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Chronic insufficient sleep increases obesity, overall body fat in children

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One of the most comprehensive studies of the potential link between reduced sleep and childhood obesity finds compelling evidence that children who consistently received less than the recommended hours of sleep during infancy and early childhood had increases in both obesity and in adiposity or overall body fat at age 7. The study from MassGeneral Hospital for Children (MGHfC) investigators, published in the June issue of *Pediatrics*, also finds no evidence of a specific period during which insufficient sleep has greater influence on later obesity.

"Our study found convincing evidence that getting less than recommended amounts of sleep across early childhood is an independent and strong risk factor for obesity and adiposity," says Elsie Taveras, MD, MPH, chief of General Pediatrics at MGHfC and lead author of the *Pediatrics* paper. "Contrary to some published studies, we did not find a particular 'critical period' for the influence of sleep duration on weight gain. Instead, insufficient sleep at any time in early childhood had adverse effects."

While several studies have found evidence of an association between sleep and obesity in young children, few have examined the effects of constant sleep deprivation across time or used measures other than body mass index (BMI), which determines obesity based solely on height and weight. The current study analyzed data from Project Viva, a long-term investigation of the health impacts of several factors during pregnancy and after birth. Information used in this study was gathered from mothers at in-person interviews when their children were around 6

months, 3 years and 7 years old, and from questionnaires completed when the children were ages 1, 2, 4, 5 and 6.

Among other questions, the mothers were asked how much time their children slept, both at night and during daytime naps, during an average day. Measurements taken at the seven-year visit included not only height and weight but also total body fat, abdominal fat, lean body mass, and waist and hip circumferences – measurements that may more accurately reflect cardio-metabolic health risks than BMI alone. Curtailed sleep was defined as less than 12 hours per day from ages 6 months to 2 years, less than 10 hours per day for ages 3 and 4, and less than 9 hours per day from age 5 to 7. Based on the mothers' reports at each age, individual children were assigned a sleep score covering the entire study period – from 0, which represented the highest level of sleep curtailment, to 13, indicating no reports of insufficient sleep.

Overall, children with the lowest sleep scores had the highest levels of all body measurements reflecting obesity and adiposity, including abdominal fat which is considered to be particularly hazardous. The association was consistent at all ages, indicting there was no critical period for the interaction between sleep and weight. Lower sleep scores were more common in homes with lower incomes, less maternal education and among racial and ethnic minorities; but the association between sleep and obesity/adiposity was not changed by adjusting for those and other factors.

While more research is needed to understand how sleep duration affects body composition, Taveras notes, potential mechanisms could include the influence of sleep on hormones that control hunger and satiety; the disruptions of circadian rhythms or possible common genetic pathways involved in both sleep and metabolism; poor ability to make good decisions on food choices and eating behaviors caused by sleep deprivation, or household routines that lead to both reduced sleep and

increased food consumption. Insufficient sleep may also lead to increased opportunities to eat, especially if time is spent in sedentary activities, such as TV viewing, when snacking and exposure to ads for unhealthy foods are common.

"While we need more trials to determine if improving sleep leads to reduced obesity," she says, "right now we can recommend that clinicians teach young patients and their parents ways to get a better night's sleep – including setting a consistent bedtime, limiting caffeinated beverages late in the day and cutting out high-tech distractions in the bedroom. All of these help promote good sleep habits, which also may boost alertness for school or work, improve mood and enhance the overall quality of life." Taveras is an associate professor of Pediatrics and Population Medicine at Harvard Medical School (HMS).

Provided by Massachusetts General Hospital

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