



YALE RUDD CENTER
FOR FOOD POLICY & OBESITY

Study Synopses: Sugar-Sweetened Beverages (SSBs) and Child Obesity

Citation	Funder(s)	Conclusions
DeBoer, M.D., Scharf, R.J., Demmer, R.T. (2013). Sugar-sweetened beverages and weight gain in 2- to 5-year-old children. <i>Pediatrics</i> , in press.	NIH	Higher rates of SSB consumption were associated with higher BMI scores among children ages 4 and 5 years but not yet at 2 years. Children aged 5 years who drank SSBs regularly were at greater risk for being obese.
Flores, G., Lin, H. (2013). Factors predicting severe childhood obesity in kindergarteners. <i>Int J Obes</i> , 37, 31 - 39.	n/a	Sugary beverage consumption in kindergarten at least weekly was associated with more than double the odds of severe kindergarten obesity.
Malik, V.S., Pan, A., Willett, W.C., Hu, F.B. (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. <i>Am J Clin Nutr</i> , 98.4, 1084 - 1102.	NIH	A review and meta-analysis of a total of thirty-two prospective cohort studies and trials showed an overall positive association between consumption of SSBs and body weight in both children and adults.
Morgan, R.E. (2013). Does consumption of high-fructose corn syrup beverages cause obesity in children? <i>Pediatr Obes</i> , 8, 249 - 254.	n/a	Two systematic reviews found no relationship between consumption of high-fructose corn syrup beverages and childhood obesity; two other systematic reviews found possible links. Meta-analyses found that consumption can contribute to obesity and limiting SSBs may help decrease obesity in children.

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Carlson, J.A., Crespo, N.C., Sallis, J.F., Patterson, R.E., Elder, J.P. (2012). Dietary-related and physical activity-related predictors of obesity in children: A 2-year prospective study. <i>Childhood Obesity</i> , 8.2, 110 - 115.	National Institute of Diabetes and Digestive and Kidney Diseases	Decreasing sugar-sweetened beverage consumption and reducing sedentary behaviors were associated with a decrease in body fat.
Pollock, N.K., Bundy, V., Kanto, W., Davis, C.L., Bernard, P.J., Zhu, H., Gutin, B., Dong, Y. (2012). Greater fructose consumption is associated with cardiometabolic risk markers and visceral adiposity in adolescents. <i>J Nutr</i> , 142.2, 251 - 257.	NIH	Greater consumption of fructose, as found in sugar-sweetened beverages, may increase adolescents' risk of cardiovascular disease and type 2 diabetes because it increases visceral fat (the kind that accumulates around internal organs).
Committee on Nutrition and the Council on Sports Medicine and Fitness. (2011). Clinical report -- Sports drinks and energy drinks for children and adolescents: Are they appropriate? <i>Pediatrics</i> , 127, 1182 - 1189.	n/a	Sports drinks and energy drinks can lead to increased risk of overweight and obesity, as well as dental erosion. In addition, the inclusion of stimulants in energy drinks may pose potential health risks for children and adolescents.
Lasater, G., Piernas, C., Popkin, B.M. (2011). Beverage patterns and trends among school-aged children in the US, 1989 - 2008. <i>Nutr J</i> , 10.103, 1 - 9.	Dunlevie Honors Undergraduate Research Award; RWJF	Study showed a substantial increase in the consumption of SSBs among school-aged children, especially high fat-high sugar milk, soft drinks, and sports drinks, which mirrors current trends of childhood obesity.
Fiorito, L.M., Marini, M., Mitchell, D.C., Smiciklas-Wright, H., Birch, L.L. (2010). Girls' early sweetened carbonated beverage intake predicts different patterns of beverage and nutrient intake across childhood and adolescence. <i>J Am Diet Asso</i> , 110.4, 543 - 550.	NIH, National Dairy Council*	Girls who drank soda at age 5 years had higher soda intake, lower milk intake, higher added sugars intake, and lower protein, fiber, vitamin D, calcium, magnesium, phosphorus, and potassium intake from ages 5 to 15, years than girls who did not consume soda at age 5.

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Ranjit, N., Evans, M.H., Byrd-Williams, C., Evans, A.E., Hoelscher, D.M. (2010). Dietary and activity correlates of sugar-sweetened beverage consumption among adolescents. <i>Pediatrics</i> , 126.4, e754 - e761.	Michael & Susan Dell Center for Healthy Living; Division of Health Promotion and Behavioral Sciences, University of Texas School of Public Health, Austin, Texas	Consumption of sports drinks coexists with healthy dietary and physical activity behaviors, which suggests popular misperceptions of these beverages as being consistent with a healthy lifestyle.
Babey, S.H., Jones, M., Yu, H., Goldstein, H. (2009). Bubbling Over: Soda consumption and its link to obesity in California. Los Angeles: UCLA Center for Health Policy Research and California Center for Public Health Advocacy.	The California Endowment	In California, there is a strong correlation between weight and soda consumption. Those who drink one or more sodas per day are 27% more likely to be overweight than those who do not drink soda, and soda accounts for 43% of the increase in calorie consumption over the past 30 years.
Fiorito, L.M., Marini, M., Francis, L.A., Smiciklas-Wright, Birch, L.L. (2009). Beverage intake of girls at age 5 y predicts adiposity and weight status in childhood and adolescence. <i>Am J Clin Nutr</i> , 90, 935 - 942.	NIH; The National Dairy Council* ; General Clinical Research Center; the Diet Assessment Center of The Pennsylvania State University	SSB intake at age 5 predicted participants' adiposity and overweight from age 5 to 15. Greater consumption of SSBs at age 5 was associated with a higher percentage of body fat, waist circumference, and weight status from ages 5 to 15.
Lim, S., Zoellner, J.M., Lee, J.M., Burt, B.A., Sandretto, A.M., Sohn, W., Ismail, A.I., Lepkowski, J.M. (2009). Obesity and sugar-sweetened beverages in African-American preschool children: a longitudinal study. <i>Obesity</i> , 17.6, 1262 - 1268.	National Institute for Dental and Craniofacial Research, University of Michigan; Delta Dental Fund of Michigan; NIDDK	Among a longitudinal cohort of African-American preschool children, high consumption of SSBs was significantly associated with an increased risk for obesity.
Malik, V.S., Willett, W.C., Hu, F.B. (2009). Sugar-sweetened beverages and BMI in children and adolescents: reanalyses of a meta-analysis. <i>Am J Clin Nutr</i> , 89, 438 - 439.	Harvard School of Public Health	A re-analysis of the Forshee et al. 2008 study found that the reasons for the discrepant results between Forshee et al. and others stem from analytic errors in their meta-analysis. This re-analysis finds that there is an association between drinking SSBs and high BMI among children and adolescents.

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<p>Sichieri, R., Paula Trotte, A., de Souza, R.A., Veiga, G.V. (2009). School randomized trial on prevention of excessive weight gain by discouraging students from drinking sodas. <i>Public Health Nutr</i>, 12, 197 - 202.</p>	<p>Brazilian National Research Council</p>	<p>Decreasing sugar-sweetened beverage consumption significantly reduced BMI among overweight children, mainly among girls.</p>
<p>Forshee, R.A., Anderson, P.A., Storey, M.L. (2008). Sugar-sweetened beverages and body mass index in children and adolescents: a meta-analysis. <i>Am J Clin Nutr</i>, 87, 1662 - 1671.</p>	<p>American Beverage Association*</p>	<p>This quantitative meta-analysis and qualitative review found that the association between SSB consumption and BMI was near zero, based on the current body of scientific evidence.</p>
<p>Ebbeling, C.B., Feldman, H.A., Osganian, S.K., Chomitz, V.R., Ellenbogen, S.J., Ludwig, D.S. (2006). Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study. <i>Pediatrics</i>, 117, 673 - 680.</p>	<p>NIDDK; Charles H. Hood Foundation; NIH</p>	<p>A simple environmental intervention almost completely eliminated SSB consumption in a diverse group of adolescents. The beneficial effect on body weight of reducing SSB consumption increased with increasing baseline body weight.</p>
<p>Malik, V.S., Schulze, M.B., Hu, F.B. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review. <i>Am J Clin Nutr</i>, 84, 274 - 288.</p>	<p>NIH; American Heart Association</p>	<p>The weight of epidemiologic and experimental evidence indicates that a greater consumption of SSBs is associated with weight gain and obesity in both children and adults.</p>

Citation	Funder(s)	Conclusions
<p>Forshee, R.A., Storey, M.L., Ginevan, M.E. (2005). A risk analysis model of the relationship between beverage consumption from school vending machines and risk of adolescent overweight. <i>Risk Analysis: An Official Publication of the Society for Risk Analysis</i>, 25.5, 1121 - 1135.</p>	<p>American Beverage Association*</p>	<p>There was no relationship between SSB consumption from all sources and BMI. Additionally, the analysis showed no impact on BMI by removing SSB consumption in schools.</p>
<p>Berkey, C.S., Rockett, H.R., Field, A.E., Gillman, M.W, Colditz, G.A. (2004). Sugar-added beverages and adolescent weight change. <i>Obesity</i>, 12.5, 778 - 788.</p>	<p>NIH; Boston Obesity Nutrition Research; Prevention Research Center; CDC; USDA; Kellogg's*</p>	<p>Consumption of SSBs may contribute to weight gain among adolescents, probably due to their contribution to total calorie intake.</p>
<p>Forshee, R.A., Anderson, P.A., Storey, M.L. (2004). The role of beverage consumption, physical activity, sedentary behavior, and demographics on body mass index of adolescents. <i>Intl J Food Sci Nutr</i>, 55, 463 - 478.</p>	<p>American Beverage Association*</p>	<p>There was no statistically significant association between BMI and the consumption of regular carbonated soft drinks and fruit drinks/ades.</p>
<p>James, J., Thomas, P., Cavan, D., Kerr, D. (2004). Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomized controlled trial. <i>BMJ</i>, 328, 1237 - 1243.</p>	<p>GlaxoSmithKline; Aventis; Pfizer; Bournemouth Diabetes and Endocrine Centre</p>	<p>A targeted, school based education program produced a modest reduction in the number of carbonated drinks consumed, which was associated with a reduction in the number of overweight and obese children.</p>

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<p>Newby, P., Peterson, K.E., Berkey, C.S., Leppert, J., Willett, W.C., Colditz, G.A. (2004). Beverage consumption is not associated with changes in weight and body mass index among low-income preschool children in North Dakota. <i>J Am Diet Assn</i>, 104.7, 1086 - 1094.</p>	<p>USDA; NIH; Harvard Education Program in Cancer; Prevention Control; Boston Obesity Nutrition Research Center</p>	<p>This study does not show an association between beverage consumption and changes in weight or body mass index in a population of low-income preschool children in North Dakota.</p>
<p>Novotny, R., Daida, Y.G., Acharya, S., Gvoe, J.S., Vogt, T.M. (2004). Dairy intake is associated with lower body fat and soda intake with greater weight in adolescent girls. <i>J Nutr</i>, 8, 1905 - 1909.</p>	<p>USDA</p>	<p>Soda intake among Asian-Americans was significantly and positively associated with weight gain.</p>
<p>Philips, S.M., Bandini, L.G., Naumova, E.N., Cyr, H., Colclough, S., Dietz, W.H., Must, A. (2004). Energy-dense snack food intake in adolescence: longitudinal relationship to weight and fatness. <i>Obesity</i>, 12.3, 461 - 472.</p>	<p>NIH; Mars, Inc*</p>	<p>In this cohort of initially non-obese girls, overall energy-dense food consumption does not seem to influence weight status or fatness change over the adolescent period; the exception was soda, as the only food significantly related to BMI scores, but not related to the percentage of body fat.</p>
<p>Cullen, K.W., Ash, D.M, Warneke, C, de Moor, C. (2002). Intake of soft drinks, fruit-flavored beverages, and fruits and vegetables by children in grades 4 through 6. <i>Am J Public Health</i>, 92.9, 1475 - 1477.</p>	<p>Children's Nutrition Research Center, Baylor College of Medicine, Houston, TX; Blessing Hospital, Quincy, Ill; Department of Behavioral Science, University of Texas M.D. Anderson Cancer Center, Houston; Cooperative State Research, Education, and Extension Service; USDA</p>	<p>More than 50% of total beverages consumed were sweetened beverages. Students with the highest consumption of total sweetened beverages consume about 330 extra calories per day than those who did not consume sweetened beverages. Higher rates of sweetened beverage consumption were accompanied by lower fruit consumption. African-American and Mexican-American children consumed the most sweetened beverages, as did children of parents with lower education.</p>

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Welsh, J.A., Cogswell, M.E., Rogers, S., Rockett, H., Mei, Z., Grummer-Strawn, L.M. (2002). Overweight among low-income preschool children associated with the consumption of sweet drinks: Missouri, 1999 - 2002. <i>Pediatrics</i> , 115.2, e223 - e229.	CDC; Missouri Department of Health; Harvard Medical School	While normal or under-weight children did not gain weight from drinking SSBs, children who were already overweight were two times more likely to become or remain overweight if they drank SSBs.
Ludwig, D.S., Peterson, K.E., Gortmaker, S.L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. <i>Lancet</i> , 357, 505 - 508.	National Institute of Diabetes and Digestive and Kidney Diseases; National Institutes of Child Health and Human Development; CDC; Charles H. Hood Foundation	Every additional serving of sugar-sweetened beverages consumed by children increases the risk of obesity by 60%.
Harnack, L., Stang, J, Story, M. (1999). Soft drink consumption among US children and adolescents: nutritional consequences. <i>J Am Diet Assoc</i> , 99, 436 - 441.	University of Minnesota School of Public Health	Children who drank an average of 9 ounces of SSBs per day consumed approximately 188 more calories per day than those who did not drink soft drinks.

***Funding from food/beverage industry or organizations representing industry**

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Updated 9/20/13