

## The Role of Schools in Identification, Treatment, and Prevention of Children's Sleep Problems

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### Abstract

Increasing academic achievement and promoting behavioral adjustment of children and adolescents are primary missions of schools. Considerable research shows that cognitive functioning and emotion regulation are compromised by insufficient sleep, with deleterious effects for school achievement and behavior. In response to concerns about low achievement, maladaptive behavior, and inadequate sleep, a number of actions are described that schools can take toward improving the sufficiency of sleep in children. For example, observing sleepiness at school may help identify children with sleep disorders; primary and secondary school curricula can be expanded to include the relations of sleep to health and performance; and system-wide policies that facilitate adequate sleep may be considered for change.

**Key Words:** sleep, school achievement, school behavior, role of schools

### Sleep Problems and the Role of Schools

What does children's sleep have to do with the mission of schools? It is a fair question to ask, "Is this the business of schools?" If sleep were not related to school academic performance or social behavior, it might not be the school's business. Further, if sleep disorders at a clinical level were the only problem then even if performance at school were affected, sleep might be considered more the business of health care professionals. Finally, if there were no actions school personnel could take to influence sleep, it might not be a domain of child functioning that should be a responsibility of schools. In this chapter, I will argue that none of those three assumptions are valid. A case will be made that sleep does affect children's learning and social behavior at school. Evidence will be provided that sleep problems that do not rise to the level of a clinical disorder have become pervasive in children and often do not come to the attention of health care providers. Most importantly, many actions to facilitate children's sleep with the potential to improve school

performance at school will be outlined. In short, it will be argued that sleep definitely is the school's business.

Primary and secondary schools constitute a significant component of the sociocultural infrastructure of American society. The majority of children (~87%; IES, National Center for Educational Statistics, US Department of Education) attend government-funded public schools, a substantial percent attend private and parochial schools (~10%; IES), and an increasing number are schooled at home (~3%; IES). But whatever the type of school, law demands that all children attend schools for many years. It was not always so in the United States, as compulsory education laws were enacted only during the latter nineteenth to early twentieth century. But for many decades, children from the ages of 5 or 6 up to around 16 have been required to attend school. Because attendance is mandatory, school is arguably the only societal institution where all children are required to be present. It is the one place where all children come

into regular and frequent contact with adults who are trained and motivated in their broad interests.

The mission of schools has evolved from their inception to the present. So-called "academic" subjects is undoubtedly the number one mission of schools (especially reading), science, and history (others) are considered essential to preparation for jobs and participation as citizens in societal activities including voting and jury duty. Secondary to the academic mission, it has been acknowledged that schools serve other missions. At school, children learn social impulses ("Raise your hand"), get a sense of order ("Wait for your turn"), and interact with others who are alike and different from themselves in various ways. School is also a place where "enrichment" activities such as music, art, and physical education are taught.

But while those missions have been in broad agreement among the public, many other missions have been added. Whether or not school is an appropriate place to teach character, moral development, and religious values has been a matter of debate. Are schools responsible for child health? Beginning with the National School Lunch Act in 1946, lunch has been provided in schools (School Nutrition Assistance Act). Free or reduced-cost breakfast and after-school programs that have been enacted have also been a source of controversy. In the minds of some, the role of schools in children's lives has been an extension of the too large social welfare programs (McDonnell, 2004). But Congress reauthorized the programs that provide free or reduced-cost lunch for school children in 2010 (US Department of Agriculture, 2011).

Are schools responsible for child health? Nursing care is provided and mental health services in many states. State boards of education in the United States have standards that vary widely from state to state. One state requires that a school nurse be present in every school, but only around a third of the states have a mandated nurse-to-student ratio from 1–500 up to 1–5000 with the National Association of State Boards of Education (NASBE). Even preventive medicine, once routinely administered in schools, is rarely seen in today's schools. The role of schools has generally been seen

into regular and frequent contact with professionals who are trained and motivated to look after their broad interests.

The mission of schools has evolved over the years from their inception to the present. Instruction in so-called "academic" subjects is universally agreed to be the number one mission of schools. Basic knowledge and skill in mathematics, language arts (especially reading), science, and history (and a few others) are considered essential to prepare children for jobs and participation as citizens in essential societal activities including voting and serving on a jury. Secondary to the academic mission, it has been acknowledged that school serves a socializing mission. At school, children learn to inhibit their impulses ("Raise your hand"), get along with others ("Wait for your turn"), and interact with children who are alike and different from them in many ways. School is also a place where "extracurricular" activities such as music, art, and athletics are taught.

But while those missions would likely get broad agreement among the American public, many other missions have been questioned. Whether or not school is an appropriate venue to teach character, moral development, and religious values has been a matter of intense debate. Are schools responsible for children's nutrition? Beginning with the National School Lunch Act in 1946, lunch has been provided (for a charge) in schools (School Nutrition Association, 2011). Free or reduced-cost breakfast and lunch are newer programs that have been enacted with some controversy. In the minds of some, feeding poor children at school has been an extension of an already too large social welfare program (Currie, 1979; McDonnell, 2004). But congress has repeatedly reauthorized the programs that served 31.7 million school children in 2010 (U.S. Department of Agriculture, 2011).

Are schools responsible for children's health? Nursing care is provided and mandated by many state boards of education in the United States, but standards vary widely from state to state. At least one state requires that a school nurse be present in every school, but only around a third of states have a mandated nurse-to-student ratio, and those range from 1-500 up to 1-5000 with a median of 1-750 (National Association of State School Boards, NASBE). Even preventive measures such as vaccinations, once routinely administered at schools, are rarely seen in today's schools. Health education in schools has generally been seen as important but,

as in the case of nursing care, standards vary widely. Requirements vary from state to state, with some states requiring instruction in health education but not specifying grade levels or amounts of instruction required. The majority of states require health education to be taught in elementary, middle, and junior high grades, but in some states there is no minimum number of hours set. At the high school level, requirements vary from state to state, ranging from no requirement to a half-credit (one semester) to one or more credits (full year). Many states mandate instruction in particular health education topics (e.g., reproductive health and pregnancy prevention; alcohol, tobacco, and drugs). Physical education has often been viewed as a component of health education and promotion, but emphasis has waxed and waned over past decades. A call for renewal of focus on health in schools has been made in a policy report, *A Broader, Bolder Approach to Education*: "Health and nutrition supports ensure that children come to school immunized, well fed, and without toothaches or acute asthma attacks that prevent them from focusing and learning." (Economic Policy Institute, 2011). To meet that objective, the report recommends that health care clinics be located in US schools, consistent with a similar initiative by the National Assembly on School Based Health Care (2011).

In the early history of American schools, the school was a place where health topics were addressed. Surprisingly, sleep was one of those concerns. For example, J. Mace Andress of the State Normal School in Worcester, Massachusetts, writing in the *Journal of Educational Psychology* (1911) states in the opening sentence,

"Sleep is so vitally related to the mental and physical health and efficiency of human beings that I decided to investigate the sleep of my own pupils." (p. 153)

Andress goes on to report that following "... some instruction in the physiology and hygiene of sleep..." (p. 153) a questionnaire was answered by 23 seniors (20-21 years old) and 26 juniors (17-19 years old), and they kept daily records of their sleep. The average durations of sleep are remarkable compared with the much lower numbers adolescents and young adults report today. Juniors averaged 8 hours, 54 minutes, with no individual reporting fewer than 8 hours. The average for seniors was 8 hours, 34 minutes with only one person reporting fewer than 8 hours.

Address closes with,

"The principal value of this investigation was the arousal of enthusiasm in the students for the study of psychology and hygiene and for the practice of the laws of health. Many pupils have told the writer since this investigation that they were getting more sleep. Similar information should be of value to every administrator of schools because it throws light on the mental and physical condition of students. Sleep is the great prophylactic and is comparable in its influence to fresh air, pure water, nutritious food and healthful exercise." (p. 156)

The question of whether sleep is the business of schools must be considered in the context of the many important responsibilities society has assigned to schools. We should expect parents and school professionals to be skeptical of adding a new role, and their questions deserve close attention. Over 60 years ago the realization that that hungry children did not learn well led to schools assuming more responsibility for children's nutrition. We need to consider the proposition that sleepy children are not optimally receptive learners and do not regulate their emotions well, and it is appropriate to consider what can and should be done by school personnel.

### The Scope and Extent of Children's School Problems

Concerns about underachievement of American schoolchildren have been expressed frequently over the years, but perhaps never more so than recently. Reports from The National Assessment of Educational Progress (NAEP) annually state that the United States continues to fall further behind other countries in crucial academic subjects, including science and mathematics. Many federal and state initiatives over a very long time (e.g., the No Child Left Behind Act of 2001) have been directed at improving academic performance, but results have been largely disappointing. Particularly troubling have been low scores of children from lower socioeconomic status and minority ethnicity families, whom many programs have been designated to help (NAEP, 2011; ETS, 2009; 2010). Also pertinent are the reports of increases in the numbers

of children with disorders that impair learning, including autism, learning disability (LD), and attention-deficit/hyperactivity disorder (ADHD). The percentage of children who are LD has doubled since its origination as a special education category in 1975 (Pierangelo & Giuliani, 2006) to 5% of all public school students children in 2009 (Cortiella, 2011). ADHD prevalence has also increased to 6.69% of all children, a 33% increase over 10 years (CDC 2010b). Autism prevalence has increased as well, to 0.47%, up an astounding 289.5% in the last decade (CDC, 2010a).

While most of the attention has been directed to problems of academic achievement, some evidence also suggests that behavior problems of schoolchildren have been increasing in frequency and severity. Examining results from a restandardization of the Behavior Assessment System for Children (BASC-II, Reynolds & Kamphaus, 2004), Distefano, Kamphaus, and Mindrila (2010) reported differences from the original standardization sample published in 1996. In 8 years, teacher-reported disruptive behavior had increased from 8% to 12% of the 2338 children in the stratified national sample. Children with elevated clinical scales of both externalizing (e.g., serious behavior problems) and internalizing (e.g., anxiety, depression) had risen from 4% in 1996 to 15% in 2004. Among all children in US schools, prevalence figures for those who have serious emotional or behavioral problems are estimated by the CDC at 5.1% of all children ages 4–17. And for poor children aged 11–14, that figure is 9.3% compared with 3.5% of children from affluent families (CDC, 2011; Boyle et al., 2011). It is clear that problematic behavior at school constitutes a growing challenge for educators.

### How Sleep Relates to School Problems

All available evidence suggests that children, adolescents, and adults are getting less sleep than in previous times and less than they need (Olds, Blunden, Petkov, & Forchino, 2010; Smaldone, Honig, & Byrne, 2007). The National Sleep Foundation has conducted a nationwide survey every year since 2002, with each year's topic addressing a different aspect of sleep. In the 2004 poll (Children and Sleep) and the 2006 poll (Teens and Sleep), respondents indicated that sleep duration and sleep quality is suboptimal. In the 2011 poll (Technology Use and Sleep), children 13–18 years old reported an average of 7 hours 26 minutes sleep on school nights, and 18% of them reported being awakened a few nights a week by a text message, phone call,

or e-mail. Although it is difficult to estimate figures for many reasons, estimates range from 20% of children and adolescents with a sleep problem at the present to 40% of children with a sleep problem at some point for childhood and adolescence (Mindrila, 2010). Using the smaller of those estimates, an estimated 55 million children and adolescents of Fall, 2011 (U.S. Census Bureau, 2011) 11 million children have an ongoing sleep problem or an acute sleep problem that is festering now or occurred at some point in their school years. It is important to note that a vast majority of children are not identified by sleep problems come to the attention of health care providers. Some evidence suggests that in most cases, parents do not report their children's sleep problems to their physicians (Blunden et al., 2007). Of around 150,000 children seen by pediatric physicians during 2007, only 10% had a sleep disorder diagnosis compared with a prevalence rate estimated in epidemiological studies (Meltzer, Johnson, Crosette, 2010). Thus, school is the only place where the underponderance of those children with sleep problems has a chance of being discovered. Among children at school are:

1. Children with diagnosed sleep disorders.
2. Children who have serious sleep problems that have not come to the attention of health care providers or who have subclinical sleep problems.
3. Children who have diagnosed sleep and behavior problems in school that have not been related to their disorder (e.g., autism, intellectual disability, other health conditions).
4. Children whose long-term medication (for conditions such as asthma) or short-term medication have a disruptive influence on sleep.
5. Children who have psychological problems such as depression and anxiety problems is one of an array of factors that influence sleep.
6. Children whose families have both poor sleep environment (e.g., poor air quality) and poor parent-child relationships are associated with sleep (e.g., bedtime, access to caffeinated beverages).
7. Children with insufficient sleep, but is related to a treatable condition.

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1. Children with diagnosed clinical sleep disorders.
2. Children who have serious sleep problems that have not come to the attention of health care providers or who have subclinical levels of problems.
3. Children who have diagnosed learning and behavior problems in school, but have sleep problems that have not been recognized as related to their disorder (e.g., autism, ADHD, LD, intellectual disability, other health impairments).
4. Children whose long-term maintenance medication (for conditions such as ADHD and asthma) or short-term medication (e.g., for colds) have a disruptive influence on sleep.
5. Children who have psychological problems such as depression and anxiety, for which sleep problems is one of an array of symptoms.
6. Children whose families live in poverty and have both poor sleep environments (beds, bedding, air quality) and poor parent-monitored habits that are associated with sleep (e.g., irregular and late bedtimes, access to caffeinated beverages).
7. Children with insufficient sleep that is not chronic, but is related to a transitory situation in

the family (e.g., recent move, economic stress, serious illness or death in the family, family conflict).

8. Children whose sleep is chronically insufficient in duration or quality but is unrecognized as related to academic underachievement and behavior problems at school.

The learning, behavior, and emotional problems that are the consequences of sleep disorders have been amply documented (Mindell & Owens, 2010; O'Brien, 2011). Children with sleep disorders breathing, to take one example, have been shown to have impaired cognitive functioning (e.g., Bourke et al., 2011). Similarly, the sleep problems of children with a wide range of disabilities have been documented. For example, 40%–60% of children with autism are estimated to have sleep problems (Richdale & Schreck, 2009), and rates of problems for children with intellectual disabilities and ADHD are also high (Doran, Harvey, & Horner, 2006; Konofal, Lecendreux, & Cortese, 2010). Further, children with a number of prevalent health problems, notably asthma and obesity, have been found to have concomitant sleep problems (Desager, Nelen, Weyler, & De Backer, 2004; Hart, Cairns, & Jelalian, 2011).

While the groups of children mentioned above deserve special attention, the consequences of insufficient sleep for the majority of children who have no clinical disorder of sleep, learning, or health are also becoming clearer. Researchers have only recently begun to explore sleep in these children, and some of the findings are alarming. In the cognitive domain, shorter sleep duration, poorer sleep quality, and higher levels of daytime sleepiness have all been associated with poor performance on cognitive and academic measures of many types, including grades, standardized test scores, and teacher ratings (Dewald, Meijer, Oort, Kerkhof, & Bogels, 2010). While most of these studies have been cross-sectional, measuring sleep and cognitive outcomes concurrently, recent evidence suggests that the relations endure over years. For example, Bub, Buckhalt, and El-Sheikh (2011) followed children over 3 years and discovered that children whose sleepiness increased over that time had scores on cognitive tests as much as a standard deviation below those of children whose sleepiness had not increased. Studies of experimental sleep deprivation in adults indicate that impairments in attention and vigilance are most sensitive to sleep insufficiency, while higher-order

cognitive functions are less affected (Lim & Dinges, 2010). But in children, poor sleep has been linked to a wide array of cognitive functioning not only in attention and processing speed, comparable to adults, but also in memory and verbal comprehension (Bub et al., 2011; Kopasz et al., 2010).

Turning to the behavioral domain, children with more sleep problems and higher levels of sleepiness are more likely to have school conduct problems (O'Brien et al. 2011). These results are consistent with those of other studies that have linked higher levels of internalizing problems (i.e., depression, anxiety) and externalizing problems (i.e., aggression, impulsivity) to poor sleep (e.g., El-Sheikh, Kelly, Buckhalt, & Hinnant, 2010; Gregory et al., 2005; Paavonen et al., 2002). Children who have problems with sleep, emotion regulation, and behavior are likely also to have difficulties in academic achievement.

School achievement and behavior of children from families of low socioeconomic status (SES) and those who are ethnic minorities are particularly problematic. Considerable effort has been expended to understand and ameliorate the achievement gap between these children and others. Only recently have SES and ethnicity been the primary focus of investigation in sleep of typically developing children, and the results are informative. Poorer sleep has been found in persons of African-American and Hispanic ethnicity (e.g., Ruiter, DeCoster, Jacobs, & Lichstein, 2010) and in children from poorer families. For example, Marco, Wolfson, Sparling, and Azuaje (2012) reported that lower SES adolescents went to bed later, had more variability in bedtime, and slept less on school nights. Moreover, SES and ethnicity have been found to moderate the relations between sleep and outcomes. Specifically, children from lower class and minority ethnicity families have been shown to have larger correlations between poor sleep and poor cognitive performance (Buckhalt, El-Sheikh, & Keller, 2007; Buckhalt, El-Sheikh, Keller, & Kelly, 2009) and between poor sleep and problematic behavior (El-Sheikh et al., 2010). These findings have led to the hypothesis that sleep insufficiency may be of central importance in the persistent academic gap that has defied reduction by many proposed remedies for over 40 years (Buckhalt, 2011; Buckhalt & Staton, 2011).

### What Can Schools Do?

School personnel are very familiar with the learning and behavior problems of their students. They are also very knowledgeable about students with

disabilities. At present, though, they lack knowledge about the relations of sleep to these children's problems. Sleep has not been a topic that is covered in the education of school teachers, school counselors, school psychologists, or school administrators. To take one example, in the first three editions of *The Handbook of School Psychology* (Gutkin & Reynolds, 1999; Reynolds & Gutkin 1982; 1990), each a 1100 + page comprehensive volume, sleep is not an index term and sleep problems are not addressed. In the 4th edition (Gutkin & Reynolds, 2009), one paragraph on sleep disorders is found in a chapter on neuropsychological assessment. A few articles describing the relations of sleep to school performance and behavior have been published in journals that school professionals read (i.e., Bergin & Bergin, 2009; Buckhalt & El-Sheikh, 2010; Buckhalt, Wolfson, El-Sheikh, 2007; 2009; Carskadon, 1999; Wolfson & Carskadon, 2005), but sleep has not made its way into the primary topics of educational curricula for any professionals who work in schools.

School personnel are well situated to implement aspects of recently formulated broad health policy initiatives. The Institute of Medicine, a unit of the National Academy of Sciences (2011), included several recommendations related to sleep improvement in a recent policy report:

Recommendation 5-2: Healthcare providers should counsel parents and children's caregivers not to permit televisions, computers, or other digital media devices in children's bedrooms or other sleeping spaces.

Recommendation 6-1: Child care regulatory agencies should require child care providers to adopt practices that promote age-appropriate sleep durations.

Recommendation 6-2: Health and education professionals should be trained in how to counsel parents about their children's age-appropriate sleep durations.

In Healthy People 2020 (NIH, 2011), an initiative of the National Institutes of Health, several objectives are related to improving sleep, including one specifically related to adolescents:

SH-3: Increase the proportion of students in grades 9 through 12 who get sufficient sleep.

The preceding discussion provides a compelling rationale that sleep is the appropriate business of the schools. But what can be done by school professionals about insufficient sleep and consequent

sleepiness at school? The following possible potential courses of action

1. School professionals can learn about the relations of nighttime sleep, daytime sleepiness, and sleep problems to attention, learning, regulation, and behavioral adjustment. This information should not be difficult to attain if school professionals are very motivated to discover information that will improve student performance and academic achievement. This should be part of training curricula for teachers, school professionals, particularly school counselors, and psychologists.

2. Teachers and other school professionals should learn to recognize and respond to sleep disorders and, through this, help children to pediatric sleep specialists for diagnosis and treatment. If children are not brought to the attention of many cases the signs are obvious and should be noticed. The model for this is already in place for other disorders that are in the domain of health care. For example, school professionals monitor immunization for children with numerous health problems and need referral for treatment.

3. For children with identified sleep disabilities that have been associated with a prevalence of sleep problems, school education plans can be modified to include sleep improvement among other of the specific measures will require the cooperation of parents and, while engaging and challenging, teachers and other school professionals better positioned to consult with anyone else.

4. School professionals can learn about the relations of sleep to conditions such as obesity and overweight, asthma, and other conditions that have increased significantly in recent years and are related to insufficient sleep. Children with these and other conditions should be recognized that poor sleep should be considered as a possible contributor to any other direct effects of the learning and behavior.

5. When a child is referred to a specialist for underachievement, school professionals should routinely rule out the presence of sleep problems before assuming that a disability such as vision and hearing problems



sleepiness at school? The following are among many possible potential courses of action

1. School professionals can learn about nighttime sleep, daytime sleepiness, and their relations to attention, learning, memory, emotion regulation, and behavioral adjustment. This goal should not be difficult to attain. Teachers are very motivated to discover information that will improve student performance and behavior. Sleep science and practice should become an integral part of training curricula for teachers and other school professionals, particularly administrators, counselors, and psychologists.

2. Teachers and other school professionals should learn to recognize and screen for serious sleep disorders and, through the parents, refer children to pediatric sleep specialists for diagnosis and treatment. If children are sleepy at school, in many cases the signs are obvious if we choose to notice them. The model for this action is already in place for other disorders that are considered the domain of health care. For example, schools monitor immunization for children and identify children with numerous health conditions who need referral for treatment.

3. For children with identified learning disabilities that have been associated with high prevalence of sleep problems, their individual education plans can be modified to include sleep improvement among other objectives. Many of the specific measures will require the cooperation of parents and, while engaging parents is challenging, teachers and others at school are better positioned to consult with parents than anyone else.

4. School professionals can be informed about relations of sleep to conditions such as obesity and overweight, asthma, and allergies. All of these conditions have increased significantly in recent years and are related to insufficient sleep. When children with these and other health conditions have learning and behavior problems at school, it should be recognized that poor sleep needs to be considered as a possible contributing factor beyond any other direct effects of the conditions on school learning and behavior.

5. When a child is referred for assessment of cognitive and academic functioning due to underachievement, school professionals should routinely rule out the presence of sleep problems before assuming that a disability is present. Ruling out vision and hearing problems that interfere with

learning are already part of the assessment process, and sleep problems should be treated similarly.

6. When high stakes testing is scheduled, such as group administered achievement tests or individually administered tests to determine eligibility for special services, a concerted effort can be made to optimize the sleep of children in days and weeks leading up to the tests. Many schools now provide extra snacks on testing days, and some suggest in materials sent home to parents that children should come to school well rested. They also provide focused classroom time devoted to test preparation. All of these actions imply that schools realize children need to have energy and mental preparation to perform their best, so trying to maximize the duration and quality of sleep is consistent with other ongoing efforts.

7. Especially for younger children, school administrators and policymakers need to take a hard look at the practice of having children take naps at school. It was not uncommon in past years for the youngest children to have a nap time at school. But napping is rare now in kindergarten. Many educators believe that the curriculum is too full of academic demands to consider having children spend time napping that would otherwise be devoted to instruction. Beyond kindergarten, it is very common for children and adolescents to be discouraged or even punished for sleeping at school. A child who falls asleep at school is responding to a basic need and should be referred for evaluation of the factors causing excessive sleepiness.

8. Schools begin early, and while attempts to move start times later in the morning have been met with resistance in some places (Appleman, and Stavitsky, Chapter 38), more school districts are adopting later start times for high schools. In some rural areas where bus rides are long, children board buses before 7:00 am, which means rise times of 6:30 am at the latest and in many cases much earlier. Particularly for adolescents who are experiencing sleep phase delay and who have heavy homework demands along with afterschool sports or other activities, getting to bed early enough to have sufficient sleep is all but impossible. In many schools, "zero period" has been initiated for honors courses, tutoring and remedial classes, or art and music instruction, and begins as early as 7:00 am. School administrators must weigh the evidence for and against later start times and make wise decisions in the best interest of students.

9. School administrators and policymakers need to take a close look at how school and community

activities in athletics and other domains have encroached upon school nights with the effect of delaying bedtimes. To take one example, since high school football games are scheduled on Friday nights in most communities, middle and junior high games are increasingly being scheduled on school nights. In many communities, it is not unusual for a 12-year-old to get home as late as 9 or 10 pm after an away game. For some community sports such as soccer, games and practices are held on school nights. After vigorous physical activity and emotional arousal, players, and in many cases their siblings, travel with their families from the fields to home, then take care of baths, often have an evening meal and engage in other activities, all of which delay bedtime and make it impossible to have sufficient sleep.

10. Education about sleep needs and good sleep practices should be infused into the health and science education curriculum beginning in kindergarten and continuing through high school. A few sets of materials suitable for lesson plans and activities have been developed by national organizations, but many more resources will need to be developed.

## Conclusion

All available evidence suggests that children's sleep is as vital for their optimal performance as good nutrition and regular exercise. When children's sleep is insufficient, there are deleterious consequences for cognitive processing, learning, memory, and emotion regulation. These problems in turn lead to poor academic achievement and behavior problems, both of which have posed increasing challenges for schools. School professionals could help prevent sleep problems, recognize them when they are present, and intervene in a number of different ways. Before assuming that learning or behavior disorders are the cause of low achievement and problem behavior, chronic or acute sleep disorders or inadequate sleep at the subclinical level should be ruled out. Screening for sleep disorders and sleep insufficiency can be accomplished as easily as screening for vision and hearing problems. By administering brief screening instruments recognizing overt behavioral signs of sleepiness, children who might have sleep disorders may be identified early and referred for further assessment and treatment. Teachers already reach out to parents to help them structure and monitor home activities that foster school success. Homework is the most obvious example, but teachers also work with parents when health or nutrition

problems are interfering with school performance. Consulting with parents about good sleep habits can be incorporated into the existing teacher-parent alliance. Current health education curricula can be expanded to include the relations of sleep to numerous health and performance outcomes. Finally, system-wide policies that facilitate adequate sleep, such as discontinuing very early school start times and school night sports, need to be considered.

## Future Directions

- Much of the evidence leading to the conclusion that sleep insufficiency affects school performance comes from studies that use correlational designs. We may also logically infer that if experimental studies of voluntary sleep deprivation in adults show that cognitive functioning is impaired, the same holds true for children and adolescents. Still, more experimental studies are needed, including those that take advantage of naturally occurring sleep deprivation in groups of children such as sleepovers. Further, more studies need to be done to determine sources of individual differences in the response to sleep loss. The optimal amount of sleep no doubt varies from child to child, as does their response to sleeping poorly.

- A few well-designed intervention studies have demonstrated that when children's sleep is improved, there is a concomitant improvement in school performance. More such studies with individual children and with groups of children are needed that provide information about the strategies that work.

- Further research is always needed, but sufficient evidence suggests that prevention and intervention programs should be implemented in schools. Model programs need to be developed and field-tested in schools. These programs need to be built upon existing frameworks of screening for problems that inhibit learning and adaptive behavior, upon existing methods of teacher-parent consultation and education, and infused into already existing health education curricula. Changes at the system-wide level, such as delaying school start times, need to be considered within existing ways schoolwide policies are formulated and implemented.

## Resources for Educators Tools for School Assessment of Sleep Problems and Sleepiness

BEARS—A screening interview for sleep problems (Owens & Dalzell, 2005)

Pediatric Sleep Questionnaire (Hedger, Dillon, & Pituch, 2000)  
Children's Sleep Habits Questionnaire (Spirito, & McGuinn, 2000)  
School Sleep Habits Survey (Veltman, 2003)  
Sleep Disorders Inventory for Children (Luginbuhl, 2003; 2008)  
Pediatric Daytime Sleepiness Scale (Meltzer et al. 2012)

For a review of these and other sleep questionnaires as diagnostic tools: A review of currently available sleep medicine reviews, 15, 19–3

## Materials for Sleep Education

National Institutes of Health sleep disorders, and biological rhythms: NIH curriculum supplements/grades 9–12. Retrieved 11–4–20 from <http://science.education.nih.gov/supplements/nih3/sleep/default.htm>  
American Academy of Sleep Medicine. Plans for K–12 Teachers. Retrieved from <http://www.sleepeducation.org>

## Books for Professionals

Carskadon, M. A. (2002). *Patterns: Biological, Social, and Individual Influences*. New York: Cambridge University Press.  
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ng with school performance.  
nts about good sleep habits  
to the existing teacher-parent  
th education curricula can be  
ae relations of sleep to numer-  
formance outcomes. Finally,  
that facilitate adequate sleep,  
; very early school start times  
ts, need to be considered.

lence leading to the conclusion  
y affects school performance  
at use correlational designs.  
infer that if experimental  
leep deprivation in adults show  
ning is impaired, the same  
1 and adolescents. Still, more  
are needed, including those  
f naturally occurring sleep  
of children such as sleepovers.  
need to be done to determine  
differences in the response to  
al amount of sleep no doubt  
hild, as does their response to

gned intervention studies  
hat when children's sleep is  
concomitant improvement  
ce. More such studies with  
ind with groups of children  
ide information about the

1 is always needed, but sufficient  
t prevention and intervention  
implemented in schools. Model  
developed and field-tested  
grams need to be built upon  
of screening for problems  
and adaptive behavior, upon  
teacher-parent consultation and  
ed into already existing health  
Changes at the system-wide  
g school start times, need to be  
disting ways schoolwide policies  
mplemented.

## lucators Assessment of Sleep eepiness

enning interview for sleep  
& Dalzell, 2005)

- Pediatric Sleep Questionnaire (Chervin,  
Hedger, Dillon, & Pituch, 2000)  
Children's Sleep Habits Questionnaire (Owens,  
Spirito, & McGuinn, 2000)  
School Sleep Habits Survey (Wolfson et al.,  
2003)  
Sleep Disorders Inventory for Students  
(Luginbuehl, 2003; 2008)  
Pediatric Daytime Sleepiness Scale (Drake et al.,  
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