



## NUTRITION & YOUR CHILD

VOL 1 ■ 2015

### WHICH FACTORS HAVE AN IMPACT ON OBESITY AMONG HISPANIC CHILDREN?

Obesity among Hispanic children is an increasing concern, but physical activity can help prevent obesity and other health problems. Many factors influence how active children are, including their parents, the neighborhood they live in and their own characteristics. Two recent papers by researchers from the USDA/ARS Children's Nutrition Research Center (CNRC) at Baylor College of Medicine shed light on factors that may affect physical activity in Latino children.

One study, led by Dr. Teresia O'Connor, assistant professor of pediatrics at the CNRC, focused on understanding what influences Latino parents with preschool aged children to use parenting practices that encourage or discourage their child to be physically active. It examined the influence of demographic, cultural and neighborhood factors on these parenting practices. The other, by Dr. Nancy Butte, professor of pediatrics at the CNRC, looked at how similar variables influenced physical activity and sedentary behavior in school-aged children.

Parenting practices are the things that parents do when they interact with their children to get their child to engage in, and even value doing a particular behavior, such as physical activity. O'Connor's study, published in *BMC Public Health*, involved about 240 Latino parents of preschool-aged children who live in Harris County, Texas, from diverse neighborhoods, including those with high crime and high traffic, high crime-low traffic, low crime-high traffic and low crime-low traffic.

Four different groups of predictors of Latino parents' physical activity parenting practices were examined through a survey that was administered to the parents. These included:

- **Sociodemographics** – gender of child, age of child, parents' age, parents' education and kind of home (single family home, apartment, etc.)
- **Cultural variables** – acculturation and familism (strong attachment to family)
- **Neighborhood variables measured by city or publically available data (objective data)** – crime and traffic risk, as well as distance to parks and play equipment
- **Parent-perceived neighborhood characteristics** – such as parents' perception of the safety of their neighborhood, how available they believe play equipment and parks to be, and stranger danger

"What this paper reported was that it was parents' perceptions of their neighborhood that were the most important predictors of their parenting practices around physical activity," O'Connor said. "And that makes a lot of sense—if they perceive it to be unsafe, that will affect how and whether they encourage their child to be active," she said.

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### RESEARCHERS FIND CORONARY ARTERY CALCIFICATION IN OBESE YOUTH

Obesity in adolescence has been associated with an increased risk for coronary heart disease in adulthood. Researchers at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine investigated if there were signs of coronary artery calcification (the buildup of calcium deposits in the coronary arteries) among adolescents. Such findings could indicate a greater risk of developing coronary artery disease in the future. Their results were recently published in the journal *Diabetes Care*.

Dr. Fida Bacha, associate professor of pediatrics at Baylor, and her colleagues recruited 90 obese adolescents for the study. Of these adolescents, 37 had normal glucose tolerance, 27 had pre-diabetes and 26 had type 2 diabetes. The adolescents underwent evaluation for coronary artery calcifications.

Researchers found that among overweight and obese adolescents, those who had coronary artery calcifications were more likely to have higher body mass index, fat mass and abdominal fat than those who did not. This was independent of other risk factors such as high cholesterol or blood pressure.

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# STUDY SHOWS ACCURACY OF A UNIQUE METHOD TO MEASURE ENERGY EXPENDITURE



Measuring how many calories people burn (energy expenditure) in everyday life is fundamental to many areas of nutrition research, and scientists have relied on several measurement methods in their studies. Many of these methods, however, interfere with usual behavior or have potential measurement errors, making the results difficult to interpret. One method—the doubly-labeled water method—has become increasingly important in nutrition research because of its noninvasiveness and accuracy.

“The doubly-labeled water method is noninvasive, and it measures total energy expenditure while patients and study participants are free living,” said Dr. Nancy Butte, professor of pediatrics at the USDA/ARS Children’s Nutrition Research Center at Baylor College of Medicine. “It’s been a really important tool for nutrition research across all stages of life, including infants, children and pregnant women.”

The ability to measure energy expenditure in a free-living environment is one of method’s key benefits because other important energy expenditure methods, such as room calorimeters, require that the subjects remain in a closed room over a 24-hour period while doing structured activities like sleeping, playing and exercising in an attempt to simulate their daily lives in the external, free-living environment.

The CNRC played a major role in the development of the doubly-labeled water method. It is a stable isotope method that tracks two end products of metabolism—carbon dioxide and water. Study participants drink a special type of water that is enriched with two non-radioactive isotopes. They then go about their normal daily routines for 5 to 14 days, collecting urine samples once a day. The urine is analyzed for the two isotopes from which measurements researchers can calculate carbon dioxide production and thereby estimate total energy expenditure (oxygen consumption) during the study period. Based on this information, researchers can determine how many calories the specific individual must eat to maintain a healthy body weight or to potentially reduce excess weight. Consequently, the doubly-labeled water method has been used to develop dietary reference intakes for energy intake (calorie consumption).

A recent study led by Dr. William Wong, professor of pediatrics at the CNRC, sought to verify the accuracy of the doubly-labeled water method over the decades since its first introduction. The study was published in the *Journal of Nutrition*.

The study showed that the outcome measures, such as energy expenditure or caloric intake, can be reproduced highly accurately over a long period of time, Wong said.

The instrumentation used to measure the isotopes in the doubly-labeled water method is known for its high accuracy and reproducibility. However, there was no scientific data in the literature until this publication to confirm that the measurements on the same samples over long periods of time can be reproduced accurately.

“These findings will allow anyone using the doubly-labeled water method to determine the long-term treatment effect, such as a reduction in energy intake on body weight, increase in physical activity on energy expenditure, or any other clinical treatment to combat obesity,” Wong said.

Others who took part in this research included Lucinda Clarke, USDA/ARS Children’s Nutrition Research Center; Susan Roberts and Sai Krupa Das, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston; Susan Racette, Washington University School of Medicine, St. Louis, Mo.; Leanne Redman, Pennington Biomedical Research Center, Baton Rouge, La.; James Rochon, Manjushri Bhapkar and William Kraus, Duke Clinical Research Institute, Duke University.

Research was funded by a National Institute on Aging grant with support from a USDA/ARS grant.

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. For most studies, financial compensation is provided and transportation may be available.

**FOR MORE INFORMATION ON ANY OF THE FOLLOWING CNRC NUTRITION STUDIES,** contact Marilyn Navarrete at 713.798.7002 or [rilynn@bcm.edu](mailto:rilynn@bcm.edu).

## VOLUNTEERS

### Newborn Colic **NEW!**

Does your infant cry and fuss a lot? Researchers at Baylor College of Medicine and Texas Children’s Hospital are seeking infants between 14 and 28 days of age who are very fussy for possible participation in a feeding study. You must be able to read and understand English and have telephone access to be eligible.

### Adult Volunteers Needed **NEW!**

Healthy, overweight volunteers aged 18 to 65 and volunteers diagnosed with type 2 diabetes within the last three years, also aged 18 to 65, 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.

### Children’s Physical Activity in the Neighborhood **NEW!**

Researchers at Baylor College of Medicine want to study how neighborhoods influence young children’s physical activity. If you enroll, your child will be asked to wear activity monitors and a location monitor for 3 hours (one time only). Your child will be asked to perform a series of tasks at your home and neighborhood with the assistance of a research staff member. The child’s parent has to be with him/her at all times. Study requirements: Healthy child age 3-to-5 years old, family owns a car with child car seat, parent has a valid driver’s license.

### Dietary Changes in Chinese Culture **NEW!**

Children ages 9 to 13 years of Chinese descent are needed for a study to understand their cultural identity and health. The study involves two surveys and an interview and may be completed at home.

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## STUDY SHOWS EPIGENETIC CHANGES CAN DRIVE CANCER

In recent decades scientists have come to believe that epigenetic changes—which don't change the DNA sequence but rather how it is 'read'—play a role in cancer development. In particular DNA methylation, the addition of a methyl group (or molecule), is an epigenetic switch that can stably turn off genes, suggesting the potential to cause cancer just as a genetic mutation can. Until now, however, direct evidence that DNA methylation drives cancer formation was lacking.

Researchers at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine have now created a mouse model providing the first evidence that epigenetic alterations alone can cause cancer. Their report appears in the *Journal of Clinical Investigation*.

"We knew that epigenetic changes are associated with cancer, but didn't know whether these were a cause or consequence of cancer. Developing this new approach for 'epigenetic engineering' allowed us to test whether DNA methylation changes alone can drive cancer," said Dr. Lanlan Shen, associate professor of pediatrics at Baylor and senior author of the study.

Shen and colleagues focused on p16, a gene that normally functions to prevent cancer but is commonly methylated in a broad spectrum of human cancers. They devised an approach to engineer DNA methylation specifically to the mouse p16 regulatory region (promoter). As intended, the engineered p16 promoter acted as a "methylation magnet." As the mice reached adulthood, methylation at the p16 promoter gradually increased, leading to a higher incidence of spontaneous cancers, and reduced survival.

"This is not only the first in vivo evidence that epigenetic alteration alone can cause cancer," said Shen, but this also has profound implications for future studies, because epigenetic changes are potentially reversible. Our findings therefore both provide hope for new epigenetic therapies and validate a novel approach for testing them."

Shen, who is also with the National Cancer Institute-designated Dan L. Duncan Cancer Center at Baylor, predicts that this new approach will be widely useful because in addition to p16, there are many other genes and diseases other than cancer that are connected to epigenetics (such as neurodevelopmental diseases, obesity and diabetes).

"If we can identify epigenetic changes that predispose people to cancer, these may actually be treatable or preventable, so to me this fuels optimism regarding new ways to address cancer," said Dr. Robert Waterland, associate professor of pediatrics at Baylor, who was also involved in the study.

Others who took part in the study include Da-Hai Yu, Pumin Zhang, Deborah Schady, Miao-Hsueh Chen, Yongtao Guan and Manasi Gadkari, all with Baylor. Funding for this study came from grants from the Sidney Kimmel Foundation, the U.S. Department of Agriculture-Agricultural Research Service, the March of Dimes and the National Institute of Diabetes and Digestive and Kidney Diseases (1R01DK081557), a part of the National Institutes of Health.

## OBESITY FACTORS

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Sociodemographic factors were associated with some of the parenting practices, but neighborhood characteristics measured objectively and cultural variables were not associated with parenting practices to either encourage or discourage physical activity.

"This is important information for researchers and program developers going forward," O'Connor said. "If you're trying to develop interventions to promote physical activity for Latino preschoolers, you really need to deal with their parent's perceptions of the neighborhood in which they live."

Butte's research, which appeared in the *International Journal of Behavioral Nutrition and Physical Activity*, was a longitudinal study conducted over two years that sought to identify parental, child and neighborhood factors that influenced children's physical activity and sedentary behavior. The study involved 282 8- to 10-year old Latino children in California and their parents.

"We measured several things in this study, and the strongest predictors of physical activity and sedentary behavior were the children's own characteristics, specifically age, gender and BMI," Butte said.

Because of the longitudinal design, results revealed some interesting trends across the study period, including that physical activity tracked over time. As the kids in the study got older, their moderate to vigorous physical activity decreased and sedentary behavior increased, as measured repeatedly by an accelerometer. In addition, boys had more moderate to vigorous physical activity than girls. The kids' body mass index (BMI) also impacted their activity—the higher their BMI, the higher the sedentary behavior.

Parental factors, particularly maternal BMI and education, paternal age and acculturation, played a minor role in the children's physical activity and sedentary behavior.

Neighborhood factors, including neighborhood disorder and victimization, proved to have little influence over children's behaviors. This finding was contrary to what researchers expected, Butte said. Study participants came from a variety of neighborhoods and areas, and it was thought that less access to parks and more concerns about crime would have impacted activity and sedentary behavior.

Others involved in Butte's study were Steven Gregorich, Jeanne Tschann, Carlos Penilla, Lauri Pasch, Cynthia De Groat and Suzanna Martinez, University of California at San Francisco; Elena Flores, University of San Francisco; Julianna Deardorff, University of California at Berkeley; and Louise Greenspan, Kaiser Permanente San Francisco. The research was supported by a grant from the National Heart, Lung and Blood Institute awarded to Jeanne Tschann.

Others involved in O'Connor's study were Ester Cerin, The University of Hong Kong and Deakin University, Australia; Rebecca Lee, University of Houston and Arizona State University; Nathan Parker, University of Houston; Tzu-An Chen, Sheryl Hughes, and Tom Baranowski, all of the CNRC at Baylor; and Jason Mendoza, CNRC and University of Washington School of Medicine. The study was funded by a grant from the National Institutes of Health-Eunice Kennedy Shriver National Institute of Health and Human Development.

## NUTRITION & YOUR CHILD

is published quarterly by Baylor College of Medicine as a research and information update for the general public and Center volunteers and supporters. Send comments or change of address information to

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The Children's Nutrition Research Center is operated by Baylor College of Medicine, in cooperation with Texas Children's Hospital, for the Agricultural Research Service of the United States Department of Agriculture.

## CALCIFICATION IN OBESE YOUTH

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Researchers concluded that there is evidence of coronary artery calcification in obese adolescence.

"These findings are concerning," said Bacha. "Early manifestations of atherosclerosis should not exist in adolescence."

Bacha and researchers emphasize the increased risk of cardiovascular disease in obese adolescents and the need for early interventions to reverse obesity and the early signs of atherosclerosis.

Others who took part in the study include Daniel Edmundowicz from Temple University, and Silva Arslanian from the Children's Hospital of Pittsburgh. This work was supported by the Thrasher Research Fund, University of Pittsburgh Ultrasound Research, U.S. Public Health Service grant K24-HD-01357, Richard L. Day Endowed Chair, Department of Defense grants FA7014-09-2-0008, MO1-RR-00084, UL1-RR-024153 and the U.S. Department of Agriculture/Agricultural Research Service.

## VOLUNTEERS

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Ayuda a los científicos aprender sobre las experiencias alimenticias de los niños con su participación in clases educativas y actividades alimenticias con otras familias. Todas las madres serán recompensadas por su tiempo en cada día de pruebas. Las clases se llevaran a cabo en el código postal 77092.

### Cardiovascular Study

13- to 18-year old adolescents and young adults (normal weight and overweight) with and without type 2 diabetes are needed for a research study investigating risk for heart disease in youth. The study involves body composition, heart scan and blood tests.

### Fatty Liver

11- to 21-year old overweight adolescents and young adults with and without liver disease are needed for a research study investigating risk for early heart disease in youth. The study involves body composition, liver scan and blood tests.

### Pregnancy & Child Health

Did you have a pregnancy complicated by preeclampsia or a baby with low birth weight? Can a complicated pregnancy in mom put the child at risk for future health problems? To answer this question, we are conducting a research study that looks at pregnancy history and its effect on the child's health. 8- to 11-year old children of both eclamptic and non-preeclamptic pregnancies are needed as well as 8- to-17 year olds of pregnancies with high blood pressure. The study involves body composition and blood tests.

### Games for Health

Children ages 10 to 12 years old are needed for a 6-month study to understand how to help them eat healthier and be more physically active. Must play two "Games for Health" video games and give us three blood samples. Sign up at [www.g4hstudy.org/s3/Eligibility](http://www.g4hstudy.org/s3/Eligibility). Watch game trailers at <https://www.youtube.com/watch?v=K89f7lqFJ-w> and [https://www.youtube.com/watch?v=3e2z0L\\_bpZM](https://www.youtube.com/watch?v=3e2z0L_bpZM).