Kids' Abnormal Breathing During Sleep Linked to Increased Risk for Behavioral Difficulties

Risk of Problems Later in Childhood Can Double with Snoring and Apnea

March 5, 2012 — (BRONX, NY) — A study of more than 11,000 children followed for over six years has found that young children with sleep-disordered breathing are prone to developing behavioral difficulties such as hyperactivity and aggressiveness, as well as emotional symptoms and difficulty with peer relationships, according to researchers at Albert Einstein College of Medicine of Yeshiva University. Their study, the largest and most comprehensive of its kind, published online today in the journal *Pediatrics*.

"This is the strongest evidence to date that snoring, mouth breathing, and apnea [abnormally long pauses in breathing during sleep] can have serious behavioral and social-emotional consequences for children," said study leader Karen Bonuck, Ph.D., professor of family and social medicine and of obstetrics & gynecology and women's health at Einstein. "Parents and pediatricians alike should be paying closer attention to sleep-disordered

breathing in young children, perhaps as early as the first year of life."

Sleep-disordered breathing (SDB) is a general term for breathing difficulties that occur during sleep. Its hallmarks are snoring (which is usually accompanied by mouth breathing) and sleep apnea. SDB reportedly peaks from two to six years of age, but also occurs in younger children. About 1 in 10 children snore regularly and 2 to 4 percent have sleep apnea, according to the American Academy of Otolaryngology–Health and Neck Surgery (AAO-HNS). Common causes of SDB are enlarged tonsils or adenoids.

"Until now, we really didn't have strong evidence that SDB actually preceded problematic behavior such as hyperactivity," said Ronald D. Chervin, M.D., M.S., a co-author of the study and professor of sleep medicine and of neurology at the University of Michigan. "Previous studies suggesting a possible connection between SDB symptoms and subsequent behavioral problems weren't definitive, since they included only small numbers of patients, short follow-ups of a single SDB symptom, or limited control of variables such as low birth weight that could skew the results. But this study shows clearly that SDB symptoms do precede behavioral problems and strongly suggests that SDB symptoms are causing those problems."

The new study analyzed the combined effects of snoring, apnea and mouth-breathing patterns on the behavior of children enrolled in the Avon Longitudinal Study of Parents and Children, a project based in the United Kingdom.

Parents were asked to fill out questionnaires about their children's SDB symptoms at various intervals, from 6 to 69 months of age. (Studies of similar questionnaires have shown that parents do a good job of assessing kids' SDB:

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their evaluations compare well with data from carefully controlled overnight sleep studies, Dr. Bonuck reports.)

> *-- Karen Bonuck, Ph.D.*

When their children were approximately four and seven years old, parents filled out the Strengths and Difficulties Questionnaire (SDQ), which is widely used to assess behavior. The SDQ has scales for assessing a child's inattention/hyperactivity, emotional symptoms (anxiety and depression), peer problems, conduct problems (aggressiveness and rule-breaking), and prosocial behavior (sharing, helpfulness, etc.). The researchers controlled for 15 potential confounding variables, including socioeconomic status, maternal smoking during the first trimester of pregnancy, and low birthweight.

"We found that children with sleep-disordered breathing were from 40 to 100 percent more likely to develop neurobehavioral problems by age 7, compared with children without breathing problems," said Dr. Bonuck. "The biggest increase was in hyperactivity, but we saw significant increases across all five behavioral measures."

Children whose symptoms peaked early—at 6 or 18 months—were 40 percent and 50 percent more likely, respectively, to experience behavioral problems at age 7 compared with normally-breathing children. Children with the most serious behavioral problems were those with SDB symptoms that persisted throughout the evaluation period and became most severe at 30 months.

Researchers believe that SDB could cause behavioral problems by affecting the brain in several ways: decreasing oxygen levels and increasing carbon dioxide levels in the prefrontal cortex; interrupting the restorative processes of sleep; and disrupting the balance of various cellular and chemical. Behavioral problems resulting from these adverse effects on the brain include impairments in executive functioning (i.e., being able to to pay attention, plan ahead, and organize), the ability to suppress behavior, and the ability to self-

regulate emotion and arousal.

“Although snoring and apnea are relatively common in children, pediatricians and family physicians do not routinely check for sleep-disordered breathing,” said Dr. Bonuck. “In many cases, the doctor will simply ask parents, ‘How is your child sleeping?’ Instead, physicians need to specifically ask parents whether their children are experiencing one or more of the symptoms—snoring, mouth breathing or apnea—of SDB.”

“As for parents,” said Dr. Bonuck, “if they suspect that their child is showing symptoms of SDB, they should ask their pediatrician or family physician if their child needs to be evaluated by an otolaryngologist (ear, nose and throat physician) or sleep specialist.”

According to the AAO-HNS, surgery is the first-line treatment for severe pediatric SDB in cases where the tonsils and adenoids are enlarged. Another option is weight loss for overweight or obese children.

Dr. Bonuck’s paper is titled “Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years.” In addition to Dr. Bonuck, other Einstein contributors were Katherine Freeman, Dr.P.H., and Linzhi Xu, Ph.D.

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