



***The Journal of Nutrition* – May 2018 Media Summaries**

The following articles are being published in the May 2018 issue of *The Journal of Nutrition*, a publication of the American Society for Nutrition. Summaries of the selected articles appear below; the full text of each article is available by clicking on the links listed. Manuscripts published in *The Journal of Nutrition* are embargoed until the article appears online either as in press (Articles in Press) or as a final version. The embargoes for the following articles have expired.

Might childhood malnutrition predispose teenage boys to behavioral problems?

Can altering the caloric density of foods help with appetite control?

New study finds dietary patterns might be established by 1 or 2 years of age

Might childhood malnutrition predispose teenage boys to behavioral problems?

Mental illness among children and adolescents continues to be a serious public health problem worldwide. In fact, experts estimate that mental health problems affect between 10 and 20% of children and adolescents worldwide. In the United States, about 7% of children and teens are thought to suffer from attention-deficit/hyperactivity disorder (ADHD), 3% from anxiety, and 2% from depression. These conditions and others not only affect physical and mental health during the formative years, but also extend into adulthood if not adequately treated. Malnutrition during infancy and childhood is known to play an important role in cognitive and behavioral development, and thus likely also impacts risk for mental illness. For example, iron deficiency in infancy can negatively influence a child's ability to learn, cause behavior problems and anxiety in adolescence, and is associated with higher risk of psychiatric disorders in adulthood. In a study published in the May 2018 issue of *The Journal of Nutrition*, Dr. Eduardo Villamor (University of Michigan) and colleagues report their findings that inadequate iron and vitamin B12 status during the pre-teen years may also preferentially increase risk of behavioral problems in adolescent boys but not girls.

This research leveraged the Bogotá School Children Cohort study, an initiative launched in 2006 to investigate the complex relationship between nutrition and health in Colombian children. When the study began, 3202 school-aged children (5 to 12 years old) were enrolled, and a variety of data collected regarding a wide range of habits, such as typical diet. The children were also weighed and their heights measured, and blood samples were collected from a subset and analyzed for markers of zinc, iron, vitamin B12, and vitamin A levels. Between 2011 and 2015, about a third of the study participants were contacted again and asked to complete a questionnaire assessing their mental health. The questionnaire asked about aggressive and rule breaking behaviors, anxiety, depression, physical complaints, attention problems, social problems, and cognition. The researchers then explored whether nutritional status measured at the start of the study was related to behavioral problems during adolescence.

Childhood iron deficiency was associated with higher scores in scales that measure both "internalizing" behaviors, such as anxiety and depression, and "externalizing" behaviors, such as aggression and rule breaking. Low levels of vitamin B12 were also associated with increased chances of developing the latter. Interestingly, however, these relationships were only true for the boys. There were no detectable relationships between zinc and vitamin A nutrition and behavior problems. The authors urge controlled intervention studies to determine if these relationships are causal (rather than coincidental) in nature.



Reference Robinson SL, Marín C, Oliveros H, Mora-Plazas Mercedes, Richards BJ, Lozoff B, Villamor E. [Iron deficiency, anemia, and low vitamin B-12 serostatus in middle childhood are associated with behavior problems in adolescent boys: results from the Bogotá school children cohort.](#) *Journal of Nutrition* 2018;5:760-770.

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Can altering the caloric density of foods help with appetite control?

On a gram-for-gram basis, the number of calories you get from foods can vary substantially depending on their water and fat contents. Nutrition researchers refer to this concept as the 'energy density' of a food, defined as the amount of energy (or calories) per gram of food. Foods with lower energy densities provide fewer calories per gram of food than those with higher energy densities. Low-energy-density foods include soups and stews which have high water contents, pasta and rice that absorb water during cooking and contain little in the way of oils, and fruits and vegetables that are naturally high in water and low in fats. High fiber foods, such as whole grains and legumes, also tend to have low energy densities. Some research in non-dieting participants has provided evidence that consuming low-energy-dense foods and beverages before a meal can decrease the number of calories consumed from the meal. None-the-less, whether low-energy-dense foods increase fullness and decrease food intake in individuals engaged in weight loss and whether following a program that involves eating low-energy-dense foods results in greater weight loss compared to a program focusing simply on calorie restriction are not known. The May 2018 issue of *The Journal of Nutrition*, however, includes results from an encouraging study designed to help answer these questions.

This research project was led by Dr. Nicola Buckland at the University of Leeds (United Kingdom; now at the University of Sheffield, UK) and involved 78 overweight and obese women who were already involved in one of two weight-loss programs: Slimming World, a group-based commercial weight loss program which advocates for low-energy-dense foods, or the self-led National Health Service Live Well program, which focuses on restricting daily intake to 1400 kilocalories. To help account for confounding variables, participants in the two weight-loss programs were matched for age and body mass index (BMI). During the 12-week study, the participants attended sessions at a research lab and were provided with a day of either low- or high-energy-density foods. The purpose of these session was to examine the effects of consuming these types of foods on a variety of outcomes including hunger and fullness, calorie intake, and preferences for low- and high-energy-dense foods. Body weight was also monitored throughout the study.

The research team found that individuals enrolled in Slimming World program lost more weight than those participating in Live Well. In addition, during the lab sessions, all participants reported increased feelings of fullness, were less hungry, and consumed an average of 1507 fewer calories after the low-energy-dense breakfast and lunch meal compared to the high-energy-dense meals. The researchers concluded that consuming low-energy-dense meals can improve appetite control in women attempting to lose weight, and the effect appears to be long lasting.



Reference Buckland NJ, Camidge D, Croden F, Lavin JH, Stubbs RJ, Hetherington MM, Blundell JE, Finlayson G. [A Low Energy–Dense Diet in the Context of a Weight-Management Program Affects Appetite Control in Overweight and Obese Women](#). *Journal of Nutrition* 2018;5:798-806.

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New study finds dietary patterns might be established by 1 or 2 years of age

Experts agree that dietary patterns can greatly influence health throughout the entire lifespan. For instance, increased consumption of fruits, vegetables, and dairy foods is associated with lower risks for a variety of conditions such as obesity, cardiovascular disease, and certain forms of cancer. Nonetheless, it is difficult for many adults to shift what they eat due to a litany of factors such as food preferences and long-ingrained habit. This is one of the reasons it is critically important to establish healthy eating patterns early in life. But what is the critical window of opportunity in terms of when these preferences are established? Some studies have suggested that food patterns are already established in childhood. But in a paper published in the May issue of *The Journal of Nutrition*, Dr. Joaquin Escribano (University of Rovira and Virgil, Spain) and colleagues provide proof that dietary habits may be formed as early as 1 year of age.

The researchers tested their hypothesis by evaluating a previously collected dataset associated with the European Union's Child Obesity Project which longitudinally studied 633 children living in Germany, Belgium, Italy, Poland, and Spain. Consumption of all foods and beverages was carefully recorded for each child multiple times from 1 to 8 years of age. The researchers applied a variety of statistical techniques to these data to determine whether what the children were fed when they were toddlers was related to what they chose to eat at later ages.

In general, children's diets when they were 1 year old fell into two patterns. These were referred to by the scientists as (1) "core foods" rich in vegetables, fish, olive oil, and meat and lower in ready-to-eat infant foods, sugar, and sweets and (2) "poor quality fats and sugars" high in saturated spreads, sugar, fruit juices, and sweets and low in olive oil, fish, and milk. Between 2 and 8 years of age, 3 patterns emerged: in addition to the dietary patterns identified when the children were 1 year old, there was also a subset of the children who consumed a "high protein" diet rich in milk, fish, eggs, meat, chips, and olive oil and low in fruits. The researchers discovered that the children whose diets most closely mapped to one of these food patterns when they were 1 and 2 years old were very likely to continue choosing these types of foods when they were 8 years old. They concluded that "dietary patterns are established between 1 and 2 years of age and track into mid-childhood." Additional research will be needed to determine if a concerted effort to alter a toddler's diet will influence what his or her dietary choices later in life.



Reference Luque V, Escribano J, Closa-Monasterolo R, Zaragoza-Jordana M, Ferré N, Grote V, Koletzko B, Totzauer M, Verduci E, ReDionigi A, Gruszfeld D, Socha P, Rousseaux D, Moretti M, Oddy W, Ambrosini GL. [Unhealthy dietary patterns established in infancy track to mid-childhood: the EU Childhood Obesity Project.](#) *Journal of Nutrition* 2018;5:752-59.

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