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NUTRITION & YOUR CHILD

FLASH TV 3.0: NEW TOOL TRACKS CHILDREN'S TV VIEWING HABITS

Researchers at the USDA/ARS Children's Nutrition Center (CNRC) at Baylor College of Medicine, along with scientists and engineers at Rice University, have developed a novel tool to measure how much time children spend watching television. Known as FLASH TV 3.0— the tool uses advanced machine learning, a series of computerized calculations that pick out patterns in information— to passively monitor screen time in children aged 5 to 12. It was developed with funding from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) to explore whether TV-watching is linked to children's development, growth or physical and mental health outcomes.

FLASH TV 3.0, which looks similar to camera attachments used on computers, can identify when a child is in front of a TV and can differentiate that child from others. When the TV set is on, video data is collected and shared with a computer processor within the FLASH system. The images then go through three steps.

"Our machine-learning procedures first identify if there are any faces in front of the television. Then, it checks to see if those faces match the child we are studying, and last, it tracks to see if the child is actually watching the television or doing something else in the room," said Dr. Teresia O'Connor, professor and associate director for human sciences at the CNRC.

Researchers found some variability; FLASH TV 3.0 worked better for some children than others. Because it uses facial recognition, it relies on algorithms that are similar to many other facial recognition software packages. Some algorithms do not work as accurately with facial features as others.

"We found that while it worked on the vast majority, there was more variability in how well it worked among Black or African-American children," said O'Connor. "We would like to continue to work on improving that. We tried to minimize this difference in performance as much as possible by using newer algorithms developed to specifically address this challenge."

After studying the children, parents received a detailed report of their child's screen use. For some families, the results validate what they already suspected; for others, the data offered new insights. "Some parents are very aware of what their child is doing in terms of screens. Others may be less aware, and this provides them a snapshot of what their kids were doing during the study period," O'Connor said.

Currently, FLASH TV 3.0 is being used to study the association of TV-watching on young children's development and growth through another NIH-

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funded study. To participate in this study, visit bcm.edu/healthcare/clinical-trials/h-52282.

As technology becomes more integrated into everyday life, tools like FLASH TV 3.0 may play a crucial role in helping families and healthcare providers better understand how screen time affects childhood development. By addressing current limitations and ensuring accuracy in measurement, O'Connor and her team hope to inform interventions that will help parents guide their young children to use screens in a way that supports their healthy development.

By Taylor Barnes, senior communications associate at Baylor College of Medicine

RESEARCHERS FIND A WAY TO IMPROVE DIABETES DIAGNOSIS, PREDICT DISEASE PROGRESSION IN CHILDREN

Diabetes is a disease in which the body struggles to regulate blood sugar levels, leading to a buildup of sugar in the bloodstream. The condition is one of the most common chronic diseases in children and adults younger than 20 years. If untreated, diabetes can lead to serious long-term consequences, including kidney disease, vision loss and damage to nerves and blood vessels. These facts highlight the importance of accurately diagnosing the condition as soon as it emerges in children to provide optimal treatment.

There are two types of diabetes, type 1 and type 2, which share many symptoms, making it challenging to accurately diagnose which type of diabetes a patient has in order to plan an effective therapy. However, a study by scientists at the CNRC offers to make diagnosis and disease management easier. The researchers identified blood tests that not only help physicians to distinguish between type 1 and type 2, but also predict disease progression.

Insulin is a hormone produced in the pancreas that regulates blood sugar. Dr. Mustafa Tosur, associate professor of pediatrics, diabetes and endocrinology at Baylor College of Medicine and Texas Children's Hospital, has found that measuring the blood C-peptide protein and autoimmune antibodies that target insulin-producing cells in the pancreas helps distinguish between type 1 and type 2 diabetes. These markers also predict the function of the cells producing insulin in children with emerging diabetes.

The study found a new way to interpret four different combinations of autoimmune antibodies and C-peptide levels. Importantly, Tosur's team demonstrated only one of these combinations identifies patients who may be able to safely stop insulin treatment after diabetes diagnosis.

According to the Centers for Disease Control and Prevention, 352,000 children and adolescents younger than 20 years — or 35 of 10,000 U.S. youth — have been diagnosed with diabetes.

This study is an important contribution to the efforts to prevent and control this serious condition around the world.

By Ana María Rodríguez, Ph.D., lead science writer at Baylor College of Medicine

RESEARCHERS DEVELOP NEW EQUATIONS TO BETTER CALCULATE CHILDREN'S CALORIC NEEDS

Childhood obesity is on the rise and often continues into adulthood; increasing the risk for developing chronic diseases, such as diabetes. Thus, preventing obesity during childhood is important for overall lifelong health. However, knowing just how much a child should eat to support their health without causing excess weight gain differs depending on their body size. Accurate calculations of a child's total energy (or caloric) needs is important to ensure that they remain in energy balance, meaning the amount of energy they eat balances the energy they use, which is ideal for maintaining their health.

Researchers at the CNRC realized that existing equations used to predict a child's energy needs might not be accurate, particularly for children who have excess weight. They believed it was necessary to refine these equations and focused on the estimation of basal energy expenditure (BEE), which is the amount of energy a body needs when it is resting. BEE accounts for 60-to-70% of a child's energy needs. Their findings were published in the *American Journal of Clinical Nutrition*.

"Energy equations utilize BEE in addition to an estimate of physical activity level to come up with the total energy requirement for a child during a 24-hour period," said Dr. Fida Bacha, professor of pediatric nutrition and endocrinology and diabetes at Baylor College of Medicine and senior author of the paper.

The study included more than 1,000 boys and girls between the ages of 5 and 19 years who were of normal weight, overweight or obese. Their BEE was measured in a specialized facility at the CNRC called a room calorimeter, that measures a person's oxygen usage and carbon dioxide production, from which energy expenditure is calculated. Researchers also measured each individual's weight, height, waist and hip circumferences and their fat and lean mass. From these measurements, the investigators developed new BEE prediction equations and then tested their accuracy in a subset of the study population. They also compared their equations to others published in the literature.

The new equations accurately predicted the children's measured BEE. It performed equally well with children who are healthy weight, overweight and children with obesity. The new equations were also more accurate than those previously available in literature.

> ***"This model will get us closer to predicting the actual energy needs of children, so that we don't overestimate how many calories they need in a day."***

Bacha said, "We can say that this study sets a foundation for further research into energy expenditure in children and more personalized recommendations tailored to each child's specific energy needs."

Accurate BEE predictions can contribute to better health outcomes, especially in children who have excess weight, by ensuring that they receive the right amount of calories needed for good health and normal development without gaining excess weight.

"The new prediction equations can be applied widely and have implications for public health strategies that aim to prevent childhood obesity and chronic diseases. We are happy that we were able to provide this improvement to the study of energetics in children, and I think it will have a positive impact on the efforts to reduce obesity in this population." Bacha said.

By Homa Warren, senior communications associate at Baylor College of Medicine

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JOIN A CNRC NUTRITION STUDY!

Houston-area residents are invited to participate in the nutrition research projects designed to help CNRC scientists learn more about the nutritional needs of children. Parking is free and financial compensation is provided for most studies. **For questions on becoming a CNRC research volunteer, call Noemi Islam at 713.798.7002 or email nislam@bcm.edu**

Please scan the QR code provided and join the legions of families helping the CNRC advance science through research. Our researchers are interested in studying children of all ages on diverse topics.