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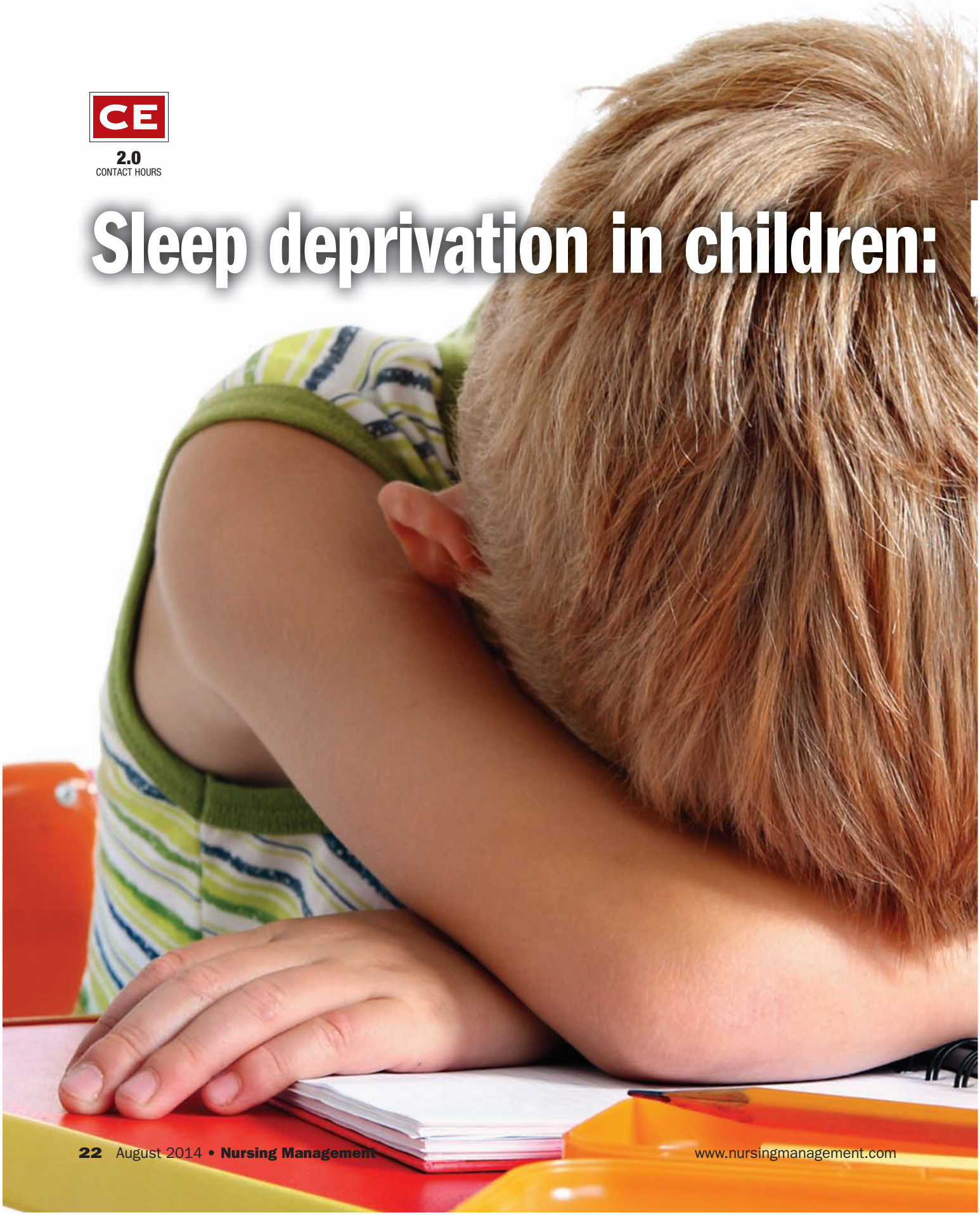
Sleep deprivation in children:



A growing public health concern

By Lois Gerber, MPH, BSN, RN

We live in a sleep-deprived society: The CDC states insufficient sleep is a public health epidemic for both adults and children.[1] Lack of restorative sleep can compromise the physical and emotional health of children and interfere with normal growth and development.[2-4] This article focuses on sleep-deprived children between ages 5 and 18 and discusses the causes, long-term effects on health, signs and symptoms, relevant assessment tools, and appropriate interventions to manage the problem.

In general, children need more sleep than the 7 to 9 hours recommended for adults.[5] Children ages 5 to 10 need 10 to 11 hours of sleep; those ages 10 to 17 require 8.5 to 9.25 hours.[5] Children are getting enough rest if they can fall asleep within 15 to 30 minutes after going to bed, wake up easily at the correct time, and are awake and alert all day without napping.[6] The American Academy of Pediatrics estimates that 10% of children in the United States have a sleep issue. The percentage rises to 50% to 75% in children with mental health and neurologic/developmental disorders.[7]

Obvious signs of sleep deprivation in children are excessive daytime sleepiness, dark circles under the eyes, inattention, and frequent school tardiness and absenteeism.[8] Difficulty getting up in the morning, irritability, hyperactivity, depression, impatience, mood swings, impulse control issues, and aggressive behavior are more subtle indications.[9,10]

Untreated sleep disorders can become chronic, lead to underachievement at school or work, and cause accidents, depression, interpersonal conflicts, and predisposition to or exacerbation of health problems such as obesity and diabetes.[4] Evidence suggests inadequate sleep results in increased snacking and carbohydrate consumption.[8] Research also indicates that rested children contract fewer infections because restorative sleep strengthens the immune system.[11] Inadequate sleep is a contributing factor in the death of adolescents, especially from motor vehicle accidents.[12]

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Physical causes of sleep deprivation

The source of childhood sleep problems can be physical (related either to sleep apnea or chronic illness) or behavioral (related to stress, anxiety, or mood disorders). Often a combination of physical and behavioral issues leads to sleep deprivation, and/or a cause-and-effect relationship exists between sleep deprivation and its causes.[2,13]

A sleep-related breathing disorder called sleep-disordered breathing (SDB) is an abnormal respiratory pattern caused by upper airway obstruction occurring during sleep. It includes apneas, hypopneas, respiratory effort-related arousals, and hypoventilation.[14]

Signs and symptoms of SBD include mouth breathing, snoring, and sleep apnea. It peaks in children ages 2 to 6. Poorly controlled asthma, a high body mass index, and restless legs syndrome can be factors.[15,16]

Obstructive sleep apnea (OSA), the major physical cause of chronic sleep deprivation, is characterized by episodic partial or complete upper airway obstruction, usually from enlarged tonsils and/or adenoids. OSA affects 2% to 5% of infants, children, and teens.[15]

A recent study reports children with SDB are 40% to 100% more likely to develop neurobehavioral problems by age 7, three times more likely to have school grades of C or lower, and seven times more likely to have parent-reported learning problems.[10,17] The most significant behavior change is hyperactivity. Studies correlate childhood SDB with obesity, metabolic syndrome, and the risk of future heart disease, hypertension, and cancer.[2,11]

Low socioeconomic status increases the risk of SDB, partially because of environmental concerns and the high obesity rate in children living in poverty.[11,18,19] Many poor children eat less fresh food and have fewer opportunities for outdoor play and involvement in sports programs.[18,20] They're more likely to be exposed to air pollutants and other environmental toxins that can increase the body's inflammatory response and cause proliferation of the lymphadenoid tissue. Research correlates habitual snoring with SDB and associates it with lower socioeconomic status, severe respiratory problems, and adenotonsillar hypertrophy.[19,21,22] Black children are twice as likely to experience SDB as White children.[8]

Sleep problems in children can also be related to chronic disease. Children diagnosed with painful chronic illnesses, such as rheumatoid arthritis, sickle cell disease, or gastroesophageal reflux, and those with neurologic and psychiatric illnesses, are more likely to have sleep problems not related to sleep apnea.[13] Fifty percent to seventy-five percent of children with neurologic and/or developmental problems experience sleep disruption.[7]

Behavioral and psychiatric factors

Children may become sleep deprived due to emotional factors such as stress, anxiety, and mood disorders.[23] Children with a diagnosis of attention-deficit hyperactivity disorder (ADHD), an autism spectrum disorder, or substance abuse may have impaired sleep cycles.[2] Children who've experienced severe trauma, including physical and sexual abuse, may suffer from posttraumatic stress disorder (PTSD), which puts them at risk for serious sleep problems such as sleep enuresis, sleepwalking, nightmares, and night terrors.[2]

Nocturnal enuresis (recurrent involuntary nighttime voiding in children over age 5) can disturb a child's sleep. Its cause, which can

be either physical (due to renal/urologic abnormality or bladder overactivity) or behavioral, needs to be determined and treated.[24] Some children have a genetic predisposition to nocturnal (sleep) enuresis.[25] Children who've never established urinary continence are considered to have primary enuresis. Secondary enuresis (bedwetting that occurs after an established 6-month period of dryness) is usually related to stress, anxiety, or an undiagnosed medical condition.[2]

Enuresis is treated with behavioral interventions such as enuresis alarms (activated when a sensor placed in undergarments or on a bed pad detects moisture), bladder training, giving rewards for dryness, and limiting evening fluids.[26] The most commonly prescribed medication to treat enuresis is the antidiuretic hormone desmopressin.[2,25]

Sleepwalking usually begins between ages 6 and 12 and affects more boys than girls.[23] It occurs more frequently and is more intense in chronically sleep-deprived kids.[2]

Nightmares, which affect more girls than boys, are common in childhood and occur later in the night during light or rapid eye movement (REM) sleep. Although the child may be scared or upset, the dream is usually remembered and the child can be comforted.[6]

Night terrors are anxiety provoking to parents because the child appears to be awake but may be screaming uncontrollably. The child is confused and disoriented, unaware of the parent's presence, and not easily comforted. The child may wake up or go back to sleep quickly and have no memory of the night terror in the morning. Night terrors usually occur within 4 hours of bedtime during deep non-REM sleep and are more common in boys.[2,6]

Behavioral signs of a child's sleep problems can also include frequent awakenings during the night, talking during sleep, bruxism (teeth grinding), and jaw clenching.[23]

Cultural effects on sleep

Insufficient sleep has become increasingly common among adolescents.[12] The onset of puberty, circadian rhythm disturbance (a delayed sleep phase syndrome), and a physiologic shift in sleep onset to later times of the night can disrupt teens' sleep. Social researchers believe that adolescent sleep is also impacted by parents, peers, and school relationships.[27]

Teens may have difficulty falling asleep at their desired bedtime and not wake spontaneously at the correct time in the morning.[2] Young people who consume energy drinks may have trouble falling asleep because of the drinks' high-stimulant content.[28]

Many children in the United States have busy afterschool schedules, fitting in sports, school events, and other activities with heavy homework expectations. Academic stressors, family discord, depression, and low self-esteem can add to the sleep deprivation problem. Parents who work long hours may not enforce regular bedtimes or set consistent bedtime rules.[2,29]

The pressure to keep up with peers while getting enough sleep is even more intense in teens with afterschool jobs, who may use the weekends to catch up on their rest. Nearly 70% of high-school students don't get the recommended hours of sleep on school nights.[29]

Both students and teachers correlate lack of sleep with poorer school performance and lower grades.[29] Reducing sleep time by just 1 hour can measurably impair children's cognitive processing and increase their health risk behaviors related to drugs, alcohol, cigarettes, and sex.[30-32]

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Late evening use of electronics can also negatively impact children's sleep.[7] Evidence is growing that violent video games and other electronic activities put the body in a stressful state by inducing the fight-or-flight response, which increases BP and heart rate.[33] The high level of visual and cognitive stimulation from Internet surfing, texting, and late evening TV watching also stresses the brain and body. On average, children and adolescents spend over 7 hours a day engaged in a media activity.[34] More than 50% of teens in one study reported texting or talking on cell phones after bedtime.[12] Too much

light in the bedroom, heavy use of caffeine, late evening meals, family noise or outdoor noise pollution, and uncomfortable bedroom temperatures are other deterrents to restorative sleep.

Assessing for sleep problems

Routine use of brief assessment tools can lead to early identification of sleep issues and their underlying causes. Various screening tools are available to help clinicians assess children for sleep deprivation. (See *Screening for sleep deprivation*.)

A nurse who suspects a child has sleep problems should obtain a comprehensive health history and perform a complete physical assessment. Parents can use a sleep diary to record the child's sleep/wake habits over a 24-hour period for 2 consecutive weeks.[2,6,13]

Any child who snores, gasps, or exhibits noisy or difficult breathing during sleep should be assessed for OSA.[35] An overnight polysomnographic evaluation may be needed.[13] If the child is diagnosed with OSA, treatment options include positive airway pressure therapy (continuous positive airway pressure or bilevel positive airway pressure) or surgery (often an adenotonsillectomy). If obesity is a contributing factor, the child and parents should receive dietary counseling and information about the importance of regular physical activity.[2,13,30]

Treatment options

The plan of care for children with sleep deprivation should include the entire family. Advise parents to model healthy sleep habits for their children. Explore family dynamics for strain, discord, and dysfunction.[3,36] Consider ethnicity and cultural values about cosleeping, daytime napping, night snacking, watching TV, and the importance of sleep. Children with chronic night terrors or those with special needs (such as PTSD, ADHD, Tourette disorder, or Prader-Willi syndrome) should be referred to a sleep specialist or child psychologist or psychiatrist for ongoing professional follow-up.[2,3,13,30]

Advise parents to model healthy sleep habits for their children.

Children and parents may benefit from techniques and lifestyle changes to address limit-setting problems, busy parental work schedules, and other family stressors. Sleep-related fears and anxieties may be eased by relaxation training, guided imagery, and positive reinforcement.[2,3]

School nurses, who interact with both teachers and students, should discuss sleep hygiene in health education classes; middle-school children are particularly receptive to this material.[37] Along with teaching the importance of healthy sleep practices and the signs and symptoms of sleep deprivation, advise children to:

- Avoid naps late in the day.
- Reduce food and drink with high caffeine and sugar content, especially in the evening.
- Cut down on nonessential after-school activities.
- Create a bedtime routine centered on quiet activities such as reading or listening to mellow music.
- Avoid high-energy activities 3 hours before bedtime.
- Use the bedroom for sleep only, not for communicating with friends, watching TV, or eating.
- Make the bedroom cool, dark, and quiet. For specific ways to improve the sleep environment, visit www.sleepfoundation.org.[13,30,35,38,39]

Encourage parental involvement in children's sleep hygiene practices. When speaking with parents, advise them to:

- Remove TV sets, smartphones and cell phones, video games, and computers from the child's bedroom and set curfews on their use.
- Keep sleep and wake-up times consistent, even on weekends for elementary and middle-school children. Teens may benefit from weekend sleeping in.[13,30,35,38,39]

Medications should be prescribed for sleep problems only if behavioral therapy and modifications of sleep practices are unsuccessful. When used under the direction of a healthcare provider, melatonin can be a safe over-the-counter medication to induce sleep.[6,13] In children with anxiety or mood disorders, antidepressants have been used successfully. Suicide risk must be carefully assessed, as children and adolescents may have increased

Screening for sleep deprivation

The following assessment tools for determining sleep deprivation in children can be found online.

- Children's Sleep Habit Questionnaire
  A 35-item questionnaire to identify behaviorally and medically based sleep problems in school children.
  http://www.gse.uci.edu/childcare/pdf/questionnaire_interview/Childrens Sleep Habits Questionnaire.pdf
- Pediatric Sleep Questionnaire and the Pediatric Daytime Sleepiness Scale
  Appropriate for middle-school children.
  http://www.mcbg.org/internal/services/Sleep_Center/documents/SleepPeds.pdf
- School Sleep Habits Survey
  A 63-item questionnaire that assesses older teens' sleep/wake habits and daytime functioning.
  http://sleepforscience.org/contentmgr/showdetails.php/id/93
- Sleep Disorders Inventory for Students
  Screens youth for physical causes of sleep deprivation.
  http://www.sleepdisorderhelp.com

suicidal tendencies when taking antidepressants.[27] For children with persistent insomnia whose psychiatric problems are under control, medications with sedative effects, such as chloral hydrate, gabapentin, or risperidone may be helpful. However, they must be used with caution, if at all.[2,13]

Educating the community

To increase public awareness of sleep problems in children, nurses should advocate for:

- sleep education programs in hospitals, health departments, schools, and work places
- placement of school nurses and pediatric nurse practitioners in school-based health centers and wellness clinics
- removal of caffeinated beverages and foods high in sugar from school meal plans
- evidence-based clinical screening and evaluation tools for sleep deprivation
- increased school board involvement in sleep and other health issues
- nursing school curricula addressing sleep deprivation in children.[12,15]

Sleep tight

Nurses are in a pivotal position to improve the wellness of children by routinely identifying and addressing sleep deprivation and its impact on associated health, school, and family issues. Screening for sleep problems and developing individualized care plans is a cost-effective and easy way to improve children's health. Sleep habits established in youth often carry over into adulthood, so addressing this issue with pediatric patients can have lifelong benefits.[5,34] NM

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