Sleep Disorders

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Abstract

Sleep is an essential task of human development with meaningful implications for children and adolescents. Adequate sleep duration varies by age and is connected to enhanced cognitive development, emotional control, attention, behavioral regulation, learning, memory, diet, and quality of life. Poor sleep in children and adolescents may result from several factors: obstructive sleep apnea, restless legs syndrome, periodic limb movement disorder, frequent night wakings, bedtime problems, deficient sleep, delayed sleep phase disorder, parasomnias, and poor sleep hygiene. Adequate sleep duration has been associated with a number of positive health outcomes while inadequate total sleep has been correlated with several health risks. Conditions that have a bidirectional relationship with poor sleep include obesity, concussions, asthma, pain, unintentional injuries, and attention-deficit/hyperactivity disorder. Sleep assessment provides meaningful information to inform intervention and service delivery for medical and behavioral health providers. To assess sleep difficulties among youth, a multidimensional approach is commonly used. Further, due to the multifaceted aspect of sleep, simultaneously assessing multiple domains can be time-saving and reduce the likelihood of misdiagnosis. A brief review of multi-dimensional questionnaires and sleep diaries is provided in the chapter. This chapter also provides an overview of common behavioral sleep interventions to improve sleep practices of children and adolescents.

Background

Sleep is an essential task of human development with meaningful implications for children and adolescents. Adequate sleep duration varies by age (see Table 18.1 for sleep guidelines) and is connected to enhanced cognitive development, emotional control, attention, behavioral regulation, learning, memory, diet, and quality of life for children and adolescents (Baum et al., 2014; Beebe, 2011; Beebe et al., 2013; Garetz et al., 2015). Negative secondary effects have also been noted for maternal and family well-being when children do not obtain adequate sleep (McDowall, Galland, Campbell, & Elder, 2017). Sleep duration and quality has been shown to vary significantly among

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Table 18.1 Childhood sleep guidelines (Paruthi et al., 2016)

Age	Sleep recommendations per 24 h period
0–3 months	14–17 h (including naps)
4–12 months	12–16 h (including naps)
1–2 years	11–14 h (including naps)
3–5 years	10–13 h (including naps)
6–12 years	9–12 h
13–18 years	8–10 h
18–25 years	7–9 h

healthy children and those with medical or developmental conditions (Crabtree et al., 2016; Quach, Mensah, & Hiscock, 2016).

Poor sleep in children and adolescents may result from several factors. Sleep disorders include medically based conditions such as obstructive sleep apnea (OSA), restless legs syndrome (RLS), and periodic limb movement disorder (PLMD). Sleep problems include sleep difficulties with psychological and behavioral contributors such as frequent night wakings, bedtime problems, deficient sleep, and poor sleep hygiene. It is estimated that up to 40% of children experience a sleep problem between infancy and adolescence, whereas sleep disorder diagnoses are less common and thought to occur in close to 5% of children and adolescents (Meltzer, Johnson, Crosette, Ramos, & Mindell, 2010). Common sleep disorders and problems experienced by children and adolescents are briefly described below.

Childhood Sleep Disorders

Obstructive Sleep Apnea (OSA) OSA is characterized by upper airway obstruction, despite respiratory effort, that disrupts normal sleep patterns and ventilation (American Academy of Sleep Medicine, 2005). Pediatric OSA is often associated with enlarged tonsils and adenoids, unusual sleep positions, and nighttime enuresis (American Academy of Sleep Medicine, 2005; Marcus et al., 2012). Onset is typically between 2 and 8 years of age with prevalence estimated to be between 1 and 5% (Marcus et al., 2012). Snoring and apneas that can be associated with OSA are thought to affect males and females equally. Adenotonsillectomy is the first-line treatment for OSA in children.

Sleep-Related Movement Disorders Sleep movement disorders include RLS and PLMD. RLS is defined by an urge to move the legs with associated discomfort often beginning in the evening. Additional symptoms include difficulty falling asleep, bedtime resistance, and increased motor movement (Carter, Hathaway, & Lettieri, 2014). Symptoms can be exacerbated by rest or inadequate physical activity, caffeine or nicotine use, and use of antihistamines or tricyclic antidepressants (Gamaldo & Earley, 2006). PLMD includes brief movements or "jerks" during sleep that can last up to 5 s, occur in 20–40 s intervals, and are more common in lower extremities. Children are usually unaware of these movements. Information surrounding the prevalence of sleep movement disorders is limited but available studies suggest a prevalence of around 2% (Picchietti et al., 2007). Higher incidence has been shown among those with attention-deficit/hyperactivity disorder (ADHD) and a family history of RLS. Treatment includes implementing strict routines for bedtime and wake up time, reducing environmental stimulation prior to bedtime (e.g., limiting television or video games), iron supplementation due to low ferritin levels, and encouraging daily exercise.

Childhood Sleep Problems

Behavioral Insomnia Behavioral insomnia of childhood is characterized by a learned difficulty with sleep initiation, duration, consolidation, or quality that occur despite age-appropriate bedtime and opportunity for sleep (Carter et al., 2014). Behavioral insomnia often presents as bedtime refusal or resistance, delayed sleep onset, or prolonged nighttime waking that requires parental intervention. The condition is divided into sleep-onset association type, limit-setting type, and combined type. Sleep-onset association type is characterized by a child's inability or

unwillingness to fall asleep or return to sleep in the absence of sleep-specific conditions (e.g., parent's presence, bottle feeding, watching television; Moturi & Avis, 2010). Limit-setting type occurs when parents do not set appropriate boundaries for sleep, such as allowing a child to sleep in their bed, which result in bedtime delay. Prevalence is estimated to be between 10 and 30% with males and females equally affected. Prevention is the best treatment including education on typical sleep patterns, sleep hygiene, setting boundaries, implementing regular and consistent feedings, nap times, bedtime routines, and consistent sleep-wake times.

Delayed Sleep Phase Disorder In children with delayed sleep phase disorder, habitual sleep-wake times are delayed by at least 2 h compared to socially acceptable times. This disorder is most common during adolescence when the circadian rhythm is thought to lengthen and the child becomes more social. Up to 16% of adolescents have been diagnosed with delayed sleep phase disorder with 40% having a family history of the condition (Carter et al., 2014). Concerns usually focus on late bedtimes (i.e., 2:00 am or later), sleeping in, difficulty awakening, daytime sleepiness, and school tardiness. Treatment aligns the circadian rhythm with desired sleep-wake times, maintaining a regular sleep-wake cycle, and practicing good sleep hygiene.

Parasomnias Sleepwalking, sleep talking, sleep terrors, and nightmares affect up to 50% of children and most often occur between 8 and 12 years (Carter et al., 2014). Parasomnias are defined as undesirable events that accompany sleep and typically occur during sleep-wake transitions. During these events, children appear to exhibit purposeful movements although interactions within their environment is not purposeful. Additional symptoms include confusion, difficulty awakening, amnesia, and rapid return to sleep after the event. Factors that can influence the presence of parasomnias include insufficient sleep, disorders causing partial awakenings from sleep, OSA, PLMD, forced awakenings, gastroesophageal reflux disease, and specific medications (Guilleminault, Palombini, Pelayo, & Chervin, 2003). Parasomnias often resolve spontaneously by adolescence; however, 4% will have recurring events (Carter et al., 2014). Treatment focuses on providing reassurance, reducing triggers, and increasing sleep duration (Carter et al., 2014).

Poor Sleep Hygiene Sleep hygiene are behaviors that facilitate good sleep quality and duration while limiting or avoiding behaviors that interfere with sleep (Riedel, 2000). Good sleep hygiene includes having a consistent bedtime routine, falling asleep and waking near the same time daily, limiting use of electronics or caffeine prior to bedtime, getting regular exercise, eliminating bedroom activities not associated with sleep, keeping the bedroom quiet and dark, and engaging in relaxing activities prior to bedtime. Signs of poor sleep hygiene include frequent sleep disturbances, daytime sleepiness, and difficulty falling asleep (National Sleep Foundation, 2018). Behavioral strategies that modify sleep routines and habits have been shown to be effective in promoting sleep onset and duration.

Physical Health Implications

Adequate sleep duration has been associated with several positive health outcomes while inadequate total sleep has been shown to lead to several health risks.

Obesity The relationship between sleep and obesity has been well studied in pediatric populations. Children with short sleep duration tend to have more adiposity and larger waist circumference (Wang et al., 2016). Furthermore, obese children with short sleep duration have a greater number of metabolic risk factors and poorer physical activity index (Navarro-Solera et al., 2015). Short sleep duration has also been linked to insulin sensitivity in obese individuals (Kong et al., 2011; Koren et al., 2011). In a study of 3–12-year-olds, more

hours asleep, earlier bedtimes, and later wake times were associated with lower BMI and lower likelihood of being overweight 5 years later (Snell, Adam, & Duncan, 2007). Preschoolers with bedtimes before 8 pm were half as likely as children with bedtimes after 9 pm to be obese as adolescents (Anderson, Andridge, & Whitaker, 2016). For school-aged children, each additional hour of sleep predicted a 1-unit lower BMI at age 32 and a 30% reduction in obesity risk (Landhuis, Poulton, Welch, & Hancox, 2008). A meta-analysis demonstrated a consistent increased risk of obesity in children who do not receive the recommended amount of sleep (Cappuccio et al., 2008). For males ages 12–18, shorter sleep duration is related to higher BMI (Ames, Holfeld, & Leadbeater, 2016). Similarly, shorter sleep duration is associated with longitudinal increases in BMI for females 16–18 years (Ames et al., 2016).

Concussion Approximately 10–38% of teens experience sleep disturbance following a concussion (Beebe et al., 2007; Bramley et al., 2017). Furthermore, concussion symptoms such as headache, fatigue, anxiety, and depression exacerbate sleep disturbances (Castriotta et al., 2007). Unfortunately, sleep disturbance following concussion is associated with a three- to fourfold increase in recovery time (Bramley et al., 2017) and is a predictor of poorer functional outcomes (Tham et al., 2012). Interestingly, non-sport-related concussions are more likely to result in sleep disturbance than sport-related concussions (Bramley et al., 2017).

Asthma Asthma is the most common chronic illness of childhood, and these children experience a significantly higher risk for developing sleep disordered breathing and disturbed sleep than healthy peers (Brockmann, Betrand, & Castro-Rodriguez, 2014; Stores, Ellis, Wiggs, Crawford, & Thomson, 1998; Strachan, Anderzon, Limb, O'Neill, & Wells, 1994). One study found that 34% of children with asthma wake at least once a week due to breathing difficulties (Action Asthma, 1993). Youth with asthma and obesity exhibit greater week to weekend variability in sleep and get less sleep during the week than youth with obesity who do not have asthma (Krietsch, Lawless, Fedele, McCrae, & Janicke, 2017).

Pain Pain can interfere with quality and quantity of sleep due to frequent night awakenings and prolonged sleep-onset duration (Logan et al., 2015; Valrie, Bromberg, Palermo, & Schanberg, 2013). Conversely, sleep disturbances impact pain by interfering with the ability to implement coping skills for pain management and compromised emotional, cognitive, and behavioral functioning (Lewin & Dahl, 1999; Valrie et al., 2013). Improvements in sleep habits are related to improvements in functional disability, mood, greater sleep duration, less sleep-onset delay, and fewer night wakings (Logan et al., 2015).

Unintentional Injuries Children with frequent injuries or parent-reported injury prone behaviors tend to have significantly more sleep problems overall than children with low injury rates (Owens & Dalzell, 2005). Conversely, preschool boys with less than 10 h of sleep the night before were found to have an increased risk of injury (Valent, Brusaferro, & Barbone, 2001). In addition, temperament-related "irregular sleep patterns" in young children may play a role in increasing injury risk (Irwin, Cataldo, Matheny, & Peterson, 1992). The relationship between sleep and unintentional injuries has also been demonstrated in teens. Severity of teen-reported sleep problems and daytime sleepiness is positively correlated with accidental injuries (Giannotti & Cortesi, 2003). Poor sleep quality is also associated with crash risk in teen drivers (Pizza et al., 2010) and risk-taking behaviors in adolescents (O'Brien & Mindell, 2005).

ADHD Inadequate sleep has been linked to difficulties with attention, impulse control, and behavior regulation (Paavonen, Porka-Heiskanen, & Lahikainen, 2009; Sadeh, Gruber, & Raviv,

2002). Behavioral sleep difficulties affect up to 70% of children with ADHD (Owens, Spirito, McGuinn, & Nobile, 2000). Children with ADHD present with elevated levels of sleep problems, significantly longer duration awakenings, poorer sleep efficiency, and changes in sleep architecture (Vigliano et al., 2016; Williams & Sciberras, 2016). Furthermore, sleep problems in children with ADHD tend to be more persistent than children not diagnosed with ADHD (Lycett, Sciberras, Hiscock, & Mensah, 2016). To complicate the relationship between ADHD and sleep, as high as 30% of OSA-hypopnea syndrome (repetitive episodes of airflow reduction or cessation due to upper airway collapse during sleep) have ADHD (Wu et al., 2017). Treatment with stimulant medications for 6 months did not significantly change sleep parameters (Lycett et al., 2016). One study found a general association between increased methylphenidate dose and increased sleep problems in children with ADHD particularly for children of lower weight and BMI (Becker, Froehlich, & Epstein, 2016). However, children with preexisting sleep problems no longer had sleep difficulties once on the highest methylphenidate dose (Becker et al., 2016).

Screening and Assessment

Clinical assessments of sleep need to accurately describe various dimensions of sleep and identify appropriate intervention strategies (Lewandowski, Toliver-Sokol, & Palermo, 2011). Without accurate assessment, clinicians may reach misleading conclusions about the causal factors of a child's presentation. Fortunately, there is great variety in available methods to assess sleep. For instance, biophysiological assessment of sleep includes polysomnography and actigraphy. Polysomnography records changes in brain function, heart rate, eye movement, and muscle activation and is used primarily to diagnose OSA (Mindell & Owens, 2015). Actigraphy uses sensors to record motor movement and provide an objective estimate of sleep patterns. While biophysiological measures are useful, they do not account for environmental, psychological, or behavioral factors that contribute to sleep difficulties or the dimensions of sleep that are amenable to intervention. These factors are best captured using questionnaires.

Questionnaires can be used alone or in combination with biophysiological measures to provide a comprehensive assessment of sleep. Questionnaires are typically retrospective and measure typical sleep patterns, disturbances, or behaviors (Lewandowski et al., 2011). To be considered useful to clinicians, questionnaires must be valid, brief, easy to administer and score, cost-efficient, and easy to read (Sheldrick & Perrin, 2009).

Most pediatric sleep measures assess multiple dimensions of sleep. Due to the multifaceted aspect of sleep, simultaneously assessing multiple domains can be time-saving and reduce the likelihood of misdiagnosis. For example, a child may have prolonged sleep-onset latency, which could support a diagnosis of insomnia. However, if sleep-onset difficulties are caused by leg discomfort, RLS may be a more accurate diagnosis and target for treatment. A brief review of multidimensional questionnaires is provided below.

The *Children's Sleep Habits Questionnaire (CSHQ)* is a 45-item parent-completed questionnaire designed to assess symptoms of common pediatric sleep disorders. (Seifer, Sameroff, Dickstein, & Hayden, 1996). Initially designed for ages 4–12, a revised version of the CSHQ has been adapted for use with preschoolers (Sneddon, Peacock, & Crowley, 2013). Each version takes approximately 10–15 min to complete. Parents rate statements about their child's sleep using a 3-point scale (*Usually, Sometimes, Rarely*) and indicate if each statement constitutes a problem. The Overall Total Sleep Disturbances score ranges from 33 to 99, with higher scores indicating greater disturbances. There are eight subscales: Bedtime Resistance, Sleep-Onset Delay, Sleep Duration, Sleep Anxiety, Night Wakings, Parasomnias, Sleep Disordered Breathing, and Daytime Sleepiness. Psychometrics are acceptable for use in community settings (Owens et al., 2000).

The *Sleep Disturbances Scale for Children (SDSC)* is a 27-item standardized parent-completed measure of sleep disturbance (Bruni et al., 1996). Initially developed for use with children ages 6–15, the SDSC has been adopted for use with preschoolers (Romeo et al., 2013). The SDSC generates a total *T* score and six subscale scores: Disorders of initiating and maintaining sleep, sleep breathing, disorders of arousal, sleep-wake transition disorders, disorders of excessive somnolence, and sleep hyperhidrosis. The SDSC has strong internal consistency and test-retest reliability (Bruni et al., 1996). The SDSC is considered "well-established" due to acceptable psychometrics and use by multiple researchers (Lewandowski et al., 2011).

The *Children's Report of Sleep Patterns (CRSP)* is a 60-item self-report measure for children ages 8–12 (Meltzer et al., 2013). Three modules assess sleep patterns, sleep hygiene, and sleep disturbance, as well as a brief sleepiness scale. Validation for children ages 13–18 has occurred on the sleep hygiene and sleep disturbance modules (Meltzer et al., 2014). The Sleep Disturbance Indices had acceptable internal consistency except for the Parasomnia Scale. Test-retest reliability was good for all scales except for the Restless Legs Scale.

Another essential sleep assessment tool is the sleep diary as it prospectively records sleep on a night-by-night basis (Bootzin & Engle-Friedman, 1981). While there is generally no standard form, most clinicians agree that sleep diaries should capture several relevant metrics such as sleep-onset latency, wakefulness after initial sleep onset, total sleep time, total time spent in bed, sleep efficiency, and sleep quality or satisfaction (Carney et al., 2012). As such, multiple lab-specific sleep diaries have emerged, with response formats including numerical sleep-wake estimates, Likert ratings, and visual analogue scales. Despite the lack of a standardized format, the sleep diary has been regarded as a "gold standard." Sleep diaries are considered more accurate than sleep questionnaires due to the influence of memory, experiences, vague and often inaccurate, and recall bias (Werner, Molinari, Guyer, & Jenni, 2008). While several studies have not found sufficient agreement for actual sleep time and nocturnal wake time between actigraphy and sleep diaries (Sadeh, 1995; Sadeh, Sharkey, & Carskadon, 1994), Werner et al. (2008) have asserted that actigraphy and sleep diary are interchangeable regarding sleep start, sleep end, and assumed sleep.

Prevention and Intervention

As noted earlier, it is important for children to have sufficient sleep quality and quantity. If a child is extremely difficult to wake in the morning (i.e., takes longer than 15 min to get out of bed), is sleeping two or more additional hours on weekends or school vacations when compared to school nights, is falling asleep at school or other inappropriate times, or exhibiting noticeable changes in mood or behavior following nights of increased sleep, intervention is recommended (American Sleep Association, 2018). The following strategies are common behavioral sleep interventions to improve sleep.

Prevention Strategies Techniques that focus on teaching children to fall asleep independently put themselves back to sleep following awakenings, healthy and consistent bedtime routines, and promoting restful sleep environments are first-line approaches to improve sleep. For infants and young children, strategies that prevent sleep difficulties may include putting children to sleep when drowsy but not yet asleep and having a consistent bedtime routine. As children get older, engaging in relaxation exercises before bed, discussing worries outside of bedtime, and making bedrooms electronic free promote sleep onset. In adolescents, encouraging bedrooms to be used solely for sleep and limiting caffeine intake are additional strategies that promote good sleep habits. Additional guidance from medical, behavioral health, and school providers to prevent sleep problems before they occur are presented in Table 18.2.

Table 18.2 Interdisciplinary sleep anticipatory guidance recommendations

Medical provider	Behavioral health provider	Daycare/school-based provider
Infants and toddlers		
– Encourage parents to get plenty of sleep and sleep when infant is sleeping – Help baby wake for feedings by light patting, diaper change, or undressing – Continue to offer feeds during the night every 3 h	– Provide coping skill recommendations to caregivers to help with transition of having a newborn at home and impact on parental sleep and stress level	– Maintain regular sleep schedule and feeding schedule – Maintain safety recommendations – Put baby to sleep when drowsy but awake
– Put infant to sleep on their back. Choose cribs with slats 2 3/8″ apart. Don't use loose, soft bedding and infant should sleep in crib in caregiver's room – Pay attention to infants' cues for sleep	– Help families set a consistent schedule and routine for sleep – Provide psycho-education on sleep-onset associations	– Implement consistent routine for sleep – Help provide feedback to caregivers on daytime sleep habits
– Put baby to sleep when drowsy but awake – Develop a schedule for naps and nighttime sleep – Infant should sleep in crib in caregiver's room (starting at 2 months) – Do not put baby in crib with a bottle – Choose mesh playpen with weave less than ¼″	– Discuss routine for feeds – Help family gradually fade nighttime feeds – Psycho-education on daytime disruptive behavior management (i.e., differential attention)	– Support independent sleep-onset and fade feedings during naps – Provide families feedback on helpful behavioral strategies and positive discipline techniques used at daycare
– Discuss changing sleep pattern – Discuss limit setting and positive discipline – Nighttime feeds not necessary (starting at 9 months to 1 year) – One nap per day (starting at about 1-year old) – Encourage quiet time such as reading, singing, and a favorite toy before bed – Discuss night awakenings, parents should reassure briefly, give a preferred object (blanket or stuffed animal), and put back to bed. No bottle in bed – Do not put TV, computer, or digital device in bedroom. Use other methods to improve calming behavior	– Discuss nap schedule as to not disrupt nighttime sleep – Discuss use of transitional object for sleep – Discuss limit setting around electronics and digital media for sleep	– Monitor sleepiness outside of daily sleep schedule – Monitor developmental performance (i.e., cognitive, oral, and motor development). Assess sleep concerns if developmental delays arise – Maintain consistent naptime earlier in the afternoon to avoid impact on nighttime sleep – Use transitional object at naptime
School age children		
– Create and maintain a calm bedtime routine – Limit TV to no more than 1 h a day, no TV in bedroom – Monitor school performance and consider impact of poor sleep on tardiness, daytime behavior – Consider implementation of family media plan to balance needs of physical activity, sleep, school, and quiet time without media (www.healthychildren.org/mediauseplan)	– Help families establish a consistent bedtime routine that is not too long (i.e., bath, brush teeth, PJs, story, lights out) – Encourage daytime exercise and limit electronics use. Eliminate TV and other screens at least 1 h before bed	– Monitor drowsiness in school, report episodes of sleep during school day to caregivers – Monitor academic and behavioral performance. Assess sleep difficulties when evaluating concerns – Introduce psycho-education on sleep during class time and to parents during PTO/PTA meetings and back-to-school night

(continued)

Table 18.2 (continued)

Medical provider	Behavioral health provider	Daycare/school-based provider
– Do not operate machinery, especially motor vehicles, when drowsy – Discuss maintaining a sleep routine in light of other activities, work, school, exercise, extracurricular activities, free time. Keep routine consistent on weekends and vacations	– Provide psycho-education around proper use of Melatonin if used – Introduce CBT strategies for older children to help calm bedtime fears, anxiety, and mood concerns – Help families implement behavioral strategies for bedtime refusal, night awakenings, and parasomnia's – Discuss daily schedule to maintain balance between school, friends, homework, and work – Discuss limit setting around driving a vehicle if sleep deprived	– Monitor tardiness, school attendance, and changes in mood or anxiety levels – Encourage regular exercise (i.e., PE classes) – Consider changing school start times – Provide psycho-education on the impact of poor sleep on driving behavior and safety – Manage school schedules so extracurricular activities do not occur too early in the morning or too late at night

Sleep Hygiene Strategies that address bedtime routines, sleep habits, and nighttime interactions are essential to allow other sleep interventions to be successful (Johnson, Giannotti, & Cortesi, 2009). As such, improving sleep habits is often recommended as a first-line treatment to improve sleep (Jan et al., 2008). Keeping consistent wake and sleep times across weekday and weekends is recommended. Further, eliminating naps can help build sleep debt and improve sleep onset at bedtime. Sleep should occur when sleepy and time in bed should be minimized to ensure a child is in bed only for sleep. This includes eliminating "sleeping in" and engaging in play, homework, or social media use while in bed. To help maintain regular sleep schedules and decrease sleep-onset latency, children should avoid caffeine, especially in evening hours, and eliminate access to stimulating activities before bed (i.e., use of electronics/screen use and rigorous exercise) at least 1 h before sleep. This includes eliminating access to TV in the bedroom and eliminating TV use as part of the bedtime routine. Other modifications to the sleep environment include keeping a bedroom temperature between 60 and 75° Fahrenheit, eliminating internal and external light within the bedroom, and making the bedroom a place only for sleep. Engaging in brief nighttime rituals and routines can also improve sleep hygiene. This can include taking a bath or shower, putting on pajamas, engaging in a quiet activity like reading independently or with a caregiver, and prayer at a consistent time each night, including weekends (Tierney & Wang, n.d.). Completion of the nighttime routine should not exceed 30 min.

Extinction Typical extinction procedures involve parents ignoring all bedtime disruptions and not interacting with a child until the next morning. Extinction may involve a temporary increase in negative behaviors prior to sleep habits improving. There are three types of extinction procedures a caregiver may implement to decrease crying or disruptive behavior concerns at bedtime. The first is the unmodified extinction or "cry it out" method. This requires caregivers to endure crying and other disruptive behaviors and ignore these behaviors until the next morning. Caregivers may only attend to disruptive behavior if concerns about the child being ill or safety issue arises (Etherton, Blunden, & Hauck, 2016). The second type of extinction is graduated extinction. With this method, caregivers respond to crying after a set amount of time on a fixed or incremental schedule. This strategy is different than the

unmodified approach as it can be tailored to a child's age and developmental level and caregiver's comfort in how long they can ignore before responding to crying and other disruptive behaviors (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006). The third type of extinction approach is extinction with caregiver presence wherein a caregiver stays in the room with the child but ignores crying behaviors (Etherton et al., 2016). Common pitfalls include misconceptions about the amount of time it may take for this intervention to reach success, difficulty allowing disruptive behaviors to continue if they are affecting family members' or neighbors' sleep, and caregiver frustration (Etherton et al., 2016).

Scheduled Awakenings If a child exhibits a chronic (>3 episodes per month) and severe (almost nightly, or at least multiple times per week) pattern of NREM parasomnia (abnormal movements, behaviors, emotions, perceptions, or dreams that occur while falling asleep, sleeping, or waking up) episodes which is significantly disruptive to the child or family, scheduled awakenings may be indicated (Byars, 2011; Sadeh, 2005). Scheduled awakenings have been reported to work with full resolution at 1-year follow-up (Lask, 1988). The mechanism by which scheduled awakenings works is not fully understood and may involve disruption of sleep cycling into slow wave sleep (Owens & Mohan, 2016). Scheduled awakenings consist of parents keeping a diary of the timing of the parasomnia over several nights and then wake the child 15 min before the event typically occurs, making sure the child was fully awake for at least 5 min. Scheduled awakenings have been shown to eliminate sleepwalking in more than 80% of children and results were shown to be maintained for 3 and 6 months (Frank, Spirito, Stark, & Owens-Stively, 1997).

Stimulus Fading Stimulus fading often targets co-sleeping and involves gradually removing the presence of a parent from the child's room (Vriend, Corkum, Moon, & Smith, 2011). To target parental presence at bedtime, on the first night a parent may sleep on a mattress beside the child's bed as opposed to directly in bed with them. On subsequent nights, the parent continues to distance themselves from their child until they are completely out of the child's room. Stimulus fading has been shown to be effective at decreasing sleep onset and reducing night wakings and co-sleeping (Howlin, 1984).

Multi-component Intervention Intervention packages involving more than one approach to improve sleep (e.g., extinction, graduated extinction, stimulus fading, sleep hygiene, reward plans) have been shown to decrease sleep-onset latency, night wakings, bedtime disturbances, and improve daytime behavior (Montgomery, Stores, & Wiggs, 2004; Reed et al., 2009). Though it can be difficult to evaluate the efficacy of intervention packages, a combination of intervention strategies is often more feasible and practical for families to implement rather than individual intervention techniques.

Cognitive Therapy Cognitive strategies can help manage age-appropriate bedtime fears and comorbid anxiety concerns. It can be helpful for a child to identify maladaptive thinking patterns, and automatic thoughts around sleep and engaging children in basic cognitive restructuring techniques (Gradisar et al., 2011). Additionally, other cognitive behavioral therapy (CBT) strategies for sleep include self-control training, systematic desensitization, relaxation strategies, use of positive self-statements, and positive reinforcement (Tikotzky & Sadeh, 2010). Incorporating cognitive strategies to challenge bedtime fears or worry around not obtaining enough sleep, for example, can help decrease the further likelihood that catastrophic thoughts will lead to further sleep problems. For children, employing cognitive strategies during the day, such as "worry time" before starting the bedtime routine be helpful.

Exposures/Imagery Rehearsal Approximately 5–8% of the general population experience nightmares (i.e., unpleasant dreams that awaken the sleeper; Zadra & Donderi, 2000). Imagery

rehearsal therapy (IRT) has received the most empirical support as an intervention (Krakow & Zadra, 2006). Imagery rehearsal therapy is a CBT intervention consisting of cognitive restructuring of thoughts around the unpleasant dream and a specific set of imagery steps to decrease the frequency and intensity of nightmares. Those who received IRT experienced reduced frequency of nightmares compared to those on a waiting-list and results were maintained over a 9-month follow-up (St-Onge, Mercier, & DeKoninck, 2009). IRT has also been found helpful in treating PTSD-related forms of nightmares (Kellner, Neidhardt, & Krakow, 1992). One study investigated the effectiveness of IRT for nightmares of 6- to 11-year-old children. Keeping a prospective dream log was associated with decreases in unpleasant dream frequency, nightmare distress, and manifest anxiety. Results also suggested that drawing modified versions of nightmares was associated with reductions in distress and anxiety (Simard & Nielsen, 2009).

Implications for Interprofessional Care

Youth live and function within multiple systems. Various professionals within these systems contribute to the health and well-being of each child throughout the lifespan. For instance, medical providers monitor a child's health and well-being starting at the mother's prenatal visit and continuing over the life of the child during well-child visits. Childcare and educational professionals also impact a child's growth and development by informing caregivers of child behavior while they are out of the home. Given significant implications of sleep on behavior and learning, it is appropriate and necessary that these professionals provide interprofessional care of sleep.

Anticipatory guidance is a process which medical providers discuss issues with families in anticipation of their emergence (Hagan, Shaw, & Duncan, 2017). Early discussions on sleep can start before a baby is born and continue at each well-child visit. Expectations for variability in infant sleep patterns, as well as, safe sleep practices, night time feedings, development of self-soothing skills, consistent sleep location, and strategies to decrease likelihood of an inappropriate sleep-onset association should be discussed (Hagan et al., 2017; Mindell & Owens, 2015). During toddler years, discussions among medical and daycare providers are focused around use of transitional objects at sleep, developmental fears at sleep onset, transition from a crib to toddler bed, behavioral limit-setting strategies, and use of electronics at bedtime (Hagan et al., 2017; Meltzer & Mindell, 2006; Mindell & Owens, 2015; Stein, Mendelsohn, Obermeyer, Amromin, & Benca, 2001). As children reach school age, focus shifts to maintaining a regular sleep routine, sleeping an adequate amount of time, screening for sleep disordered breathing, and functional impact of poor sleep on learning, school engagement, and social-emotional development (Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010; Meltzer & Mindell, 2006; National Sleep Foundation, 2015; Sadeh et al., 2002). School personnel should not only monitor these factors, but assess for sleep difficulties before completing psycho-educational assessments for academic and behavioral concerns (Taras & Potts-Datema, 2005). During teenage years, focus should be centered on implications of poor sleep on academic performance, school truancy, and disruptive behavior and increased internalizing symptoms common to anxiety and depression, memory and attention issues, and safety (Dahl, 2008). Table 18.2 summarizes how sleep can be addressed inter-professionally along childhood development.

Daycare providers, teachers, nurses, social workers, and school psychologists can also provide anticipatory guidance of sleep. Schools and daycares can incorporate psycho-education into curricula. Youth spend a majority of their day in school allowing for ongoing monitoring of daytime sleepiness and the evaluation and impact of poor sleep on behavior, emotional regulation, and academic performance. For instance, Wilson, Miller, Bonuck, Lumeng, and Chervin (2014) evaluated the impact of a preschool-based sleep education program consisting of a presentation to parents and teachers and 2 weeks

of lessons on sleep. Results demonstrated an increase in parent knowledge, attitudes, self-efficacy, and beliefs around sleep. In addition, participants increased weeknight sleep by 30 min compared to a control group. Another study of first-grade students found improved sleep habits over a 12-month period after families received brief school-based consultation around sleep issues (Quach, Hiscock, Ukoumunne, & Wake, 2011). Two studies of 11th-grade students examined the efficacy of providing sleep education within the school setting. Results of one study indicated a decrease in the discrepancy between time out of bed from weekday to weekend (Moseley & Gradisar, 2009) while the other study demonstrated significant improvement of knowledge with a large proportion of students attempting to change sleep behaviors (Cain, Gradisar, & Moseley, 2011).

Beyond providing educational intervention to students and caregivers within the school setting, delaying start times is another strategy schools can employ to improve sleep. Changing school start time by 1 h later has been found to increase sleep duration, decrease sleeping later on weekends to make up for lost sleep, and a decrease in motor vehicle accidents (Danner & Philips, 2008). In a study of high school boarding students, a delay in school start time by 30 min resulted in an increase of sleep duration and a decrease in daytime sleepiness (Owens, Belon, & Moss, 2010). A large longitudinal study demonstrated that daytime sleepiness and nighttime sleep duration improved following a delay of school start times by 30 and 60 min (Li et al., 2013).

Case Study

"Ben" is a Caucasian male seen by his primary care provider (PCP) for his 5-year well-child visit. During the visit, Ben's mother reported concerns regarding inattention and hyperactivity at home and school, as well as difficulty meeting Kindergarten academic benchmarks. During a parent–teacher conference, school staff suggested that Ben be evaluated for ADHD. Ben's mother reported that she does not want Ben to fall behind academically and would like an evaluation to address these concerns. Ben's PCP agreed to discuss the possibility of an ADHD evaluation after considering other factors such as sleep. Ben's mom shares that while bedtime is 8:30 pm, he often does not fall asleep until 11:00 pm or later. He no longer naps at home but falls to sleep in school a couple times each week. He is sometimes permitted to sleep in the nurse's office. Ben's mother noted that he is often awake during the night, two to three times, for at least 30 min each awakening. She awakens him at 6:00 am on school mornings so he may catch the bus at 6:30 am. Ben has the TV on at night and uses a timer to shut it off at 2:00 am. Ben turns on his TV with each night awakening. The PCP discusses the importance of setting limits on TV and electronics use to less than 1 h per day and to eliminate use at least 1 h before bedtime. The PCP also provides suggestions to improve the bedtime routine. Ben's mother was resistant to remove the TV from Ben's bedroom due to concerns that this may increase tantrums and lead to difficulties falling asleep. The PCP consulted with the pediatric primary care psychologist to discuss techniques for gradually fading the TV out of the bedroom. The psychologist explained that a sleep-onset association has developed around TV use. The psychologist, Ben, and his mother engaged in a 15-min discussion around electronics use and sleep and steps for gradually fading out the use of TV at bedtime. The psychologist also provided the family with a 2-week sleep diary and the preschool version of the CSHQ for the parents to complete. The family expressed interest in implementing these strategies and scheduled a visit with the psychologist for short-term solution focused treatment for insomnia. The psychologist further explained how poor sleep can result in decreased attention thereby impacting academic performance. Ben's mother agreed to defer evaluation of ADHD until sleep interventions are implemented. Ben's mother provided permission for the psychologist to discuss sleep concerns with Ben's school counselor. Furthermore, the psychologist recommended that school staff do not allow Ben to sleep at school. The psychologist also suggested use of a Daily Report Card to help Ben and his parents

monitor his level of school engagement that can be tied to privilege-based rewards at home if he meets his daily behavior goals at school.

Conclusions and Future Directions

Addressing youth sleep issues requires a multi-systems level approach. Medical providers discuss implications of poor sleep, preventative strategies, and basic intervention techniques during well-child visits. However, moving recommendations into action can be difficult for caregivers at times. Assistance from behavioral health providers (i.e., pediatric psychologists) and school personnel can be helpful as these professionals are uniquely qualified and have resources (e.g., time and increased contact with youth) to further assess and treat sleep problems. Despite growing literature indicating the benefit of assistance from each of these groups on improving sleep problems, more research is needed to demonstrate the efficacy of a collaborative multi-system level approach to inform assessment and intervention.

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