtime is reached (Durand, 2014). It is worth noting that faded bedtime is not an ideal intervention for all children, and additional studies are needed to test its efficacy in children receiving ABA services and to determine the conditions under which it will and will not be successful.

Setting Events Setting events are environmental variables that affect the relation between an antecedent and a behavior. Biological factors, such as fatigue resulting from lack of sleep, have been suggested to increase the probability of challenging behavior (Carr & Smith, 1995). Researchers have used functional analysis to identify that a problem behavior may be correlated with sleep deprivation (Kennedy & Meyer, 1996; O'Reilly, 1995; O'Reilly & Lancioni, 2000), and fatigue has been successfully treated using behavior-analytic procedures (Smith, Carr, & Moskowitz, 2016).

To understand the extent to which lack of sleep may be a setting event for problem behavior, a clinician may keep a sleep log while systematically tracking target problem behaviors. If problem behavior is elevated on days following a night with poor sleep, such information may suggest that sleep at least partially contributes to the increased probability of problem behavior. In another example, a clinician may conduct a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994) of problem behavior on days following a night of poor sleep and days following a night of good sleep

in order to more systematically examine poor sleep as a setting event.

Though poor sleep may contribute to the increased probability of problem behavior, we caution against attributing its entire cause to poor sleep. Instead, we argue that a complete functional assessment of problem behavior, and subsequent treatment, involves an analysis of all potential variables that may contribute to problem behavior and arranging the environment in such a way that treatment of each variable is satisfied. For example, a clinician may determine that a child's problem behavior occurs because it produces access to attention and that it is more likely to occur on days following a poor night of sleep and a medical cause for poor sleep has been ruled out. In this case, functional communication training (Carr & Durand, 1985) may be used in conjunction with a behavioral treatment for sleep as a comprehensive treatment plan for problem behavior.

Discussion

This paper provides a review of behavioral observations and treatments for sleep problems that may benefit clinicians treating individuals with ASD. Clinicians working in behavior-analytic programs for children with ASD are often faced with problematic daytime behaviors that may be indicative of poor sleep, and when presented with these potential problems, they should first work closely with parents to identify the specific area of concern. Asking parents about their child's sleep habits, using parent-reported sleep measures

(e.g., CSHQ; FISH), and/or documenting the child's sleep through a sleep diary may provide a starting point for incorporating sleep interventions in the child's treatment plan. The National Sleep Foundation, American Academy of Sleep Medicine, and Autism Speaks have free online resources which include helpful information about sleep hygiene and home intervention techniques (e.g., bedtime routines and visual schedules).

While ABA is the leading intervention model for children with ASD, relatively few studies have assessed the role of sleep from a behavior-analytic perspective (see Jin, Hanley, & Beaulieu, 2013, for a notable exception). The primary goal of this paper is to provide clinicians with basic knowledge about sleep in children with ASD, in addition to practical guidelines for identifying and treating sleep problems. However, it should be noted that further research is needed to effectively determine the role of sleep in a child's intervention progress. This call for additional research is twofold. First, additional studies should assess direct relations between sleep, daytime behaviors, and intervention outcomes. In line with Smith et al. (2016), these studies should include further exploration of sleep difficulties as biological setting events for problem behavior. Second, future research should assess behavioral interventions discussed in this paper, including parent sleep training in ABA centers for children with ASD. Behavioral sleep interventions should be tailored to individual child and family needs, including the specific nature of the child's sleep problem.

In summary, given the prevalence of sleep problems in children with ASD, clinicians should be aware of the signs of sleep problems, available screening tools, and behavioral treatment options. This paper provides general guidelines for such a process. Finally, we recommend that a clinician seek the advice of a trained medical provider should they have questions or require further expertise.

Compliance with Ethical Standards This article does not contain any studies with human participants or animals performed by any of the authors.

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

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