



STUDY EXAMINES ASSOCIATION BETWEEN SLEEP AND WEIGHT IN U.S. PRESCHOOLERS

Sleep plays a significant role in maintaining healthy functioning of the body. While there have been many studies centered on the association between short sleep duration and obesity, few studies have focused on the association between sleep duration and obesity in preschoolers. In a recent study published in *Obesity*, researchers at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine explored whether sleep duration was related to overweight/obesity, measured by body mass index (BMI) in preschoolers.

"Our study looked at the association between sleep and obesity among low-income African-American and Hispanic families," said first author Dr. Lydi-Anne Vézina-Im, research scholar with the Children's Nutrition Research Center. Vézina-Im and her team looked at data collected from 228 African-American and Hispanic parents and their preschoolers, aged 3 to 5 years old, recruited from Head Start centers.

"We carefully accounted for several variables that are often known to be associated with overweight/obesity in preschoolers, such as bedtime, energy intake during dinner and television watching. Going to bed later, eating a high energy intake at dinner and watching television, as a measure of sedentariness, would be associated with risk of overweight/obesity among this population. When we consider those variables into our analysis, we wanted to see if our results were explained by these variables instead of sleep duration," said Vézina-Im. "Since it is common to control for demographics including age, gender and ethnicity, we also controlled for those."

Researchers also accounted for whether preschoolers' parents were overweight/obese, measured by BMI, in their analysis since there is data that indicates that parents' BMI is associated with the BMIs of their children. Additionally, the researchers controlled for the stress levels and depressive symptoms of parents. If parents are stressed or depressed, it may impact their child's sleep duration or other behaviors associated with obesity.

"We put these variables in a statistical model to make sure that when we see an association between sleep duration and obesity in preschoolers, it's not all explained by these other variables. It's so we can be more confident in the

results we have. Our results suggest that sleep duration could be a factor to target if you wanted to prevent obesity in the preschool population, but the association between sleep duration and overweight/obesity appears weak. When we controlled for other variables, this association disappeared, which suggests that other factors not measured in the study could explain the risk of overweight/obesity among preschoolers," Vézina-Im said.

Researchers found that longer sleep duration was not associated with lower BMI among the participants after adjusting for preschoolers' and parents' characteristics. The relationship between sleep duration and overweight/obesity was not explained by higher energy intake at dinner. The sleep duration-overweight/obesity association did not vary according to which time preschoolers went to bed or their ethnicity.

"Our study indicates that we still need to explore the connection between sleep duration and obesity. It's still up for debate about the mechanisms behind the association between not sleeping enough and the risk of obesity. Also, sleep is usually related to physical health like obesity, but some studies have found that it is related to mental health and emotional development as well, which we have yet to target, especially in this population," Vézina-Im said.

Other researchers who participated in the study include Sheryl O. Hughes, Tom Baranowski, and Theresa A. Nicklas, all from Baylor.

The first author is the recipient of a fellowship award from the Canadian Institutes of Health Research. This study was partially funded by the United States Department of Agriculture (2006-55215-16696) and Kraft Foods, Inc.



A TALE OF TWO FATS

Researchers develop mouse models to find types of fat that could fight metabolic disease and obesity

The body consists of white and brown fat, both of which play an important role in the functioning of the body. White fat's main role is to store energy, whereas the main function of brown fat is to regulate heat by burning calories. Because brown fat produces a unique protein called uncoupling protein 1 that utilizes fat to generate heat, it can play a role in the balance between nutrient uptake and utilization, and could potentially be used as a therapeutic treatment for metabolic diseases and obesity.

In a recent study in the journal *JCI Insight*, researchers at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine looked specifically at a type of brown fat called supraclavicular brown fat in mice that resembles the same brown fat in humans.

Supraclavicular brown fat is found in the region of the neck above the clavicle bone. When researchers studied this fat in mice, they found that these cells express a high level of uncoupling protein 1. To show that this fat is metabolically active, researchers then transplanted this fat from one group of mice to another group. The group that received additional supraclavicular brown fat had better insulin sensitivity and regulation of body temperature than the other group of mice, which suggests that this fat is involved in the regulation of whole-body metabolism.

Finally, researchers found that this fat in mice can serve as an animal model for studying supraclavicular fat in humans because it resembles and expresses similar gene markers to human supraclavicular fat.

"We can now directly test the physiological importance of the supraclavicular brown fat and determine if loss of this fat affects metabolic homeostasis," said Dr. Miao-Hsueh (Ashley) Chen, assistant professor of pediatrics-nutrition at Baylor and the CNRC and senior author of the paper. "We also can directly test the impact of high-fat diet, exercise, or circadian rhythm on the function of supraclavicular brown fat and screen novel transcriptional regulators that regulate the development of this fat. Lastly, we can study the development of the cells that are responsible for generating this depot."

All of these studies will add significant new insights into our understanding of the origin, function and metabolic contribution of supraclavicular brown fat in humans."

Others who took part in the study include Qianxing Mo, Jordan Salley, Tony Roshan, Xin Guo, Qiang Tong, and Alli M. Nuotio-Antar with Baylor and the CNRC; Lisa A. Baer, Francis J. May, Adam C. Lehnig and Kristin I. Stanford with The Ohio State University Wexner Medical Center; Dr. Eric J. Jaehnig with Rice University and Farnaz Shamsi and Yu-Hua Tseng with Harvard Medical School.

This study was funded by USDA/ARS CRIS 3092-51000-059-02S, NIH P30-DK079638, American Heart Association 16GRNT30720003, and NIH K01-DK105109.

PEER MENTORS CAN EFFECTIVELY ENHANCE SCHOOL-BASED OBESITY INTERVENTION

Schools provide an ideal opportunity to reach children and families to address obesity prevention. However, the most effective school-based obesity interventions are delivered at an intensity that can be difficult for teachers to implement without assistance from research staff. Peer mentors, a type of mentorship that takes place between an individual that has lived through an experience (mentor) and a person new to that experience, may be one way to help facilitate teacher delivered school-based obesity interventions. In a study that compared exercise and nutrition related classes led by physical education teachers with and without the help of peer mentor, researchers at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine found that students showed a greater decrease in standardized BMI in the peer mentored classes. The study appears in the current edition of *Preventing Chronic Disease*.

The research was conducted at a local Houston area school where middle school and high school students are under the same roof. The study was open to both healthy weight students and overweight or obese students.

"The goal with our research has been to develop an evidence-based obesity intervention that could be disseminated to high school teachers in a way that could be implemented in a practical manner within the school setting," said Dr. Jennette Moreno, instructor of pediatrics - nutrition at Baylor, and second author on the study. "We thought we could train high school students, who also attend the same school, to serve as assistants to the teachers, acting as peer mentors in the classrooms and helping to deliver this intervention to younger students."

A total of 506 adolescents took part in the study, and of those, 189 were overweight or obese. Students were randomly divided into two groups led by physical education teachers with or without peer mentors.

Students participated in the study for six months of the school year and the intervention was for five days a week. Four days out of the week they did an intensive physical activity that was based on a circuit training approach and one day a week they had nutrition education.

RESEARCHERS WORK ON DEVELOPING TOMATOES THAT WITHSTAND HARSH CONDITIONS

Tomayto; tomahto – the pronunciation may be up for debate, but what’s clear through research at the USDA/ARS Children’s Nutrition Research Center at Baylor College of Medicine is that by using genetic engineering, tomatoes can be developed to survive conditions in which a normal tomato would die.

“We have created tomatoes that require less water, can survive in drought conditions and produce fruit when a normal tomato plant dies,” said Dr. Kendal Hirschi, professor of pediatrics at the CNRC. “This plant would require less water if grown in the fields for production agriculture.”

Hirschi and his colleagues have studied a gene called GRX17 for several years in the lab, trying to determine its function using gene cloning and biochemistry. This gene is involved in “redox shielding”, i.e., protecting against a process called “redox”, short for reduction-oxidation reactions. This is a chemical reaction in which the oxidation states of atoms are changed—think of rust, where the redox reaction occurs relatively slowly, or fire, where it happens quickly. Redox reactions occur in plants when they become stressed by a pathogen or unfavorable growth conditions, such as drought or bad soil. Since a plant cannot walk away from the stress, the plant must alter its own cellular processes to cope.

“Once we knew that GRX17 was a gene required for redox shielding, we placed this plant gene in crop plants to look at how it changed the plant’s growth and productivity,” Hirschi said. “The goal here was to shield the plant with extra redox protection.”

The result was tomatoes that, in a research greenhouse, needed less water and survived drought, while still producing fruit. Outside of the laboratory, this would mean that crops could be grown in dryer conditions and with less water, which would be beneficial in certain parts of the country and the world where water is scarce.

“This change—expressing a redox shield in plants—is a new approach to change plant stress responses.” Hirschi said.

“We can make plants that require less water and fertilizer, which is a great thing for our environment. However, more testing needs to get done. Are these plants healthy when they are grown in the field as opposed to in a greenhouse as done here at the CNRC? This is really the tip of the iceberg.”

The research was published in *Biochemical and Biophysical Research Communications*. Others who contributed to this work include Qingyu Wu, Ying Hu, Stuart Sprague, Tayebah Kakeshpour, Jungeun Park, and Sunghun Park, all from the Department of Horticulture and Natural Resources at Kansas State University; Paul Nakata and Ninghui Cheng from the CNRC; and Frank White from the Department of Plant Pathology at the University of Florida.

This research was supported by the Kansas State University AES, the National Natural Science Foundation of China, the U.S. National Science Foundation and the U.S. Department of Agriculture, Agricultural Research Service.



The nutrition education was adapted from the Epstein Traffic Light Diet where foods are grouped into categories. Foods in the green group can be eaten in any amount, foods in the yellow group should be portion controlled, and foods in the red group should be eaten in moderation.

In the peer mentor group, the peers were present in the class every day and they helped the teachers in modeling activities, providing positive reinforcement, encouraging students and facilitating the physical activity intervention. On the nutrition days they participated in small groups with the children helping to disseminate the information as well as leading group conversations about the content.

The students were assessed at three different points of the study. Their weight was calculated at the start of the study, six months and again at 12 months.

“We found that participants in both groups improved their weight status from baseline to six months, but we saw better maintenance of the effects at 12 months in the group with the peer mentors,” said Moreno.

Moreno says having peer mentors was an added benefit to encourage students to engage in healthy behaviors.

“As a part of normal development, adolescents naturally want to be like their peers, especially peers

who are the same age or slightly older. There is a tendency to idealize other youth and to strive to be like them. In this study we aimed to take advantage of this natural part of adolescent development. Though we did not specifically measure it, we hypothesized that by having high school students serve as peer mentors and role model healthy behaviors for their younger peers, it would facilitate the perception that healthy eating and exercise was cool, creating a school culture that valued healthy eating and physical activity.”

For students in the group with only the physical education teacher, their BMI decreased but Moreno said it was relatively small, yet comparable to other similar obesity interventions.

“I think that we showed that an obesity intervention delivered by PE teachers with the help of peer mentors has the potential to make improvements in children’s weight status. While the overweight and obese children did not necessarily transition to a healthy weight, they showed improvements and hopefully if they maintain these improvements, over time it could have a positive long-term impact on their weight status and overall health.” This research was supported by the Oliver Foundation.

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Join a CNRC Nutrition Study!

Houston-area residents are invited to participate in the following nutrition research projects designed to help CNRC scientists learn more about the nutritional needs of children. Free parking is provided. Financial compensation is provided for most studies.

FOR MORE INFORMATION ON CNRC STUDIES, CONTACT

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Adult Volunteers Needed H-34291

Volunteers aged 18 to 65 who are either healthy and overweight, or have been diagnosed with type 2 diabetes within the last three years are needed for a metabolic study. The study will investigate whether healthy volunteers, type 2 diabetics and ketosis-prone diabetics make an important compound called arginine in different amounts. Healthy, overweight volunteers should have no chronic medical conditions, and all who reply should consume a diet adequate in calories and protein. Women must not be pregnant.

Baylor Infant Orometer Study H-40416

Researchers are conducting a study to examine infants' (4 months old) feeding behaviors and their overall behavior. The study requires one visit to the CNRC. Financial compensation is provided. For more information, contact Maria Papaioannou at 713.798.7054 or papaioan@bcm.edu.

Fatty Liver Study H-31469

Does fat in the liver increase the future risk for heart disease? Adolescents and young adults aged 11 to 21 who are overweight with and without fatty liver disease are needed for a research study investigating the risk for early heart disease in youth. Study involves body composition, liver scan and blood tests. Compensation provided. If interested, call 713.798.6791 or 713.798.6715.

Survey for Fathers H-38237

Fathers with children ages 5 to 11 are needed to answer an online questionnaire about their interactions with their child to promote physical activity and eating behaviors. Compensation provided. If interested, call Alicia at 713.798.0503, email healthydads@bcm.edu (subject: Fathers' Study) or visit www.healthydads.net.

Teen Heart Health H-30665

Adolescents and young adults aged 12 to 21 (normal weight and overweight) with and without type 2 diabetes are needed for a research study investigating risk for heart disease in youth. Study involves body composition, scan and blood tests. Compensation provided. If interested, call 713.798.6791.

Peppermint Oil Study H-40351

Children aged 7 to 12 who have frequent abdominal pain are needed for a research study on peppermint oil (how it works as well as to determine the appropriate amount given to children to treat frequent belly pain). The study involves three visits to the CNRC with free parking provided. Financial compensation is provided at end of each study visit. If you are interested in participating, please click on the link [Parent Screening Survey Questionnaire](#) and complete the survey. For any additional questions, please email Peppermint@bcm.edu.

VOLUNTEERS