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Nutrition Perspectives

University of California, Davis, Department of Nutrition and the Center for Nutrition in Schools

Self-Regulation in Toddlers and Risk of Obesity in Kindergarten

Self-regulation is an important skill that may impact that risk of obesity. Because self-regulation in early childhood may be associated with risk of obesity as an adult, childhood obesity prevention efforts have begun to focus on improving these skills. Despite this, not much is known about how self-regulation differs in its impact of obesity risk between genders, and there have been few population-based cohorts examining the relationship between self-regulation and obesity risk in young children.

A recent study published in *JAMA Pediatrics* used data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) to investigate different levels of self-regulation in toddlers and prevalence of obesity at kindergarten age (n=6,400). This large, nationally representative cohort study included thousands of children born in 2001 that were followed for the next six years.

During the 24-month assessment, researchers administered a short series of questions to assess cognitive and motor skill development while simultaneously making observations of the child behavior thought to be associated with self-regulation using a 4-item scale. At 5.5 years of age, height and weight were

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measured and used to calculate body mass index (BMI) percentile-for age. Data were also collected on various sociodemographic characteristics to control for these during analysis.

Researchers found that self-regulation varied by gender, with girls more likely to be in the highest quintile (58.2 percent of the quintile) of self-regulation and boys in the lowest quintile (66.5 percent of the lowest quintile). At kindergarten age, boys were more likely to be obese than girls (19.2 percent vs 16.5 percent).

Reserachers found that self-regulation varied by gender.

Interestingly, the pattern of obesity prevalence compared to self-regulation quintile was markedly different between the genders. For boys, those with lowest self-regulation scores had higher BMIs, however this was not statistically significant. For girls, the association between self-regulation and BMI formed a U-shaped curve. Girls with the highest and lowest self-regulation were more likely to be obese compared to those whose self-regulation fell into the middle quintiles. The authors suggested that these results may be related to differing social expectations of behavior from boys and girls from a young age, and that social expectations might induce stress in girls, in turn impacting energy balance and metabolism. These findings suggest that interventions targeting self-regulation may have differing effects on boys versus girls. However, the scale used to assess self-regulation was not validated, which could mean that it might not accurately capture self-regulation. Further research is needed to understand the differences observed in this study.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

CDC Releases 2018 Breastfeeding Report Card

Over 80 percent of infants started out breastfeeding in 2015, demonstrating that most mothers want to breasfeed and try to do so.

Of the approximately 4 million babies born in 2015, most (83.2 percent) started out breastfeeding – but many stop earlier than recommended, according to the 2018 Breastfeeding Report Card released today by the Centers for Disease Control and Prevention (CDC).

Good nutrition starts with breastfeeding exclusively (only breast milk) for about the first six months of life, as recommended by the American Academy of Pediatrics' Policy on Breastfeeding. While nearly 6 in 10 (57.6 percent) infants are still breastfeeding at 6 months of age, only 1 in 4 are breastfeeding exclusively.

"We are pleased that most US babies start out breastfeeding and over half are still breastfeeding at 6 months of age," said Ruth Petersen, MD, MPH, director of CDC's Division of Nutrition, Physical Activity, and Obesity. "The more we support breastfeeding mothers, the more likely they will be able to reach their breastfeeding goals."

Breastfeeding provides benefits for babies and mothers

Infants who are breastfed have reduced risks of asthma, obesity, type 2 diabetes, ear and respiratory infections, and sudden infant death syndrome (SIDS). Breastfeeding can also help lower a mother's risk of hypertension, type 2 diabetes, and ovarian and breast cancer.

Only about one-third of infants were still breastfed at 12 months.

Highlights from the 2018 Breastfeeding Report Card show:

- Among infants born in 2015, 4 out of 5 (83.2 percent) started out breastfeeding. This high

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percentage of babies who start out breastfeeding shows that most mothers want to breastfeed and are trying to do so.

- Almost half (46.9 percent) were exclusively breastfeeding at 3 months.
- Only one-third (35.9 percent) of infants were breastfeeding at 12 months.
- Almost half (49 percent) of employers provide worksite lactation support programs.
- Over 1 in 4 babies are born in facilities that provide recommended maternity care practices for breastfeeding mothers and their babies.
- CDC researchers analyzed data on breastfeeding practices and support from 50 states, the District of Columbia (D.C.), Puerto Rico, Guam and the Virgin Islands. For the first time, the Breastfeeding Report Card includes data for Guam and the U.S. Virgin Islands.

Almost half of infants were still exclusively breastfed at 3 months of age.

Mothers and families benefit from breastfeeding support from all sectors

CDC's recommendations for support to mothers include encouraging hospitals and health care staff to implement practices that support breastfeeding, including helping patients identify covered benefits, such as breast pumps and access to lactation consultants, to help support the mothers' transition back to home, to school, and/or to work.

All sectors of society (family and friends, hospitals, health care offices/clinics, childcare facilities, community-based organizations, and workplaces) can play a role in improving the health of families by supporting breastfeeding. To reach their breastfeeding goals, mothers need worksite accommodations and continuity of care through consistent, collaborative and high-quality breastfeeding services. They need the support from their doctors, lactation consultants and counselors, and peer counselors.

The CDC Breastfeeding Report Card provides state-by-state data to help public health practitioners, health professionals, community members, childcare providers and family members work together to protect, promote and support breastfeeding.

For more information on CDC's work on nutrition and breastfeeding, please visit www.cdc.gov/breastfeeding.

Source: CDC Media Releases. August 20, 2018; https://www.cdc.gov/media/releases/2018/p0820-breastfeeding-report-card.html

Lead Contamination of Ground Turmeric

Lead exposure can cause lasting damage to a child's growth and development. While the removal of lead from paint and gasoline resulted in a marked decrease in lead exposure in children, there are still avenues by which they may become exposed to lead. According to a recent article by researchers from Boston University, a growing body of evidence suggests that ground turmeric adulterated with lead may be causing lead poisoning in children (1).

Lead was found in all ground turmeric samples collected from stores and markets in the Boston area.

Between 2010 and 2014, six cases of lead poisoning in children were linked to culinary spice consumption, and there have been numerous recalls in the U.S. of ground turmeric and curry powder containing turmeric due to lead contamination.

In one study conducted by the researchers in 2011 and 2012, 32 samples of ground turmeric purchased from grocery stores, specialty stores, and ethnic markets all contained detectable amounts of lead, ranging from 0.03 ppm to 99.50 ppm. Half of the samples exceed the FDA's allowable amount of lead in candy of 0.1 ppm, which was chosen as a comparison (the FDA does not currently set limits on lead in spices). One sample exceeded this threshold by almost 1000 times. In a study of turmeric samples from 18 households in Bangladesh, lead concentrations were detected up to 483 ppm, far above the maximum allowed in spices in the country (2.5 ppm).

Turmeric is a root with brightly colored flesh. India is the largest exporter of turmeric in the world.

Lead is poorly absorbed by plants during growth, which suggests that lead is introduced during processing. A turmeric farmer in Bangladesh, interviewed for a newspaper, reported that bright yellow lead chromate was used by traders in the boiling and polishing stages to hide flaws and damage caused by pests and raise the value before being sold to spice processing firms. In a raid conducted by inspectors in India, over 100 bags of raw turmeric contaminated with lead chromate were discovered at a spice manufacturing plant. Bangladesh and India are amoung the leading exporters of

Turmeric *Continued on Page 6*

Turmeric (Continued from page 5)

Turmeric is a common ingredient in curry powder.

turmeric to the U.S.

In the past 50 years, per capita consumption of turmeric has almost doubled. This can be attributed to several factors, including the increased diversity of the population as well as an increase in the use of spices as flavor enhancers to replace salt. Beyond the culinary uses, turmeric is being used more widely as a natural food coloring to replace artificial colors in many processed foods. Research suggesting that turmeric contains antioxidant and anticancer properties has contributed to turmeric becoming one of the highest selling herbal supplements in the U.S.

In light of the evidence of adulteration with lead and the increased consumption of turmeric, the researchers recommend several steps to help prevent further cases of lead poisoning:

- heavy metal screening of spices at major ports,
- targeted field research by the FDA to better understand the pathways by which turmeric is contaminated and how it enters the U.S. food supply,
- development of strategies by the FDA International Food Protection Training Institute to prevent and detect lead contamination,
- lead-specific screening incorporated into the hazard analysis plans of spice facilitates in the U.S.,
- addition of heavy metal risk analysis to the FDA risk profiles for spices, and
- establishment of a maximum allowable level of lead in spices.

Lead chromate is used to adulterate turmeric due to its yellow color.

The researchers also recommend that public health officials and clinicians be aware of the potential for lead contamination in ground turmeric and develop guidance and protocols to be used when investigating cases of lead poisoning.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

Intermittent Fasting and Glycemic Control in Patients with Type 2 Diabetes

Participants in the intermittent fasting group were limited to 500-600 calories per day for two days each week, and were instructed to eat their normal diet the other five days of the week.

Intermittent fasting has received an increasing amount of attention over the last few years as a method for weight loss that is less burdensome than a traditional calorie-restricted diet. While there is research to suggest it is as effective as continuous calorie restriction when it comes to the total amount of weight lost, at least in the short term, there is less known about whether it can positively impact glycemic control in those with Type 2 diabetes. In a recent article published in *JAMA Network Open*, researchers from the University of South Australia investigated that question.

In a randomized study, overweight and obese adults with Type 2 diabetes were assigned to either an intermittent energy restriction group (n=70) or a continuous energy restriction group (n=67). In the intermittent group, participants were limited to 500-600 calories per day with at least 50 grams of protein for two days each week, and were instructed to eat their normal diet the other five days of the week. In the continuous group, participants were limited to 1200-1500 calories per day (about 70 percent of their normal calorie needs). Individuals in both groups met regularly with a dietitian and worked with an endocrinologist to manage their diabetes medication throughout the trial. To determine the success of the diets in improving glycemic control and weight loss, measurements were taken at baseline, 3 months, and 12 months. These included body weight, body composition, fasting blood glucose and lipids, and hemoglobin A1c (HbA1c), a measure of overall glycemic control .

Both groups experienced a decrease in HbA1c and weight, with no significant differences between the groups. Those with higher baseline levels HbA1c had greater improvements in glycemic control. This may be due to having more room for improvement; those with already well-controlled type 2 diabetes may be less able to further reduce their HbA1c. Measurements taken at 3 and 12 months suggest that the majority of the

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Hemoglobin A1c provides an approximate average of blood glucose control over a two- to three-month span.

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weight loss occurred within the first three months and then was maintained for the remainder of the trial. Patients tended to adhere to both diets fairly well in the first three months, with the adherence beginning to decline at that point from around 90 percent to closer to 50 percent by the end of the study. Anecdotally, participants reported that intermittent energy reduction was useful in preventing weight regain, because it only required fasting two days per week.

While fasting blood glucose was measured in the study, the primary measure of glycemic control was hemoglobin A1c.

The authors concluded that intermittent energy restriction may be an effective alternative to a traditional diet in reducing HbA1c in patients with type 2 diabetes. However, they did caution that patients using diabetes medications such as sulfonylureas or insulin should be monitored by a doctor due to the danger of hypoglycemia.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

Obesity May Be Related to How Long an Individual is Contagious with the Flu

Influenza can be a serious illness, causing as many as 700,000 hospitalizations and 56,000 deaths annually, according to the CDC.

When someone is obese, they are more likely to become more severely ill when they contract influenza (often called the flu) than someone who is normal weight. But are they also contagious for a longer period of time?

In a recent paper published in the *Journal of Infectious Diseases*, a large study of households in Nicaragua was conducted over multiple flu seasons to investigate this question (1). Three flu seasons were included in the study: late 2015, 2016/2017, and late 2017. As soon as someone within a participating household became ill with the flu, everyone within the household was monitored. This consisted of daily symptom

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diaries and home visits every two to three days in which researchers took nose and throat swabs and measured temperatures. Only secondary cases, those who became ill after monitoring began, were included in the analysis. This allowed researchers to begin track the illness before a patient even began to have symptoms or if they never exhibited symptoms at all.

Overall, 1783 people in 320 households participated in the study, with 276 secondary cases included in the final analysis. A little over half (58 percent) had contracted influenza A, while the remainder were influenza B.

CDC recommends annual influenza vaccination for everyone 6 months and older.

Obese adults with symptoms were contagious with the influenza A virus 42 percent longer than normal-weight adults. This was not the case with influenza B, as there was no significant difference between obese and normal weight individuals with regards to how long they remained contagious. Among cases of influenza A in which individuals had very few or no symptoms, obese adults were contagious 104 percent longer than normal weight adults.

The authors suggest a few possible mechanisms to explain this difference. Obesity can lead to altered immune function, which may partly explain why obese individuals tended to remain contagious longer than normal-weight individuals. Obesity can also contribute to difficulties in breathing and increased oxygen requirements; as the flu is a respiratory virus, this may also play a role. Other research has suggested that obesity is associated with an increase in the amount of virus present in the breath (2).

While this study found an association between obesity and the duration for which someone was contagious, it's unclear how this relates to transmission of the virus to others within the household. The authors stated that because the flu virus tends to spread more quickly within households compared to the wider community, the duration that someone is contagious may not have large impact in the spread of the flu within a household. Further research is needed to elaborate on the effect of obesity on virus transmission within the home.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

Some Facts about Organic Foods

What are organic foods?

The term "organic" is used to label foods and products that grown and produced using specific methods and practices. Practices and materials used in the production of organic products aim to improve the ecological balance of natural systems, minimize pollution, and optimize the productivity and relationship between soil life, plants, animals, and people (1). The focus of preserving and developing soil to counteract changes due to the industrialization of agriculture was at the core of the beginning of the organic movement in Europe in the 1920s (2).

While certifications and regulations for the use of the term "organic" can vary worldwide, the United States Department of Agriculture oversees the monitoring, approval and definition of the term "organic" in the United States (3).

Demand for organic food products has grown tremendously over the last decade with $43 billion spent in 2016 alone, accounting for 5.3 percent of total food sales in the United States (4).

How are methods and practices for producing organic foods different from conventional foods?

Produce: Organic farming excludes the use of synthetic pesticides and sewage sludge. It also requires the producer to use methods that maintain or improve biological, physical, or chemical condition of the soil. Some naturally-occurring substances can be used as pesticides, such as extracts from microorganisms or plants. Examples of organic farming practices include regularly rotating crops, increasing diversity of crops and livestock, soil enhancement, and non-synthetic pesticide pest control. The seeds planted for organic produce must be from organically grown products, and may not be genetically engineered unless there is no organic equivalent to the seed.2 These practices have been shown to have environmental benefits because of the reduction of chemical inputs and improved soil quality (5,6).

Meat and dairy: To be considered organic, the animals (both used for meat and those producing the milk) must be fed 100 percent organic feed. This can include feed grains and the foraging of open pastures. Organic farming practices also forbid: any drugs, including

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hormones, which promote growth; plastic pellets for roughage; urea or manure being added to feed; the use of mammal or poultry-derived by-products in the feed, including animal fats; and excessive or unnecessary use of dietary supplements. Animals must also be kept in healthy, low stress environments that allow for exercise and freedom of movement (7).

There are very specific rules for the labeling of organic foods. These rules are set by the United States Department of Agriculture. In order to receive an organic food label, the food must meet production requirements and be overseen by a USDA National Organic Program-authorized certifying agent (8). These production requirements include three limitations:

1. cannot use excluded methods (e.g. genetic engineering),
2. must use only allowable substances on the National List of Allowed and Prohibited Substances, and
3. must be overseen by a USDA National Organic Program-authorized certifying agent that also follows all USDA organic regulations (8).

Table 1 explains the differences between different organic labels approved by the USDA.

Table 1: Explaining the Approved Organic Seals (8)

Words allowed on packaging	"100% Percent Organic"	"Organic"	"Made with Organic Ingredients"
Approved USDA seal	USDA ORGANIC	USDA ORGANIC	*Cannot show USDA Organic seal, but can list up to three organic ingredients or ingredient categories.
Specific regulations	All ingredients must be certified organic. Any processing aids must be organic.	All agricultural ingredients must be certified organic. Up to five percent of the product may be non-organic ingredients allowed (excluding salt and water).	At least 70 percent of the product must be certified organic ingredients (excluding salt and water). Non-agricultural products must be specifically allowed; additional agricultural ingredients must be produced without excluded methods determined by USDA.

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Organic (Continued from page 11)

Any products with the word "organic" appearing anywhere on the label must provide the name of the certifying agent on the information panel and must identify organic ingredients with a symbol, such as an asterisk (8).

Are there nutritional differences between conventional and organic foods?

Results from a recent survey showed that health motivation is the largest factor for choosing organic foods (2). However, there is limited scientific evidence suggesting that organic foods are any healthier than conventionally grown foods (9).

A selection of studies have suggested that organically grown produce provides more vitamin C, total antioxidants, mineral content, and omega-3 fatty acids (2,10).

Organic milk and meat has been shown to have different composition of fatty acids when compared to conventional counterparts (2). Differences in fatty acid content include increases in alpha linolenic acid, omega-3 fatty acids, linoleic acid, eicosapentaenoic acid and docosahexaenoic acid (11). One study reported higher levels of fat-soluble vitamins in organic milk when compared to conventional milk; another reported that organic milk has been found to have slightly lower concentrations of iodine and selenium (12,13).

While there is some evidence that there are some compositional differences between organic and conventionally grown foods, there is not sufficient evidence that these changes have any significant implication on human health, especially in a well-nourished population (2,14).

Is there a risk in consuming conventionally grown foods?

The belief that consuming conventionally grown foods carries risk started around the 1960s. For two decades prior, the now-banned pesticide DDT had been prevalent to increase crop yields and thought to be safe to vertebrates. However, as time continued, evidence of adverse effects to human health and the environment were discovered and the use of pesticides overall became a public concern. A study examining 2240 food items concluded that detected levels of pesticides in the diet were far below a level that would be of health concern (15). Overall, there is lacking evidence to suggest that there is risk to consume conventionally grown foods to humans (14).

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Are there health implications to consuming organic foods?

Some researchers have expressed concern that organically-produced milk is significantly lower in iodine than its conventional counterpart. This concern, however, has not been supported by scientific evidence as the difference does not have considerable health implications (16). There are also a number of studies reporting a higher level of bacterial contamination on organic produce due to the omission of synthetic pesticides (17).

How can I properly clean fruits and vegetables?

To remove potentially pathogenic bacteria or any remaining pesticide residues from your produce, rinse all produce under running water. If the produce has a hard outer rind (like watermelon, squash, potatoes or melons), scrub the outside thoroughly with a brush (18). Experts recommend separating the outer layers of leafy vegetables before rinsing until you can't see any visible dirt (19).

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By Taylor Berggren, Gabriela Ayala, Roxanna Tamayo, and Preet Gill, Anna M. Jones, and Rachel E. Scherr. Center for Nutrition in Schools, Department of Nutrition, University of California, Davis

Seven Tips for Cleaning Fruits, Vegetables

Before stating any food preperation, including cleaning fruits and vegetables, wash hands thoroughly for 20 seconds.

Federal health officials estimate that nearly 48 million people are sickened by food contaminated with harmful germs each year, and some of the causes might surprise you.

Although most people know animal products must be handled carefully to prevent illness, produce can also be the culprit in outbreaks of foodborne illness. In recent years, the United States has had several large outbreaks of illness caused by contaminated fruits and vegetables—including spinach, cantaloupe, tomatoes, and lettuce.

Glenda Lewis, an expert on foodborne illness with the Food and Drug

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After produce is harvested, it passes through many hands, increasing risk for contamation.

Administration (FDA), says fresh produce can become contaminated in many ways. During the growing phase, produce may be contaminated by animals, harmful substances in the soil or water, and poor hygiene among workers. After produce is harvested, it passes through many hands, increasing the contamination risk. Contamination can even occur after the produce has been purchased, during food preparation, or through inadequate storage.

If possible, the FDA says to choose produce that isn't bruised or damaged, and make sure that pre-cut items—such as bags of lettuce or watermelon slices—are either refrigerated or on ice, both in the store and at home. In addition, follow these recommendations:

1. Wash your hands for 20 seconds with warm water and soap before and after preparing fresh produce.
2. If damage or bruising occurs before eating or handling, cut away the damaged or bruised areas before preparing or eating.
3. Rinse produce BEFORE you peel it, so dirt and bacteria aren't transferred from the knife onto the fruit or vegetable.
4. Gently rub produce while holding under plain running water. There's no need to use soap or a produce wash.
5. Use a clean vegetable brush to scrub firm produce, such as melons and cucumbers.
6. Dry produce with a clean cloth or paper towel to further reduce bacteria that may be present.
7. Remove the outermost leaves of a head of lettuce or cabbage.

Foodborne illness outbreaks have been linked to several fruits and vegetables, including spinach, cantaloupe, tomatoes, and lettuce.

Lewis says consumers should store perishable produce in the refrigerator at or below 40 degrees.

Source: FDA Consumer Updates. Updated June 10, 2018; https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm256215.htm

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UCDAVIS

University of California, Davis

Nutrition Perspectives
Nutrition Department
One Shields Ave.
Davis, CA 95616

Phone:
530.752.3387

Fax:
530.752.8905

Nutrition Perspectives
University of California, Davis
Nutrition Department
One Shields Ave
Davis, CA 95616