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Behavioral Treatment of Insomnia and Sleep Disturbances in School-Aged Children and Adolescents

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Introduction

Insomnia and related sleep disturbances commonly affect youth, with prevalence rates estimated at ~30% in school-aged children (6–12 years) and ~24% in adolescents (13–18 years).^{1,2} Estimates are higher in pediatric populations with psychiatric diagnoses, including Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), and anxiety and depression.^{3–6} Youth with insomnia face many deleterious consequences, including reduced quality of life, impaired cognition, behavioral/emotional problems, greater obesity, poorer performance in school, and greater risk-taking behaviors.^{2,7,8} Insomnia also affects family functioning and is associated with increased stress and disrupted sleep for parents.⁹ These negative outcomes, coupled with potential for chronicity and high prevalence in youth, warrant attention on the development and implementation of efficacious treatments for pediatric sleep disturbances.¹⁰

Clinicians frequently rely on pharmacological interventions when treating pediatric sleep disturbances; however, limited evidence exists for the safety and tolerability of medications for insomnia in youth, and medications also provide relatively short-lived effects not maintained following discontinuation.¹¹ In adults, behavioral interventions, such as cognitive behavioral therapy for insomnia (CBT-I), are considered first-line in treating sleep disturbances.¹² In the last decade, a growing literature has suggested that behavioral interventions may be similarly effective for youth,^{13–16} however, pediatric sleep assessments and treatments are rarely implemented in medical settings.¹⁷ This review aims to provide

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essential information regarding the efficacy of behavioral interventions for sleep disturbances in school-aged children and adolescents and to further inform psychiatric practice in the treatment of pediatric insomnia.

Behavioral Treatment Options

Patient Evaluation Overview

Diagnostic criteria for insomnia in youth include the presence of one or more of the following symptoms for at least three nights per week and for at least three months: (a) difficulty with sleep onset, commonly manifesting as difficulty in initiating sleep without a caregiver's presence; (b) night awakenings and an inability to return to sleep; and (c) early-morning awakenings.¹⁸ These symptoms must be accompanied by significant daytime impairment. For this review, it is notable that interventions commonly target a range of sleep disturbances related to insomnia, including sleep duration, sleep-onset latency (i.e., length of time to sleep onset), frequency/duration of night awakenings, regularity of bed- and wake-times, and sleep efficiency (i.e., ratio of time asleep to time in bed). An additional childhood sleep complaint is bedtime resistance; i.e., bedtime refusal, stalling, and requests for caregiver attention to delay bedtime.¹⁹ Diagnostic tools for assessing sleep disturbances in youth include parent- and child-questionnaires;²⁰ clinical interviews querying sleep schedule, habits, and the nature of sleep problems;¹⁶ daily sleep diaries;²¹ and objective assessments (e.g., actigraphy, polysomnography).¹⁶

Behavioral Sleep Intervention Guidelines

Developmental Considerations.—Sleep problems occur throughout early development but manifest differently depending on age. Sleep among school-aged children is characterized by a relatively long duration need (9–12 hours per night)²² and manifestation of circadian preference (morning lark versus night owl).²³ Insufficient sleep duration, as well as desire for parental support for initiating sleep, are common in this period. Adolescence is associated with significant changes in sleep health and behavior, including shifts toward reduced duration and later bedtimes. Given greater academic and social demands in adolescence, as well as the frequent mismatch between early school start times and their preference for delayed bed- and wake-times, most adolescents do not receive the recommended hours of sleep per night.²⁴ Sleep disturbances are common in both age groups and are connected to poorer psychiatric health and daytime functioning.² Coupled with the lack of approved medications for childhood insomnia, parents' inclination towards behavioral interventions,²⁵ and potential functional impairment, the need for effective behavioral interventions is paramount for the health and well-being of youth. Behavioral sleep interventions have been developed to target the range of sleep problems occurring during this developmental period, with implications for improved psychiatric health.

Modes of Delivery.—Behavioral sleep interventions have been delivered in a range of formats depending on the severity and type of sleep complaints targeted, but all tend to be short term (i.e., most 6 sessions). At their simplest, interventions are educational and provide information about the importance of sleep, sleep hygiene, and/or basic behavioral strategies to support sleep health.^{26–38} Among school-aged children, families have received

educational interventions via printed materials (e.g., pamphlets, information sheets),^{26–29} video^{27–38} or phone calls,^{30–33} or in-person during individual^{29–36} or group sessions^{30,36–38} led by clinically-trained health professionals (e.g., nurses, occupational therapists, psychologists, pediatricians)^{31–38} or trained research staff.^{29,30} Settings for in-person visits included children’s homes,^{29,31} schools,³³ clinics,^{31,32,34,35} or research locations.^{30,36} Given parents’ important role in establishing and implementing rules at this age, they are most frequently the targeted agents of change. Notably, however, an educational intervention delivered by older peers to elementary school students yielded sustained improvement in sleep complaints,²⁶ suggesting that as children mature, they should also be educated on healthy sleep habits.³⁹

Adolescent interventions invariably engage the teen directly, but may include parent participation.^{40–50} In this age group, school-based interventions are often employed to improve knowledge of the importance of sleep, sleep habits, and sleep duration in the general adolescent population. These interventions use classroom, lecture, and/or workbook formats and are led by trained school personnel (e.g., teachers, athletic trainers, counselors), sometimes in conjunction with clinical psychologists or physicians.^{40–44,49,51–57} In addition to didactic formats, strategies, such as modeling, role-playing, games or contests, and rewards;^{43,52,54,57} peer-to-peer teaching;⁴⁴ and digital components (e.g., online videos⁴¹), have been employed to bolster adolescent engagement.

Behavioral interventions become more structured and clinically-oriented when sleep complaints are severe (i.e., insomnia). Among school-aged children, interventions, such as CBT-I^{58–61} or other formal sleep training programs, such as faded bedtime with response cost and positive reinforcement (FBRC-PR), are frequently utilized.^{36,62} FBRC-PR involves delaying bedtime until the child is likely to fall asleep and subsequently making bedtime earlier by increments of 15 to 30 minutes once the child is able to rapidly initiate sleep at each time point. If unable to fall asleep within 20 minutes, the response cost component has the child (1) removed from bed, (2) engaged in a quiet, unrewarding activity for 20 minutes, and (3) then returned to bed to initiate sleep again. The child is rewarded for meeting FBRC-PR goals, and this strategy is implemented until the child is able to quickly fall asleep at a predetermined bedtime goal.^{62,63} Parents, and sometimes their children, participate in these therapeutic interventions via phone or in-person (individually or in groups) with psychologists/psychology trainees or paraprofessionals.^{58–62,64} In psychiatric populations, sleep interventions for school-aged children are often coupled with CBT strategies for anxiety or depression,^{59–61} parenting strategies,^{60,61} and/or application of behavior management training to children’s sleep problems.⁶⁵

Similarly for adolescents with insomnia, behavioral therapies including CBT-I are the most commonly employed modalities. Behavioral therapy is delivered directly to the teen in individual or group formats, is typically implemented by clinical psychologists or other health care providers,^{46–48,50,66–74} and may include supplementary treatments such as bright light therapy for adolescents with delayed sleep phase,^{48,66} or for psychiatric populations, be combined with other CBT treatments, such as those for depression.⁷⁵ Briefer behavioral therapies focused on sleep hygiene and/or gradual sleep extension have also been implemented with adolescents with problematic sleep.^{45,76,77} Notably, several behavioral

therapies for adolescents have utilized internet, text messaging, or telephone formats.
45,47,69,76,78,79

Common Components of Treatment.—Sleep education and sleep hygiene techniques are the most prevalent components of behavioral sleep interventions, irrespective of modality. Sleep education emphasizes the importance of obtaining sufficient sleep to support health, cognition, and achievement and provides recommended sleep guidelines. Sleep hygiene is a set of practices intended to support optimal sleep health, such as ensuring a dark, quiet sleeping environment.^{13–16} Among school-aged children, behavioral principles addressing common sleep complaints for this age group may be included (e.g., strategies for reducing bedtime resistance, co-sleeping, night waking, and early rising). Notably, when parent-targeted interventions include specific behavioral strategies—rather than just a presentation of general behavioral principles—these programs are typically tailored to the specific child/family, including use of comprehensive sleep assessments,^{29,31,35,36,38} individualized sleep management plans,^{31,33,35,36} and monitoring tools, such as sleep diaries^{29–31,35,36,38} or actigraphy.^{30,38} For adolescents, who exhibit frequent smartphone/electronics use and tend to sleep later/longer on weekends compared to weekdays, stabilizing bed- and wake-times and limiting pre-sleep electronics and substance use (e.g., caffeine, nicotine) are particularly critical aspects of sleep hygiene.⁴⁰

Therapies for clinical insomnia, such as CBT-I, incorporate these techniques in addition to specific behavioral interventions (e.g., goal-setting, stimulus control, bedtime fading, graduated extinction, sleep restriction) and cognitive restructuring.^{46–48,50,58–62,66–75} Among school-aged children, behavioral therapy may also address parent and child anxiety about sleep/bedtime (e.g., relaxation, positive self-instructions, nightmare rescripting) and parenting (e.g., effective instructions, differential attention, token economy).^{58–62} Given that adolescents often express ambivalence regarding alterations to sleep behavior,⁵³ such as reducing pre-sleep electronics use,⁷⁸ motivational interviewing techniques may be useful for supporting adoption of new sleep behaviors in this age group.^{41,52} Additional techniques, including mindfulness,^{66–68,71–73} hypnotherapy,^{46,60} and adjunct bright light therapy^{36,48,66} or melatonin,⁵⁸ may also be useful for youth with insomnia. See Table 1.

For more details about implementation of the above strategies, please see behavioral sleep manuals and resource texts targeting insomnia and sleep disturbances. See Table 2.

Clinical Outcomes for Sleep Health.—Behavioral interventions have a positive impact on sleep health in childhood and adolescence, although the magnitude of the effect has differed across mode of delivery, treatment content, and target population (general versus clinical). Among school-aged children, educational interventions have demonstrated improvements in daytime sleepiness,³⁴ earlier bedtimes,^{26,34} sleep duration,^{26,28,34} nighttime awakenings,²⁶ sleep-onset latency,³⁴ and bedtime resistance;²⁶ however, they are more likely to be effective if they are delivered by an individual rather solely through printed materials.^{27,28} When interventions expand upon education to include specific behavioral strategies, sleep outcomes also improve in this age group. Interventions that utilize individualized approaches tailored to the child/family (e.g., sleep assessments, sleep plans, sleep diaries) demonstrate both immediate and long-term (e.g., 3–6 month post-treatment)

improvements in sleep duration,^{29,35,38} nighttime awakenings,²⁹ sleep-onset latency,^{29,35,38} earlier bedtimes,³⁸ bedtime resistance,³⁸ sleep anxiety,³⁸ sleeping in own bed,³⁸ and overall sleep problems.^{31–33,36,37} Interestingly, sleep problems sometimes worsened before improving in the long-term.³⁷

Among adolescents, school-based interventions employing education and hygiene techniques improve sleep knowledge,^{49,52,53,55,57} self-efficacy⁴³ and motivation⁵² to modify sleep behaviors, sleep practices (e.g., reducing pre-sleep electronics/caffeine use, earlier bedtimes),^{40,43,57,78} and sleep health (e.g., duration, time in bed, sleep-onset latency, and regularity of bed/wake-times).^{43,44,54,57,78,79} One study showed that typical trends occurring in adolescence, including shifts toward shorter duration and later bed/wake times, were lessened among adolescents participating in a sleep education program.⁴⁹ It is notable that improvements in sleep knowledge⁵⁵ and self-efficacy in supporting sleep health⁴³ appear to be sustained over several months follow-up. However, the impact of behavioral interventions on sleep habits and duration is not consistently shown in the general adolescent population.^{42,52,53,56} Specifically, effects appear to be stronger with longer-term interventions, such as those with booster sessions across the school year⁴³ than for briefer (e.g., 1 session) treatments,⁴⁰ and for adolescents with greater sleep difficulties (e.g., delays in sleep timing⁵³) than those who already have good sleep habits.⁵¹

Behavioral therapies, such as CBT-I, frequently demonstrate improvements in school-aged children's sleep health, including sleep duration,^{58,60–62,64} sleep efficiency,^{59–61} nighttime awakenings,^{58–62,64,65} sleep-onset latency,^{58–60,62} sleep anxiety,^{60,64,65} sleeping in own bed,^{61,65} and consistent bedtimes⁶¹ and waketimes.^{61,64} These positive outcomes may be sustained up to 12 months after treatment⁶⁰ and may improve when combined with melatonin (e.g., greater improvements in sleep efficiency and sleep onset latency).⁵⁸

Among adolescents with problematic sleep, brief behavioral interventions focused on sleep hygiene and/or gradual sleep extension have been shown to increase sleep duration and time in bed; improve sleep hygiene (e.g., earlier bedtimes, reduced time in bed before/after sleeping) and subjective sleep quality; stabilize sleep-wake rhythms; and reduce insomnia symptoms, sleep disturbances, and daytime sleepiness,^{45,76,77} with one study showing sustained improvements at 20-week follow up.⁴⁵ Behavioral therapies, such as CBT-I, have been shown to shorten sleep latency; reduce nocturnal awakenings and insomnia symptoms; and increase sleep efficiency, duration, regularity, and perceptions of sleep quality/feeling rested among adolescents with insomnia,^{46,50,66,68–71,73–75} and there is evidence for efficacy using digital/telephone formats.^{47,69} In addition, CBT-I may be superior to sleep hygiene techniques alone for improving sleep health in clinical samples,⁷⁵ and one study has shown sustained improvements in sleep 6 – 12 months after treatment completion.⁴⁷ Finally, another study demonstrated that combining CBT-I with bright light therapy resulted in earlier bed- and wake-times, reduced latency and awakenings, longer sleep time, and reduced sleepiness and fatigue for adolescents with delayed sleep phase, with gains maintained 6 months later.⁴⁸

Application to Psychiatric Populations.—Sleep problems are associated with a variety of emotional and behavioral issues. Among school-aged children, programs that

introduced specific behavioral strategies, including behavioral therapy (e.g., CBT-I), have sought to characterize the impact of these interventions on parent and child well-being. Specifically, studies have found a positive impact on parent^{32,33} and child^{30,59,62} internalizing symptoms (e.g., anxiety, depression), child externalizing problems,⁶² parent^{32,61} and child^{30,32,35,64} quality of life, child emotional functioning,³⁵ and child social functioning.^{35,64} Additionally, several studies found a reduction in specific psychiatric symptoms of ADHD (e.g., inattention, hyperactivity)^{30,31,35,37,61,62} and ASD.^{30,38,61} Often, this was due to the study sample testing these behavioral sleep interventions for these specific or other psychiatric populations (e.g., neurodevelopmental disorders,^{29,36,37,65} disruptive behavior disorders^{32,62}). Overall, of the studies evaluating the effect of behavioral interventions on emotional and behavioral well-being, many did not investigate^{30,37,38,62,64} or reported null findings^{32,61} with regards to sustained psychiatric improvement in the long-term.

Among adolescents, studies have similarly sought to understand the potential downstream impact of behavioral sleep interventions on psychiatric and psychosocial functioning. In the general adolescent population, school-based sleep interventions have been associated with decreased externalizing (e.g., conduct, hyperactivity)⁴⁹ and internalizing (e.g., depressive) symptoms and improved academic performance,⁴³ however, improvements in mental health are not consistently found,⁵³ particularly for very short-term interventions (e.g., 1 session of sleep education) or among adolescents who already report good overall sleep habits.⁵¹ Behavioral therapies have a more consistent positive impact on psychiatric health. Brief behavioral therapies and/or CBT-I have been associated with reduced stress, anxiety, rumination, and depression; improved coping; and overall emotional well-being among adolescents,^{46,50,66,68,70,71,73–77} and one study showed that improvements in social, attentional, and aggressive behaviors resulting from CBT-I combined with mindfulness training were mediated by improvements in self-reported sleep quality.⁶⁷ Regarding substance use, behavioral therapy including mindfulness reduced substance abuse and improved self-efficacy about substance use with gains maintained 12 months later.^{66,71} Finally, initial evidence suggests CBT-I may be effective in reducing paranoia and hallucinations among adolescents at ultra-high risk for psychosis.⁷⁴

Given the prevalence and complexity of sleep problems in youth experiencing psychiatric symptoms, there has been recent interest in the development of a *transdiagnostic* intervention designed to flexibly treat the range of sleep problems experienced by this population. The Transdiagnostic Sleep and Circadian Intervention (TranS-C) involves a combination of CBT-I, delayed sleep phase treatment strategies, and Interpersonal and Social Rhythms Therapy (IPSRT) to treat sleep disturbances in youth with psychiatric diagnoses.⁸⁹ The TranS-C program consists of a total of 12 modules, four that define treatment goals and rationale (e.g., functional analysis, sleep/circadian education, motivational interviewing, goal setting), four “core” modules that correct unhealthy sleep habits (e.g., irregular sleep-wake times, difficulty winding down, difficulty waking up) and prevent relapse, and four optional modules targeting specific sleep disturbances (e.g. poor sleep efficiency, too much time in bed, delayed phase, sleep-related worry).

Results from an initial randomized controlled trial (RCT) indicated that TranS-C improved self-reported sleep and reduced daytime sleepiness and weekend-weeknight sleep variability in youth at risk for emotional, behavioral, social, cognitive, and/or physical health problems.⁹⁰ In addition, youth participating in TranS-C evidenced significant improvements in parent-reported cognitive health, thought problems, and rule-breaking compared to an educational control condition. Youth receiving TranS-C also displayed significantly reduced depression following treatment; however, this improvement was not significantly different from gains observed from the control intervention. Given the novelty of the TranS-C intervention, more studies are needed to determine the efficacy of this approach in treating sleep disturbances in youth with psychiatric symptoms. See Table 3.

Discussion

Summary

Sleep disturbances are common among children and adolescents and have a detrimental impact on their psychiatric health, suggesting a strong need for effective treatments in this population. Behavioral sleep interventions span several modes of delivery (educational versus behavioral, in person versus digital), include a range of components depending on the severity of the sleep complaint, and are associated with improved sleep knowledge, behavior, and health in youth. In addition, these treatments may benefit children with neurodevelopmental and psychiatric disorders, a group at particular risk for sleep complaints.

Limitations and Future Directions

Although behavioral interventions are associated with improved sleep and psychiatric health in youth, there are several important caveats to consider. First, many interventions have been implemented with generally Caucasian/White samples, and their efficacy among children and adolescents from diverse racial/ethnic and socioeconomic backgrounds is largely unknown. Indeed, in one study utilizing a text-messaging format to set individualized bedtime goals, sleep duration increased, but only for non-Hispanic White adolescents and not for racial/ethnic minorities.⁷⁹ Given documented sleep disparities across demographic groups of youth,⁹¹ tailored interventions with proven efficacy in minority groups are sorely needed.

Second, it is notable that the body of literature supporting behavioral sleep interventions in youth is relatively young, and there is a need for more studies utilizing high quality study designs¹⁴ and RCT formats.¹⁶ In addition, insomnia and related sleep problems are multifaceted clinical constructs, and a recent meta-analysis suggested that behavioral therapies, such as CBT-I, may be more effective for treating some symptoms of insomnia, including sleep-onset latency and sleep efficiency, than others, such as sleep duration and night awakenings.¹⁵ Future replication studies using high quality RCT designs are necessary to further affirm efficacy of behavioral sleep interventions in youth and to determine which aspects of insomnia may be best targeted by such treatments.

Third, relatively few studies of behavioral sleep interventions have evaluated the long-term impact on sustaining improvement in sleep health and related psychiatric symptoms, and as noted above, some have found null findings. Thus, additional research is needed to determine the effectiveness of sleep treatments in the long term, and which intervention components may be most important for sustaining treatment gains over time. For example, interventions that tailor the treatment to the individual child/adolescent, combine education with behavioral strategies, and include booster sessions may be more effective in the long term, and future studies should clarify the relative efficacy of these and other mechanisms in supporting sustained sleep and psychiatric health.

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Key Points

- Pediatric sleep disturbances are common yet rarely adequately treated.
- Behavioral sleep interventions impact many facets of children's sleep, including duration, efficiency, latency, and regularity.
- Behavioral sleep interventions may have downstream impacts on psychiatric health among youth, including inattention/hyperactivity, depression, and anxiety. Journal Pre-proof
- Future research is needed to clarify the long-term efficacy of behavioral sleep interventions as well as their efficacy across demographic groups of youth.

Synopsis

Insomnia and related sleep disturbances are prevalent among youth and are associated with adverse consequences, including poorer psychiatric functioning. Behavioral sleep interventions, ranging from brief educational interventions to behavioral therapies (cognitive-behavioral therapy-insomnia; CBT-I), are associated with positive outcomes for pediatric sleep health. Additionally, sleep interventions may improve psychiatric health for children and adolescents with neurodevelopmental and internalizing disorders. Additional research is necessary to clarify the efficacy of these interventions over the long term and across demographic groups; however, evidence to date suggests incorporating behavioral sleep strategies may prove beneficial to pediatric patients with sleep disturbances and related psychiatric complaints.

Clinics Care Points

- Comprehensive sleep evaluations, including parent and child report, identify specific sleep problems and can be used to individualize treatment targets.
- Sleep education may improve sleep health of youth; however, adding behavioral strategies to education is likely to further enhance outcomes.
- Tailoring behavioral techniques to the child/family is important to support development of new sleep behaviors.
- Consideration of developmental stage is essential, such as including a parent in treatment of school-aged children and reducing caffeine/electronics use among adolescents.
- For insomnia, CBT-I is clinically indicated and supplemental strategies, such as motivational interviewing, mindfulness, and bright light therapy, may further improve sleep.
- Behavioral sleep interventions are intended to be short-term; evidence suggests even a few sessions targeting sleep behaviors reduces insomnia in youth.

Table 1.

Examples of Behavioral Techniques to Address Insomnia and Sleep Disturbances in Youth

Target	Technique	Examples for Practice
General Sleep Health	Sleep Education	<ul style="list-style-type: none"> Information about sleep (e.g., need, architecture, homeostasis), circadian rhythms, and their interaction Importance of sleep for health, cognition, achievement American Academy of Pediatrics Guidelines: 9–12 hours/night (School-age), 8–10 hours/night (Adolescents)²²
	Sleep Hygiene	<ul style="list-style-type: none"> Set/maintain regular bed- and wake-times Set/maintain regular bedtime routine Avoid stimulating play, electronics 1 hour before bed Eliminate napping Ensure dark/quiet sleep environment Exercise daily, but avoid exercise close to bedtime For children, ensure child falls asleep in own bed For adolescents, eliminate caffeine, nicotine, and alcohol, particularly in evenings
	Goal Setting/ Tracking	<ul style="list-style-type: none"> Set specific goal (e.g., 10 pm bedtime each day) Tailor to personal sleep need and circadian preference, as appropriate Monitor adherence to goal using sleep logs
	Motivational Interviewing	<ul style="list-style-type: none"> Assess ambivalence about changing sleep behaviors Explore pros/cons Experiment with changing a sleep behavior Explore consequences
	Sleep Extension (Adolescents)	<ul style="list-style-type: none"> Assess current sleep schedule using sleep logs Advance bedtime 5 minutes per night until desired sleep length is achieved
Clinical Sleep Complaints (e.g., Insomnia)	Stimulus Control	<ul style="list-style-type: none"> Increase association between the bed and sleep; reduce association between bed and other activities Use bed only for sleeping If cannot sleep, leave bed for 15 minutes and engage in calming activity in a different space Return to bed when sleepy
	Sleep Restriction (Adolescents)	<ul style="list-style-type: none"> Assess amount of actual sleep occurring each night using sleep logs (e.g., 6 hours of sleeping during 9 hours of time in bed) Restrict time in bed to equal current sleep amount (e.g., 6 hours), typically by going to bed later Monitor using sleep logs until 85% of time in bed is spent asleep (sleep efficiency = 85%) Gradually advance sleep time until desired sleep length is met while maintaining sleep efficiency
	Bedtime Fading (Children)	<ul style="list-style-type: none"> Assess current sleep schedule using sleep diaries Determine bedtime based on when child will likely fall asleep within 15 minutes Set bedtime earlier after several successful nights until reaching the desired bedtime

Target	Technique	Examples for Practice
		<ul style="list-style-type: none"> Avoid sleeping outside prescribed times
	Graduated Extension (Children)	<ul style="list-style-type: none"> For children sleeping with parents, gradually separate parent from child (e.g., move parent from bed to sitting next to bed, next to door, outside door, etc.)
	Parenting/ Behavioral Management Training (Children)	<ul style="list-style-type: none"> Positive attention Differential attention Effective instructions Token economy system
	Relaxation	<ul style="list-style-type: none"> Progressive relaxation techniques (e.g., body scan) Deep breathing techniques
	Cognitive Restructuring	<ul style="list-style-type: none"> Recognize emotions associated with sleep (e.g., anxiety) Identify sleep-interfering thoughts (e.g., "If I don't fall asleep soon, I won't do well at school tomorrow!") Assess evidence for/against thought Replace with coping thought (e.g., "Sleep will happen when it needs to happen.") Nightmare rescripting (e.g., change anxiety-provoking elements of nightmare, rehearse altered dream script while awake)
	Mindfulness	<ul style="list-style-type: none"> Short meditation practices (e.g., 3-minute breathing space)

Note: strategies included in the table are consolidated from studies included in this review.

Table 2.

Examples of Behavioral Sleep Intervention Manuals and Resource

Audience	Authors	Title
Pediatrics	Mindell, J. A. & Owens, J. A. (2015)	<i>A Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems</i> (3rd edition) ⁸⁰
	Meltzer, L. & Crabtree, V. (2015)	<i>Pediatric Sleep Problems: A Clinician's Guide to Behavioral Interventions</i> (1st edition) ⁸¹
Adolescents *	Edinger, J. D. & Carney, C. E. (2014)	<i>Overcoming Insomnia: A Cognitive-Behavioral Therapy Approach, Therapist Guide</i> (2 nd edition) ⁸²
	Perlis, M. L., Jungquist, C., Smith, M. T., & Posner, D. (2005)	<i>Cognitive Behavioral Treatment of Insomnia: A Session-by-Session Guide</i> (1st edition) ⁸³
	Manber, R. & Carney, C. E. (2015)	<i>Treatment Plans and Interventions for Insomnia: A Case Formulation Approach</i> (1st edition) ⁸⁴
	Morin, C. M. & Espie, C. A. (2003)	<i>Insomnia: A Clinical Guide to Assessment and Treatment</i> (2004 edition) ⁸⁵
	Harvey, A. G. & Buysse, D. J. (2017)	<i>Treating Sleep Problems: A Transdiagnostic Approach</i> (1st edition) ⁸⁶
All Ages	Attarian, H. P. (Editor) (2016)	<i>Clinical Handbook of Insomnia</i> (3rd edition) ⁸⁷
	Chopra, A., Das, P., & Doghramji, K. (Editors) (2020)	<i>Management of Sleep Disorders in Psychiatry</i> ⁸⁸

* With the exception of Harvey & Buysse, 2017, CBT-I manuals have been developed for use with adults. However, strategies may be implemented with adolescents.

Table 3.

Examples of Behavioral Sleep Interventions Targeting Psychiatric Symptoms in Youth

Intervention Title	Intervention Elements	Impact on Psychiatric Symptoms
ASD		
Parent-Based Sleep Education ³⁰	Sleep Education	Reduced inattention, withdrawal, repetitive behaviors
Parent-Based Sleep Education Workshops ³⁸	Sleep Education	Reduced hyperactivity, self-stimulatory behavior
CBT-I ⁶¹	Parent/Child CBT-I	Reduced irritability, lethargy, stereotypy, hyperactivity, inappropriate speech
Sleepwise ³⁶ *	Sleep Education, Goal Setting/Tracking	No significant changes
ADHD		
Sleeping Sound with ADHD ^{31,32,35} **	Sleep Education, Hygiene	Reduced ADHD severity, inattention, emotional and behavioral difficulties
Better Nights/Better Days ⁶²	Sleep Education, Sleep Hygiene, Faded Bedtime with Response Cost and Positive Reinforcement	Reduced internalizing and externalizing behaviors
Sleep Training ⁶⁴	Sleep Hygiene, Positive Reinforcement	Improved prosocial behavior, social acceptance, emotions
Anxiety/Depression		
Sleep SENSE (Sleep and Education: learning New Skills Early) ^{67,72,73}	CBT-I, Motivational Interviewing, Mindfulness	Reduced social problems, attention problems, aggressive behaviors, anxiety
CBT-I + CBT for Depression ⁷⁵	CBT (Insomnia and Depression)	No significant differences in depression diagnosis recovery between conditions, though more participants in the treatment condition recovered at follow-up
Sleep Extension and Sleep Hygiene Combined Intervention ⁷⁶	Sleep Extension, Sleep Hygiene	Reduced depression
Substance Abuse		
Multicomponent Small Group Treatment ^{66,71}	Stimulus Control, Bright Light Therapy, Sleep Hygiene, Sleep Education, Cognitive Therapy, and Mindfulness-Based Stress Reduction	Improved mental health, reduced emotional distress, decreased substance use at 12-month follow-up
Psychosis		
SleepWell ⁷⁴	CBT-I	Reduced depression, anxiety, stress, paranoia, hallucinations, improved wellbeing, social functioning
Transdiagnostic		
TransS-C ⁹⁰	CBT-I, Delayed Sleep Phase Treatment, IPSRT	Improved cognitive health and reduced thought problems and rule-breaking compared to educational control condition, reduced depression but reduction comparable to the control intervention

* Study focused on developmental disabilities, but the majority of participants had ASD

** Study focused on comorbid ADHD and ASD