Behavior Interventions to Address Sleep Disorders

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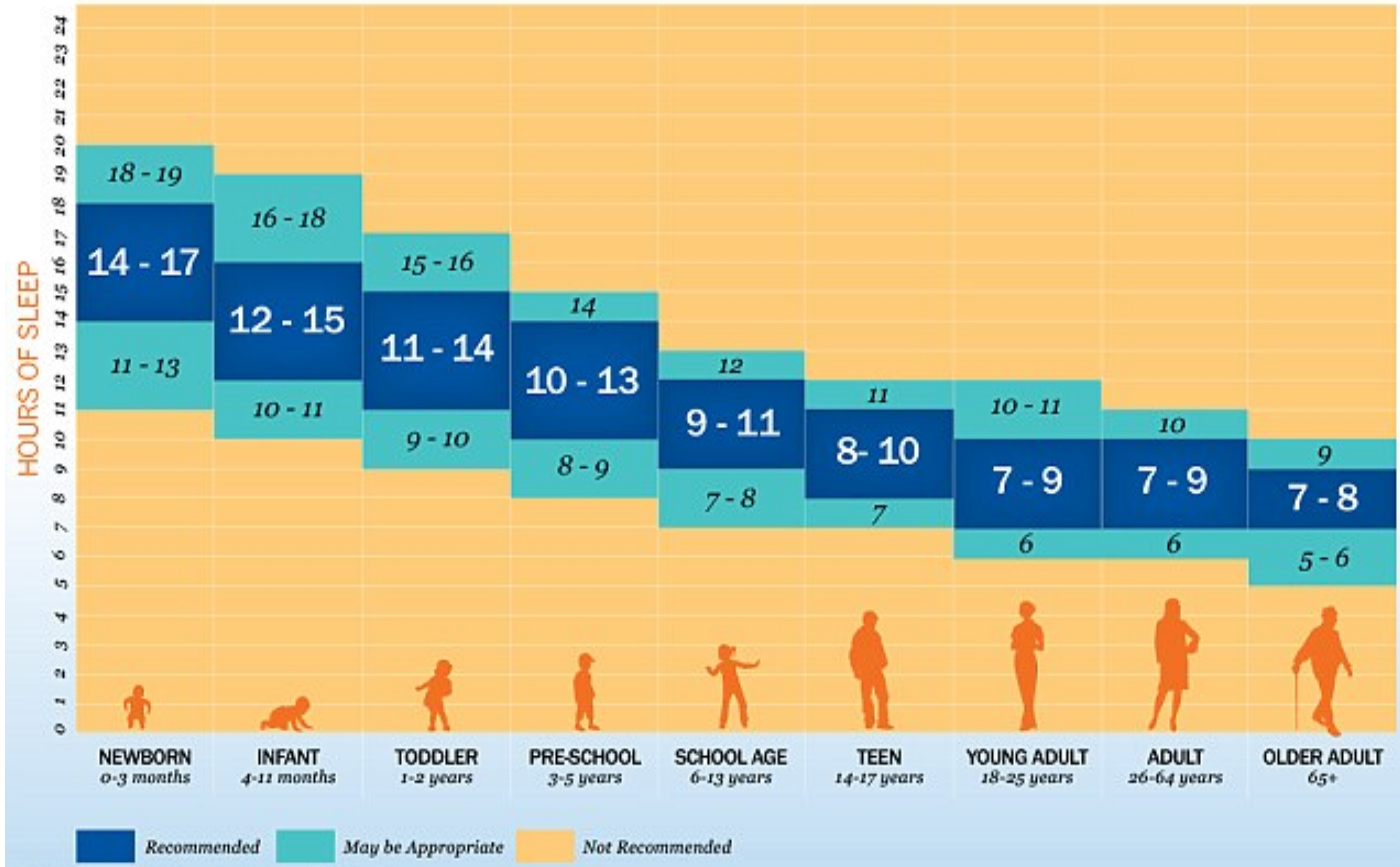
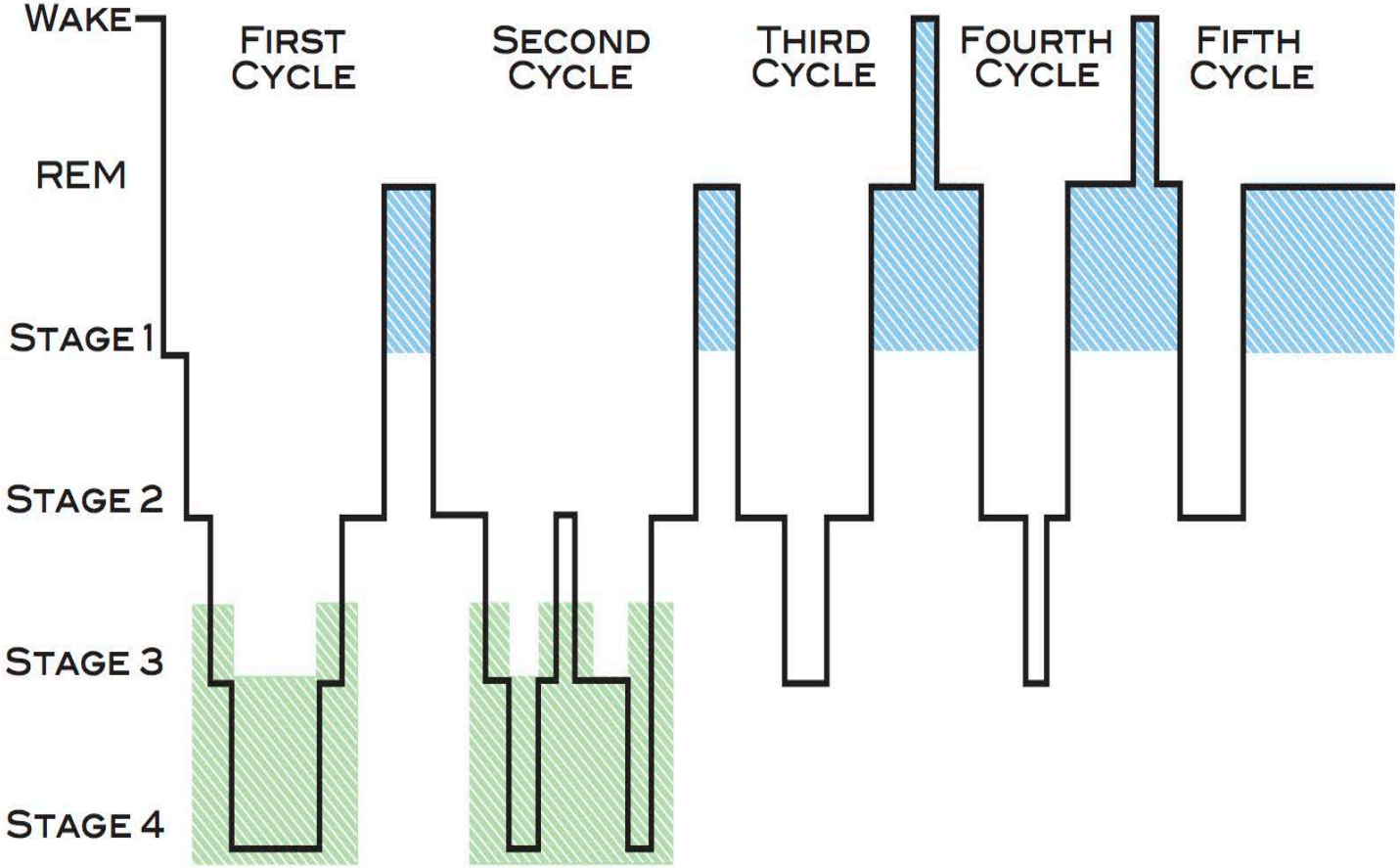
Prevalence of Sleep Disorders

- Over 25% of the population indicated they do not obtain enough sleep and 10% reported chronic insomnia.
- Individuals with intellectual and developmental disabilities (IDD) and Autism Spectrum Disorder (ASD) were noted to have a higher rate of sleep disorders in some studies.
- Sleep disorders can impact daily functioning and quality of life and may also be associated with increased behavior problems.
- Sleep requirements vary between individuals and typically decreases with age.

SLEEP DURATION RECOMMENDATIONS



Sleep Stages



Deep Sleep {SWS}
Physical Recovery

Dreaming {REM}
Mental Recovery

Types of Sleep Disorders

- Insomnia (i.e., difficulty falling asleep, waking up in the middle of the night, and waking up early and not going back to sleep, most prevalent sleep problem),
- hypersomnia (excessive sleepiness), narcolepsy,
- circadian rhythm disorders,
- breathing-related disorders (e.g., sleep apnea),
- and disorders of arousal from sleep, e.g., restless leg syndrome, leg cramps, body rocking, head banging, nocturnal enuresis, bruxism, snoring, sleep walking, night terrors, and nightmares.

Disorders Related to Factors

- Intrinsic disorders are caused by internal factors within the body. For example, sleep apnea, narcolepsy, and restless leg syndrome.
- Extrinsic sleep disorders are impacted by factors outside the body, such as, the environmental lighting, noise, or temperature.
- Circadian rhythm sleep disorders are related to the daily 24-hour sleep-wake cycle and can be impacted by time change, shift work, and sensory impairments.

Factor Associated with Sleep Disorders

- Breathing-related disorders (e.g., sleep apnea), sensory impairment, medical conditions (e.g., seizures, chronic pain), psychiatric disorders (e.g., mood, depression, and anxiety), and nocturnal urinary incontinence have associated with sleep problems.
- Other variables include age, disability, residential placement, daytime behavior problems, caffeine intake, maintaining reinforcing consequences, and medications.
- Trouble sleeping has also been linked genetic disorders, such as Angelman syndrome, Down syndrome, fragile X syndrome, Prader-Willi syndrome, and Smith–Magenis syndrome (Didden et al., 2014; Wiggs, 2012).

Factors Impacting Sleep in Adults

- Psychiatric disorders and prescription of psychotropic medication.
- Behavior problems were linked with early morning wakening, broken sleep, and significant sleep problems.
- Diagnosis of severe IDD and those with digestive and respiratory disorders were more likely to have issues with initial insomnia, broken sleep, and significant sleep problems.
- Epilepsy, prescription of antiepileptic mediations, and use of analgesics were correlated with broken sleep.
- Visual impairments were associated with initial insomnia.
- Boyle et al. (2010)

Assessment of Sleep Disorders

- Sleep can be assessed by indirect measures such as interviews, checklists, and questionnaires conducted with caregivers, sleep diaries, sleep log, sleep journal, and direct behavioral observation by caregivers of sleep during interval recordings.
- Sleep can also be monitored by an EEG, devices that monitor motor movements (fitbit), CPAP usage recording, infrared nighttime videos, and recorded during a sleep study (polysomnography).
- The Sleep Assessment and Treatment Tool (SATT, Jin et al., 2013) can be used to conduct a functional behavior assessment (FBA) of sleep disturbances.

Sleep Journal

Directions: Over the next several days you will be keeping a journal/log of your sleep cycles. Be sure to be thorough, as you will need this information to complete the analysis at the end.

Date:					
Went to sleep at:					
Woke up at:					
Total sleep time:					
What were you doing/thinking before you went to bed:					
Number of times you woke up before morning:					
How did you feel when you woke up?					
Do you remember dreaming?					
What was your dream about?					
How alert were you during the day?					
Did you take a nap today?					
How long?					

Daily Alertness Scale

1. Very alert, wide awake 2. Mostly alert, but relaxed 3. Foggy, relaxed, but still functioning 4. Fatigued, tired 5. Practically asleep

Sleep Assessment &Treatment Tool (SATT, Jin et al., 2013)

- It consists of open-ended questions regarding history of sleep problems displayed (delayed sleep onset, night awakenings, and early awakenings), behaviors that interfere with sleep, current sleep schedule, bedtime routines, sleep dependencies, desired behavioral outcomes after treatment, and sleep goals.
- Jin et al. (2013) monitored sleep onset delay, sleep-interfering behaviors, and duration of night waking with infrared nighttime video and sleep diaries recorded by parents. Effective treatment packages contained interventions based on the function of behavior interfering with sleep.

FBA to Behavior Intervention

- If sleep problems are reinforced by caregiver attention and access to preferred reinforcers such as watching television or playing video games, extinction procedures involving withdrawal of attention and tangibles can be employed.
- If disruptive behaviors serve as a means to escape going to bed, escape-extinction techniques can be utilized.

Preventative Procedures

- Based on the sleep assessment, response prevention techniques to promote nighttime sleep may include:
- Positive Bedtime Routines
- Relaxation training
- Scheduling Optimal Sleep Time
- Stimulus Control
- Sleep Hygiene
- Hylkema and Vlaskamp (2009) had 34 participants. They implemented sleep scheduling based on age, changed daytime routines, and increased physical activities during the day. Sleep efficiency improved with less time spent in bed and more time sleeping while in the bed.

Positive Bedtime Routines (PBR)

- During PBR parents proceed through 4 to 6 calming activities with the child on a consistent basis every night prior to bedtime. Regular routines may include calm bath, small snack, favorite blanket, quiet music, gentle rocking, and bedtime story.
- Each activity is followed by praise and this sets the occasion for the next behavioral interaction in the chain such as bath time, brushing teeth, reading a story, hugs and kisses, and then lights out when they leave the bedroom.
- Often PBR is coupled with bedtime fading/sleep restriction (Christodulu & Durand, 2004).
- Vriend, Corkum, Moon, & Smith (2011) considered PRB to be a promising behavioral techniques for children with ASD.

Relaxation Training

- Relaxation techniques can be used to address insomnia related to problems relaxing.
- Teaching the difference between tense and relaxed muscles can help with relaxation and can be a part of the bedtime routine.
- To address delay sleep phase syndrome in two adults, Gunning and Espie (2003) used a modified progressive muscle relaxation technique.
- Use of the relaxation program decreased sleep onset latency and treatment effects were maintained up to 50 weeks based on follow-up.

Scheduling Optimal Sleep Time

- Optimal sleep scheduling involves consolidating sleep by adjusting the time in the bed to the estimated sleep duration. It is used to help improve sleep efficiency and to reduce daytime napping, insomnia, and sleep-wake cycle problems.
- Daytime sleeping and time spent not sleeping in bed are decreased. Restriction of sleep to the bed.
- The time spent in bed is gradually increased to an optimal level in which sleep occurs.
- Times for sleeping at night and waking in the morning are set and specified. Sleep scheduling needs to be consistent with less than an hour variation between week and weekend wake-up and bedtimes.
- Hylkema and Vlaskamp (2009) effectively used sleep scheduling corresponding to the participant's age in 15 cases.

Stimulus Control

- Stimulus control involves increases in cues associated with sleeping only in the bed, reducing sleeping outside the bed, decreasing cues to remain awake in bed, and promotes stimuli being associated with staying awake outside the bed.
- A "15-minute rule" can be used, in that, if within 15 minutes of going to bed, the person is not asleep then it is best to get out of bed and return when sleepy.
- Stimulus control techniques are used to address insomnia and lying in bed awake for long durations of time (Gunning and Espie, 2003).

Sleep Hygiene

- Sleep hygiene is typically identified as the "first line of treatment" (Jan et al., 2008).
- Sleep hygiene can be separated into different categories including environmental, sleep practices, scheduling, and physiologic.
- Environmental factors that can affect sleep include noise, lighting, temperature, comfort, and safety.
- Decrease bright lights or loud noise, ensure approximate temperature, comfortable bed, scheduled regular sleep times, and set bedtime routines and practices.
- Since high-contrast objects and bright colors may stimulate alertness, these may need to be avoided in the bedroom.

Sleep Hygiene

- It is important to assess individual behavioral needs prior to intervention. Ideally the bedroom should be dark, but a night light may be helpful for children who express fear of darkness and for older adults who frequently use the restroom at night.
- A comfortable bed with preferred bedding may help promote sleep. Some children with ASD show a preference for weighted blankets (Gringras et al., 2014).
- Sleep position with the head of the bed elevated can be important especially if the child suffers from esophageal reflux.
- Regular sleep and wake times should be scheduled with children.
- Structure meals, activities, and set daily routines help circadian rhythms by acting as time cues (Jan et al., 2008).

Sleep Hygiene

- Physiologic factors to enhance sleep include providing a light snack, limiting caffeinated beverages, and avoiding strenuous physical exercise before bedtime; however, empirical research has not been conducted to prove these factors are correlated with sleep disorders with children.
- For parents or caregivers who have difficulty sleeping because they frequently get up to check on their children, a Webcam may be helpful.
- To cope with lack of sleep, parents may co-sleep with children to reduce sleep deprivation, but this practice may be underreported due to the negative stigma associated with it. Since sleep problems can affect the entire family, the caregivers' and parents' needs should be considered (Jan et al., 2008).

Behavior Interventions

- Behavior interventions to address sleep problems can include a multicomponent treatment package involving preventative procedures previously described with other techniques (e.g., bedtime fading, graduated extinction, extinction, scheduled awakenings, and positive reinforcement).
- Behavior plans including a functional assessment of the sleep problem, tailored with a choice of extinction, graduated extinction, stimulus control, and positive reinforcement, reduced settling and waking problems in children with IDD. Wiggs & Stores (2001)
- Cognitive behavior therapy, light therapy, white noise, and melatonin have also been successively utilized to improve sleep.

Bedtime Fading

- A sleep diary can be used to determine the time a person typically falls asleep. Set a bedtime that the person is most likely to fall asleep (e.g. 1:30 am), then add 30 minutes (e.g., 2:00 am – new bedtime).
- If the person falls asleep within 15 min. for a couple of nights, reduce the time by 15 min. The new bedtime would be 1:45 am. If the person does not fall asleep, extend the time.
- Continue fading the bedtime until the desired bedtime is obtained.
- This process can take several weeks and requires someone to remain awake, but fewer behavior problems are noted.
- Piazza, Hagopian, Hughes, and Fisher (1998) systematically delayed the bedtime for an 8-year-old child with IDD while maintaining a regular schedule during waking hours.

Faded Bedtime with Response Cost

- Piazza and Fisher (1991) effectively used a faded bedtime with response cost procedure to treat sleep problems for children with IDD. They collected sleep data on a 30-minute momentary time-sampling procedure.
- Baseline data were collected to determine the bedtime at which sleep was most likely (e.g., subtracted 30 minutes from average baseline sleep onset time).
- Bedtime was faded by 30 minutes dependent of the previous night sleep onset latency.
- If sleep did not occur within 15 minutes of bedtime, the child was removed from the bed for an hour and kept awake then returned to the bed.

Graduated Extinction Procedure

- Develop a bedtime routine and set a bedtime.
- Select a night to start the plan (may prefer Friday night) and establish how long you can wait before checking on the child who may engage in behavior problems (e.g., crying).
- If you decided to check on the child every 2 minutes, put to bed and leave the room, then wait 2 min before checking on a child crying.
- When checking, minimal interaction, tell him or her to go to bed then leave. Wait 2 min. before checking on the child and continue until the child goes to sleep.
- The next time increase the time by 2-3 min. and continue this procedure.
- Typically works within the first week, but can result in behavior problems.
- (Durand, 2014)

Graduated extinction

- Graduated extinction or the Ferber technique differs from typical extinction methods in that a gradual delay, often in 5-minutes-intervals (or shorter), occurs before parents/caregivers check on the child to make sure they are not sick or hurt.
- Then the caregiver leaves the bedroom, no longer attending to the child, and subsequent intervals for checking are increased in 5-minute-intervals (or shorter). This is designed to encourage "self-soothing" by the child; the key to its efficacy is that the parents or caregivers repeatedly enter the child's bedroom and no longer reinforce crying episodes by parental attention (with or without other reinforcers such as food).
- Typically works within the first week, but can result in behavior problems. (Durand, 2014)

Extinction

- Extinction was found to be the only behavioral technique that provided sufficient treatment efficacy to be effective in children with autism that evidenced sleep problems (Schreck, 2001).
- Bedtime routines, stimulus fading, and faded bedtimes were considered promising, but lacking sufficient empirical support.
- Similarly, Mindell, Kuhn, Lewin, Meltzer, and Sadeh (2006) reported extinction to be the most efficacious in their review for typically developing children.
- Caution, however, should be exercised before using extinction because parents have a difficult time carrying out this procedure during response bursts (Rickert & Johnson, 1988).

Scheduled awakenings

- Scheduled awakenings involve waking the child up at a set time prior to an "anticipated event" such as a spontaneous awakening (e.g., due to a night terror).
- With scheduled awakenings, the child is typically consoled and resettles, and this procedure is faded out.
- Johnson and Lerner (1985) showed parental adherence to implementing this procedure impacted treatment effectiveness.
- Durand (2002) successfully employed scheduled awakenings to address sleep terrors in children with ASD.

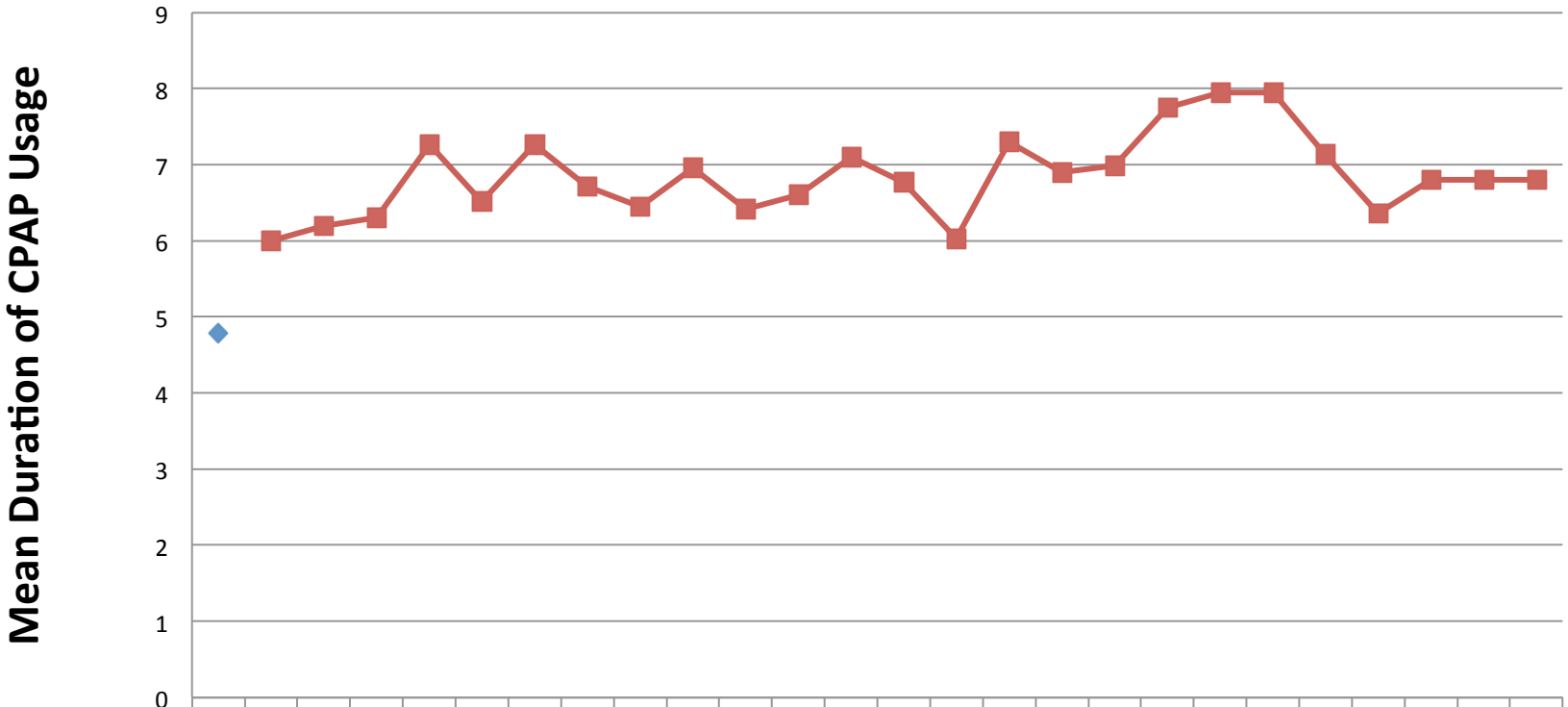
Intervention Techniques for Breathing Related Disorders

- Obstructive Sleep Apnea (OSA) affects an estimated 3 million men and 1.5 million women in the U.S. Untreated OSA is associated with excessive sleepiness, diminished quality of life, as well as cardiovascular disease and stroke.
- Continuous Positive Airway Pressure (CPAP) machines, the first line in treatment for OSA, when paid for by insurance, require a minimum usage of 4 hours per night deemed “CPAP Compliance”.
- The role of the CPAP machine is to prevent apnea or pauses in breathing which could facilitate a more restful sleep.
- When sleep problems are associated with non-adherence to medical treatments (e.g., usage of CPAP) and nighttime routines, positive reinforcement can be effectively employed.

Positive Reinforcement

- *CPAP usage* data were collected nightly as measured by ResScan software.
- During baseline, CPAP usage for one participant was less than 4 hours for 33% of nights and CPAP usage of 4 or more hours for 67% of nights with a mean duration of 4.78 hours.
- Positive reinforcement was implemented contingent hours of CPAP usage. Preferred reinforcers were provided contingent upon 4 or more hours of CPAP usage per night. Instruction on proper CPAP usage was given and demonstrated.
- After treatment was introduced, hours of CPAP usage increased.

Mean Duration of CPAP Usage Across Months



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Baseline	4.78																									
Treatment		6	6.2	6.3	7.26	6.52	7.26	6.71	6.45	6.96	6.42	6.6	7.1	6.77	6.03	7.3	6.9	6.99	7.75	7.95	7.95	7.134	6.36	6.8	6.8	6.8

Cognitive behavior therapy

- Cognitive behavior therapy has been used to address issues that interfere with sleep. Therapy services can be provided to the client or to their caregivers to help with sleep. Bradshaw (1991) used cognitive behavior therapy to help change a nightmare that interfered with sleep to a positive ending.
- Gunning and Espie (2003) employed cognitive techniques to help parents cope with their adult daughter's seizure disorder as part of the treatment to improve their daughter's sleep.
- Willner (2004) used cognitive therapy with an adult who reported having a recurring nightmare. The nightmare was re-scripted and followed by rehearsal with the ending changed. The cognitive therapy procedure used to change the details about the nightmare was shown to be effective.

Light therapy

- Light therapy can be used with circadian rhythm disorders, sleep-wake cycle disturbances, or with sleepiness in the morning and being alert late in the evening.
- It involves exposure to bring lights to facilitate the endogenous melatonin cycle controlling the “body clock.”
- Short and Carpenter (1998), used light therapy to reducing excessive daytime sleepiness and to improve the nighttime sleep pattern with an adult male with visual impairment and profound level of IDD.
- Gunning and Espie (2003) combined light therapy with stimulus control, and sleep hygiene to help address morning sleepiness and to reduce sleep onset latency in an adult female with IDD and delayed sleep phase syndrome.

White Noise

- The continuous white noise masks other sounds that might awaken children in the residence.
- Often continuous monotonous sound (approximations to white noise such as fans or air cleaners) decreases physiological arousal and sets the occasion and maintains sleep.
- It seems to be an easy, yet satisfactory, procedure for parents and caregivers to implement (Johnson, 1991).
- Knight and Johnson (2014) used a package of CRM, PBR, and continuous white noise throughout the night to decrease both bedtime struggles and night wakings in three young children with ASD.

Melatonin

- Melatonin, which is secreted by the pineal gland, plays a role in sleep control.
- In response to darkness, melatonin increases while production and release are suppressed in response to light.
- Synthetic endogenous melatonin is typically taken an hour prior to bedtime and is available in tablet, liquid, and capsule form with sustained and immediate release.
- Braam, Didden, Smits, & Curfs (2008), conducted a study with 51 children and adults with IDD using a randomized placebo-controlled design.
- Melatonin treatment was reported to be successful in decreasing chronic insomnia and associated circadian rhythm sleep disorders.

Social Validity

- Parents and caregivers are mainly responsible to implement behavior intervention techniques addressing sleep problems.
- Parents and caregivers would most likely implement procedures easy to administer with good results.
- Evidence-based practices are more likely to be implemented if they are easy to administer, functional, provide effective results to improve behavior, and are rated favorably by parents and caregivers. Reference: Jin et al. (2013) and Knight and Johnson (2014).

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Thank you

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