



Study Synopses: Sugar-Sweetened Beverages (SSBs) and Health Risks

Topic	Citation	Funder(s)	Conclusions
Cancer: Endometrial	Inoue-Choi, M., Robien, K., Mariani, A., Cerhan, J.R., Anderson, K.E. (2013). Sugar-sweetened beverage intake and the risk of type I and type II endometrial cancer among postmenopausal women. <i>Cancer Epidemiol Biomarkers Prev</i> , in press.	National Cancer Institute	Higher intake of SSBs and sugars was associated with an increased risk of type I, but not type II, endometrial cancer among postmenopausal women.
Cancer: Pancreatic	Genkinger, J.M., Li, R., Spiegelman, D., et al. (2012). Coffee, tea, and sugar-sweetened carbonated soft drink intake and pancreatic cancer risk: a pooled analysis of 14 cohort studies. <i>Cancer Epidemiol Biomarkers Prev</i> , 21.2, 305 - 318.	NIH	There is a suggestive, modest positive association for risk of pancreatic cancer for intakes of SSBs.
Cancer: Pancreatic	Mueller, N.T., Odegaard, A., Anderson, K., Yuan, J-M., Gross, M., Koh, W-P., Pereira, M.A. (2010). Soft drink and juice consumption and risk of pancreatic cancer: The Singapore Chinese Health Study. <i>Cancer Epidemiol Biomarkers Prev</i> , 19.2, 447 - 455.	National Cancer Institute	Individuals who consume ≥ 2 SSBs per week are at increased risk of pancreatic cancer.
Cancer: Pancreatic	Larsson, S.C., Bergkvist, L., Wolk, A. (2006). Consumption of sugar and sugar-sweetened foods and the risk of pancreatic cancer in a prospective study. <i>Am J Clin Nutr</i> , 84, 1171 - 1176.	Swedish Research Council/Longitudinal Studies, the Swedish Cancer Foundation, Västmanland County Research Fund against Cancer, Örebro County Council Research Committee, and Örebro Medical Center Research Foundation	The consumption of added sugar, soft drinks, and sweetened fruit soups or stewed fruit was positively associated with the risk of pancreatic cancer.

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Cancer: Prostate	Drake, I., Sonestedt, E., Gullberg, B., Ahlgren, G., Bjartell, A., Wallström, P., Wirfält, E. (2012). Dietary intakes of carbohydrates in relation to prostate cancer risk: a prospective study in the Malmö Diet and Cancer cohort. <i>Am J Clin Nutr</i> , 96, 1409 - 1418.	Swedish Council for Working Life and Social Research; Swedish Cancer Society; Albert Pålsson Foundation for Scientific Research; Gunnar Nilsson Cancer Foundation; Skåne University Hospital Foundations and Donations; Malmö General Hospital Foundation for the Combating of Cancer; Ernhold Lundström Foundation for Scientific Research	A high intake compared with zero consumption of sugar-sweetened beverages was associated with increased risk of symptomatic prostate cancer.
Cardiovascular health	Bernstein, A.M., de Konig, L., Flint, A.J., Rexrode, K.M., Willett, W.C. (2012). Soda consumption and the risk of stroke in men and women. <i>Am J Clin Nutr</i> , 95, 1190 - 1199.	NIH; Harvard Human Nutrition Program	Greater consumption of sugar-sweetened and low-calorie sodas is associated with a significantly higher risk of stroke.
Cardiovascular health	de Koning, L., Malik, V.S., Kellogg, M.D., Rimm, E.B., Willett, W.C., Hu, F.B. (2012). Sweetened beverage consumption, incident of coronary heart disease and biomarkers of risk in men. <i>Circulation</i> , 125, 1735 - 1741.	Canadian Institutes of Health Research; NIH	Men who drank one 12-ounce SSB a day had a 20% higher risk of heart disease compared to men who didn't drink any SSBs.
Cardiovascular health	Maersk, M., Belza, A., Stødkilde-Jørgensen, H., Ringgaard, S., Chabanova, E., Thomsen, H., Pedersen, S.B., Astrup, A., Richelsen, B. (2012). Sucrose-sweetened beverages increase fat storage in the liver, muscle, and visceral fat depot: a 6-mo randomized intervention study. <i>Am J Clin Nutr</i> , 95, 283 - 289.	The Danish Council for Strategic Research; The Food Study Group/Danish Ministry of Food, Agriculture, and Fisheries; Novo Nordic Foundation; Clinical Institute at Aarhus University, Denmark	Daily intake of SSBs could heighten the risk of cardiovascular and metabolic diseases.

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Cardiovascular health	Aeberli, I., Gerber, P.A., Hochuli, M., Kohler, S., Haile, S.R., Gouni-Berthold, I., Berthold, H.K., Spinas, G.A., Berneis, K. (2011). Low to moderate sugar-sweetened beverage consumption impairs glucose and lipid metabolism and promotes inflammation in healthy young men: a randomized controlled trial. <i>Am J Clin Nutr</i> , 94, 479 - 485.	Swiss National Science Foundation; Vontobel Foundation; beverages provided by Nestlé Product Technology Center*	Low to moderate consumption of SSBs has a potentially harmful effect on markers of cardiovascular risk.
Cardiovascular health	Brown, I.J., Stamler, J., Van Horn, L., Robertson, C.E., Chan, Q., Dyer, A.R., Huang, C., Rodriguez, B.L., Zhao, L., Daviglus, M.L., Ueshima, H., Elliott, P. (2011). Sugar-sweetened beverage, sugar intake of individuals, and their blood pressure: International study of macro/micronutrients and blood pressure. <i>Hypertension</i> , 57, 695 - 701.	United Kingdom Medical Research Council; NHLBI; NIH; Chicago Health Research Foundation; National agencies in China, Japan, and United Kingdom	The consumption of sugar-sweetened beverages can result in high blood pressure, particularly in individuals who also consume higher amounts of sodium.
Cardiovascular health	Chen, L., Caballero, B., Mitchell, D.C., Loria, C., Lin, P-H., Champagne, C.M., Elmer, P.J., Ard, J.D., Batch, B.C., Anderson, C.A.M., Appel, L.J. (2010). Reducing consumption of sugar-sweetened beverages is associated with reduced blood pressure: A prospective study among United States adults. <i>Circulation</i> , 121, 2398 - 2406.	NHLBI; NIH; Louisiana State University Health Science Center; Johns Hopkins Bloomberg School of Public Health	Reduced consumption of SSB and sugars was significantly associated with reduced blood pressure.

Topic	Citation	Funder(s)	Conclusions
Cardiovascular health	Duffey, K.J., Gordon-Larsen, P., Steffen, L.M., Jacobs Jr, D.R., Popkin, B.M. (2010). Drinking caloric beverages increases the risk of adverse cardiometabolic outcomes in the Coronary Artery Risk Development in Young Adults (CARDIA) Study. <i>Am J Clin Nutr</i> , 92, 954 - 959.	Gillings School of Global Public Health, University of North Carolina, Chapel Hill; School of Public Health, University of Minnesota, Minneapolis; Department of Nutrition, University of Oslo, Oslo, Norway; Danone Research Center* ; NIH; University of North Carolina -- Chapel Hill Center for Environmental Health and Susceptibility; UNC-CH Clinic Nutrition Research Center; Carolina Population Center; University of Alabama at Birmingham, Coordinating Center; the University of Alabama at Birmingham, Field Center; the University of Minnesota, Field Center; Northwestern University, Field Center; the Kaiser Foundation Research Institute from the NHLBI	Higher SSB consumption is associated with cardiometabolic risk factors, including high waist circumference, high LDL ("bad") cholesterol, low HDL ("good") cholesterol and hypertension.
Cardiovascular health	Welsh, J.A., Sharma, A., Abramson, J.L., Vaccarino, V., Gillespie, C., Vos, M.B. (2010). Caloric sweetener consumption and dyslipidemia among US adults. <i>JAMA</i> , 303.15, 1490 - 1497.	National Institute of Diabetes and Digestive and Kidney Diseases; Children's Digestive Health and Nutrition Foundation	There was a statistically significant correlation between dietary added sugars and blood lipid levels among US adults.
Cardiovascular health	Fung, T.T., Malik, V., Rexrode, K.M., Manson, J.E., Willett, W.C., Hu, F.B. (2009). Sweetened beverage consumption and risk of coronary heart disease in women. <i>Am J Clin Nutr</i> , 89.4, 1037 - 1042.	NIH	Regular consumption of SSBs is associated with a higher risk of cardiovascular heart disease in women, after accounting for other unhealthful lifestyle or dietary factors.
Cardiovascular health	Winkelmayer, W.C., Stampfer, M.J., Willett, W.C., Curhan, G.C. (2005). Habitual caffeine intake and the risk of hypertension in women. <i>JAMA</i> , 294, 2330 - 2335.	NIH	Consumption of sugar-sweetened and diet cola beverages was associated with an increased risk of hypertension, while no association between caffeine consumption and risk of hypertension was observed.

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Cardiovascular health and adolescents	Ambrosini, G.L., Oddy, W.H., Huang, R.C., Mori, T.A., Beilin, L.J., Jebb, S.A. (2013). Prospective associations between sugar-sweetened beverage intakes and cardiometabolic risk factors in adolescents. <i>Am J Clin Nutr</i> , 98.2, 327 - 334.	National Heart Foundation of Australia; Beyond Blue Cardiovascular Disease and Depression Strategic Research Program; Australian National Health and Medical Research Council; UK Medical Research Council; Faculty of Medicine, Dentistry and Health Sciences of the University of Western Australia; Raine Medical Research Foundation; National Health and Medical Research Council of Australia; Telethon Institute for Child Health Research; Women's and Infants Research Foundation; Curtin University	Greater SSB intakes during adolescence were associated with greater overweight and obesity risk and higher overall cardiometabolic risk in girls, and unfavorable changes in waist circumference, triglycerides, and HDL cholesterol in both boys and girls, independent of BMI.
Cardiovascular health and adolescents	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).
Cardiovascular health and adolescents	Welsh, J.A., Sharma, A., Cunningham, S.A., Vos, M.B. (2011). Consumption of added sugars and indicators of cardiovascular disease risk among US adolescents. <i>Circulation</i> , 123, 249 - 257.	National Institutes of Diabetes and Digestive and Kidney Diseases; Children's Digestive Health and Nutrition Foundation	Consumption of added sugars among US adolescents is positively associated with several important risk factors for cardiovascular disease.

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Cardiovascular health and adolescents	Nguyen, S., Choi, H.K., Lustig, R.H., Hsu, C. (2009). Sugar-sweetened beverages, serum uric acid, and blood pressure in adolescents. <i>J Pediatr</i> , 154, 807 - 813.	Department of Pediatrics, University of California, San Francisco; Arthritis Research Centre of Canada, Vancouver General Hospital and the University of British Columbia, Vancouver, British Columbia, Canada; Brigham and Women's Hospital, Boston, MA; Department of Medicine, University of California, San Francisco; American Heart Association; NIH	Higher SSB consumption is associated in adolescents with higher serum uric acid levels (an indicator of cardiovascular risk factors) and systolic blood pressure.
Cardiovascular health and children	Kosova, E.C., Auinger, P., Bremer, A.A. (2013). The relationships between sugar-sweetened beverage intake and cardiometabolic markers in young children. <i>J Acad Nutr Diet</i> , 113.2, 219 - 227.	unknown	Sugar-sweetened beverage intake was independently associated with alterations in lipid profiles, increased markers of inflammation, and increased waist circumference in children, all markers for risk of cardiometabolic disease.
Cardiovascular health and children	Gopinath, B., Flood, V.M., Wang, J.J., Smith, W., Rochtchina, E., Louie, J.C.Y., Wong, T.Y., Brand-Miller, J., Mitchell, P. (2012). Carbohydrate nutrition is associated with changes in the retinal vascular structure and branching pattern in children. <i>Am J Clin Nutr</i> , 95, 1215 - 1222.	Australian National Health and Medical Research Council; Westmead Millennium Institute, University of Sydney; Vision Co-operative Research Centre, University of New South Wales, Sydney, Australia	Children who consumed soft drinks once or more per day had significantly narrower retinal arterioles, a marker for future cardiovascular disease risk, than children who never or rarely consumed soft drinks.
Cardiovascular health and type 2 diabetes	Bray, G.A. (2010). Soft drink consumption and obesity: it is all about fructose. <i>Curr Opin Lipidol</i> , 21, 51 - 57.	Pennington Center, Louisiana State University, Baton Rouge, LA	In the amounts currently consumed, fructose is hazardous to the heart and metabolic health of many children, adolescents, and adults.

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Cardiovascular health and type 2 diabetes	Dhingra, R., Sullivan, L., Jacques, P.F., Wang, T.J., Fox, C.S., Meigs, J.B., D'Agostino, R.B., Gaziano, J.M., Vasan, R.S. (2007). Soft drink consumption and risk of developing cardiometabolic risk factors and the metabolic syndrome in middle-aged adults in the community. <i>Circulation</i> , 116.5, 480 - 488.	NIH; American Diabetes Association	Drinking one or more SSBs a day is linked to an increased risk of developing metabolic syndrome, obesity, increased waist circumference, impaired fasting glucose, higher blood pressure, high triglycerides, and low HDL ("good") cholesterol.
Dental	Jain, P., Hall-May, E., Golabek, K., Agustin, M.Z. (2012). A comparison of sports and energy drinks: Physiochemical properties and enamel dissolution. <i>Gen Dent</i> , 60.3, 190 - 197.		Loss of enamel after exposure to energy drinks was more than two times higher than it was after exposure to sports drinks.
Dental	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.	None	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.
Dental	Noble, W.H., Donovan, T.E., Geissberger, M. (2011). Sports drinks and dental erosion. <i>J Calif Dent Assoc</i> , 39.4, 233 - 238.	n/a	High intake of sports drinks while exercising, coupled with dry mouth from dehydration, may increase risk of erosive damage to teeth.
Dental	Buyer, D.M. (2009). Are you drinking your teeth away? How soda and sports drinks dissolve enamel. <i>J Indiana Dent Asso</i> , Summer, 11 - 13.	n/a	Sports drinks and sodas soften enamel and begin the erosion process of enamel; the more that is consumed, the greater the damage to enamel.

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Dental	Ismail, A.I., Sohn, W., Lim, S., Willem, J.M. (2009). Predictors of dental caries progression in primary teeth. <i>J Dent Res</i> , 88.3, 270 - 275.	National Institute of Dental and Craniofacial Research, Bethesda, MD; University of Michigan, Ann Arbor; Delta Dental Fund of Michigan	Frequent consumption of soda drinks was associated with caries severity at baseline and with greater increase in caries over time.
Dental	Warren, J.J., Weber-Gasparoni, K., Marshall, T.A., Drake, D.R., Dehkordi-Vakil, F., Dawson, D.V. and Tharp, K.M. (2009). A longitudinal study of dental caries risk among very low SES children. <i>Community Dent Oral</i> , 37.2, 116 - 122.	NIH	Consumption of sugar-sweetened beverages, as well as the presence of a bacterium (mutans streptococci), are significant predictors of early childhood caries in high-risk, low socio-economic status populations.
Dental	Lim, S., Sohn, W., Burt, B.A., Sandretto, A.M., Kolker, J.L., Marshall, T.A., and Ismail, A.I. (2008). Cariogenicity of soft drinks, milk and fruit juice in low-income African-American children. <i>J Am Dent Assoc</i> , 139.7, 959 - 967.	National Institute of Dental and Craniofacial Research, Bethesda, MD; University of Michigan, Ann Arbor; Delta Dental Fund of Michigan	Children who consumed more soft drinks, relative to milk and 100 percent fruit juice, were at greater risk of developing dental caries as they grew older.
Dental	Kolker, J.L., Yuan, Y., Burt, B.A., Sandretto, A.M., Sohn, W., Lang, S.W, Ismail, A.I. (2007). Dental caries and dietary patterns in low-income African American children. <i>Pediatr Dent</i> , 29.6, 457 - 464.	National Institute for Dental and Craniofacial Research; Delta Dental Fund of Michigan; Office of the Vice President for Research and the School of Dentistry, University of Michigan, Ann Arbor	African-American children frequently consume sugared drinks, which is associated with the prevalence of dental caries.
Dental	Burt, B.A., Kolker, J.L., Sandretto, A.M., Yuan, Y., Sohn, W., Ismail, A.I. (2006). Dietary patterns related to caries in a low-income adult Population. <i>Caries Res</i> , 40.6, 473 - 480.	National Institute for Dental and Craniofacial Research	The most frequently consumed food items by adults of all ages was soft drinks. Frequency of soft drink consumption and the presence of gingival plaque deposits were significantly associated with caries.
Dental	Sohn, W., Burt, B.A., Sowers, M.R. (2006). Carbonated soft drinks and dental caries in the primary dentition. <i>J Dent Res</i> , 85.3, 262 - 266.	n/a	High consumption of soft drinks by young children may be a risk indicator for dental caries.

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Dental	Touger-Decker, R. and van Loveren, C. (2003). Sugars and dental caries. <i>Am J Clin Nutr</i> , 78, 881S - 892S.	University of Medicine and Dentistry of New Jersey; School of Health Related Professions, New Jersey Dental School, Newark; Academic Centre for Dentistry, Amsterdam	Sugar in the diet is a clear risk for dental disease and deterioration, although risks are minimized or eliminated through fluoride use and other factors. The acids found in sports drinks and soft drinks contribute to tooth erosion.
Dental	Heller, K.E., Burt, B.A., Eklund, S.A. (2001). Sugared soda consumption and dental caries in the United States. <i>J Dent Res</i> , 80.10, 1949 - 1953.	CDC; US Agency for Healthcare Research and Quality; US National Institute of Dental and Craniofacial Research	There was evidence of a significant association between the consumption of sugared soda and the presence of caries among persons over 25 years. No differences in the appearance of caries, relative to soda consumption, were seen in persons under the age of 25.
Dental	Szpunar, S.M., Eklund, S.A., Burt, B.A. (1995). Sugar consumption and caries risk in schoolchildren with low caries experience. <i>Community Dent Oral Epidemiol</i> , 23, 142 - 146.	Program in Dental Public Health, School of Public Health, University of Michigan, Ann Arbor	For every five grams of sugar added to the diet, there was a 1% increase in probability of developing caries.
Fatty liver disease	Abid, A., Taha, O., Nseir, W., Farah, R., Grosovski, M., Assy, N. (2009). Soft drink consumption is associated with fatty liver disease independent of metabolic syndrome. <i>J Hep</i> , 51, 918 - 924.	n/a	80% of patients with non-alcoholic fatty liver disease had excessive intake of SSBs compared to 17% of healthy controls.
Gestational diabetes	Chen, L., Hu, F.B., Yeung, E., Willett, W., Zhang, C. (2009). Prospective study of pre-gravid sugar-sweetened beverage consumption and risk of gestational diabetes mellitus. <i>Diab Care</i> , 32.12, 2236 - 2241.	NIH	Higher consumption of SSBs (≥5 servings/week) by pregnant women is significantly associated with a higher risk of gestational diabetes.
Glycemic index, type 2 diabetes, cardiovascular disease	Ludwig, D.S. (2002). The glycemic index: Physiological mechanisms relating to obesity, diabetes, and cardiovascular disease. <i>JAMA</i> , 287, 2414 - 2423.	NIDDK; Children's Hospital League; Charles H. Hood Foundation	The regular consumption of high-glycemic index foods, such as SSBs, may increase the risk for obesity, type 2 diabetes, and cardiovascular disease.

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Gout (inflammatory arthritis)	Choi, H.K, Willett, W.W., Curhan, G. (2010). Fructose-rich beverages and risk of gout in women. <i>JAMA</i> , 304.20, 2270 - 2278.	NIH	Consumption of fructose-rich beverages, such as SSBs, is associated with an increased risk of gout in women.
Gout (inflammatory arthritis)	Choi, H.K. and Curhan, G. (2008). Soft drinks, fructose consumption, and the risk of gout in men; prospective cohort study. <i>BMJ</i> , 336, 309 - 312.	Arthritis Research Centre of Canada, Department of Medicine, Vancouver General Hospital, University of British Columbia, Vancouver, British Columbia, Canada; Brigham and Women's Hospital and Harvard University School of Public Health, Boston, MA; NIH; TAP Pharmaceuticals	The consumption of SSBs and fructose is strongly associated with an increased risk of gout in men.
Gout (inflammatory arthritis)	Choi, J.W.J., Ford, E.S., Gao, X., Choi, H.K. (2008). Sugar-sweetened soft drinks, diet soft drinks, and serum uric acid level: The third National Health and Nutrition Examination Survey. <i>Arthritis Rheum</i> , 59.1, 109 - 116.	Arthritis Research Centre of Canada, Vancouver, British Columbia, Canada; Centers for Disease Control and Prevention, Atlanta, GA; Brigham and Women's Hospital and Harvard University School of Public Health, Boston, MA; Vancouver General Hospital, and the University of British Columbia, Vancouver, British Columbia, Canada	SSB consumption is associated with increased serum uric acid levels, and frequency of hyperuricemia, the precursor of gout.
Hypertension	Cohen, L., Curhan, G., Forman, J. (2012). Association of sweetened beverage intake with incident hypertension. <i>J Gen Int Med</i> , 27.9, 1127 - 1134.	AHA	SSBs are associated with an increased risk of incident hypertension, a major risk factor for stroke, heart attacks, heart failure, aneurysms, heart disease, and chronic kidney disease.
Hyperuricemia	Gao, X., Qi, L., Qiao, N., Choi, H.K., Curhan, G., Tucker, K.L., Ascherio, A. (2007). Intake of added sugar and sugar-sweetened drink and serum uric acid concentration in US men and women. <i>Hypertension</i> , 50, 306 - 312.	NIH; National Institute of Neurological Disorders and Stroke; USDA	Males with diets high in added sugars or SSBs had higher plasma uric acid concentration. High serum uric acid (or hyperuricemia) has been suggested as a possible risk factor for metabolic syndrome, hypertension and other chronic disease.

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Kidney stones	Ferraro, P.M., Taylor, E.N., Gambaro, G., Curhan, G.C. (2013). Soda and other beverages and the risk of kidney stones. <i>Clin J Am Soc Nephrol</i> , in press.	NIH	Consumption of sugar-sweetened soda and punch is associated with a higher risk of kidney stone formation.
Kidney stones	Taylor, E.N. and Curhan, G.C. (2008). Fructose consumption and the risk of kidney stones. <i>Kidney Int</i> , 73, 207 - 212.	Renal Division and Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, MA; Department of Epidemiology, Harvard School of Public Health, Boston, MA; NIH	The consumption of fructose is independently associated with an increased risk of incident kidney stones. SSBs represented the largest source of fructose in participants' diets.
Liver disease	Assy, N., Nasser, G., Kamayse, I., Nseir, W., Beniashvili, Z., Djibre, A., Grosovski, M. (2008). Soft drink consumption linked with fatty liver in the absence of traditional risk factors. <i>Can J Gastroenterol</i> , 22.10, 811 - 816.	Liver Unit, Ziv Medical Center, Safed, Israel	SSB consumption is a cause of non-alcoholic fatty liver disease in patients without risk factors such as obesity, diabetes, or hyperlipidemia.
Liver disease and metabolic syndrome	Bray, G.A., Popkin, B.M. (2013). Calorie-sweetened beverages and fructose: what we have learned 10 years later. <i>Pediatr Obes</i> , 8, 242 - 248.	n/a	Consumption of caloric beverages sweetened with fructose continues to increase and may play a role in the obesity epidemic, metabolic syndrome and fatty liver disease. Reducing intake of SSBs is associated with less weight gain and metabolic improvement.
Metabolic syndrome	Yoo, S., Nicklas, T., Baranowski, T., Zakeri, I.F., Yang, S-J., Srinivasan, S.R., Berenson, G.S. (2004). Comparison of dietary intakes associated with metabolic syndrome risk factors in young adults: The Bogalusa Heart Study. <i>Am J Clin Nutr</i> , 80, 841 - 848.	USDA Economic Research Service; National Heart, Lung, and Blood Institute; MARS, Inc*	In specific populations, eating fewer fruits and vegetables and drinking more SSBs is linked to the prevalence of metabolic syndrome (a clustering of risk factors for coronary heart disease which include insulin resistance, central obesity, dyslipidemia, and hypertension).

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Type 2 diabetes	Bhupathiraju, S.N., Pan, A., Malik, V.S., Manson, J.E., Willett, W.C., van Dam, R.M., Hu, F.B. (2013). Caffeinated and caffeine-free beverages and risk of type 2 diabetes. <i>Am J Clin Nutr</i> , 97, 155 - 166.	NIH	Irrespective of the caffeine content, SSB intake was associated with a higher risk of type 2 diabetes and coffee intake was associated with a lower risk of type 2 diabetes.
Type 2 diabetes	Fagherazzi, G., Vilier, A., Sartorelli, D.S., Lajous, M., Balkau, B., Clavel-Chapelon, F. (2013). Consumption of artificially and sugar-sweetened beverages and incident type 2 diabetes in the Etude Epidémiologique auprès des femmes de la Mutuelle Générale de l'Education Nationale-European Prospective Investigation into Cancer and Nutrition cohort. <i>Am J Clin Nutr</i> , 97, 517 - 523.	Institut National du Cancer; Mutuelle Générale de l'Education Nationale; Institut de Cancérologie Gustave Roussy; Institut National de la Santé et de la Recherche Médicale; European Union InterAct project	Both SSB consumption and artificially sweetened beverage consumption were associated with increased risk of type 2 diabetes.
Type 2 diabetes	Malik, V.S., Hu, F.B. (2012). Sweeteners and risk of obesity and type 2 diabetes: The role of sugar-sweetened beverages. <i>Curr Diab Rep</i> , 12, 195 - 203.	n/a	Epidemiological evidence shows strong and consistent associations between SSB intake and risk of type 2 diabetes.
Type 2 diabetes	Pan, A., Malik, V.S., Schulze, M.B., Manson, J.E., Willett, W.C., Hu, F.B. (2012). Plain-water intake and risk of type-2 diabetes in young and middle-aged women. <i>Am J Clin Nutr</i> , 95, 1454 - 1460.	NIH	Substitution of plain water for SSBs or fruit juices was associated with a modestly lower risk of type-2 diabetes.

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Type 2 diabetes	de Koning, L., Malik, V.S., Rimm, E.B., Willett, W.C., Hu, F.B. (2011). Sugar-sweetened and artificially sweetened beverage consumption and risk of type 2 diabetes in men. <i>Am J Clin Nutr</i> , 93.6, 1321 - 1327.	NIH, Canadian Institutes of Health Research, Canadian Diabetes Association	SSB consumption is associated with a significantly elevated risk of type 2 diabetes, whereas the association between artificially sweetened beverages and type 2 diabetes was largely explained by health status, pre-enrollment weight change, dieting, and body mass index.
Type 2 diabetes	Hu, F.B. and Malik, V.S. (2010). Sugar-sweetened beverages and risk of obesity and type 2 diabetes: Epidemiologic evidence. <i>Physiol Behav</i> , 100.2, 46 - 54.	Departments of Nutrition and Epidemiology, Harvard School of Public Health, Boston; Channing Laboratory, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston	Findings from epidemiological studies clearly indicate that regular SSB consumption can lead to weight gain and substantially increase risk of developing chronic diseases including metabolic syndrome, type 2 diabetes and chronic heart disease.
Type 2 diabetes	Malik, V.S., Popkin, B.M., Bray, G.A., Despres, J.P., Willett, W.C., Hu, F.B. (2010). Sugar-sweetened beverages and the risk of metabolic syndrome and type 2 diabetes: A meta-analysis. <i>Diabetes Care</i> , 33, 2477 - 2483.	n/a	Persons who drank one to two servings of SSBs per day had a 26% greater risk for developing type 2 diabetes than those who drank no or fewer than one serving per month.
Type 2 diabetes	Odegaard, A.O., Koh, W-P., Arakawa, K., Yu, M.C., Pereira, M.A. (2010). Soft drink and juice consumption and risk of physician-diagnosed incident type 2 diabetes: The Singapore Chinese Health Study. <i>Am J Epidemiol</i> , 171, 701 - 708.	NIH	Relatively frequent intake of SSBs and juice is associated with an increased risk for development of type 2 diabetes in Chinese men and women.

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Type 2 diabetes	Stanhope, K.L., Schwarz, J.M., Keim, N.L., Griffen, S.C., Bremer, A.A., Graham, J.L., Hatcher, B., Cox, C.L., Dyachenko, A., Zhang, W., McGahan, J.P., Seibert, A., Krauss, R.M., Chiu, S., Schaefer, E.J., Ai, M., Otokozawa, S., Nakajima, K., Nakano, T., Beysen, C., Hellerstein, M.K., Berglund, L., Havel, P.J. (2009). Consuming fructose-sweetened, not glucose-sweetened, beverages increases visceral adiposity and lipids and decreases insulin sensitivity in overweight/obese humans. <i>J Clin Invest</i> , 119, 1322 - 1334.	NIH; American Diabetes Association; USDA-ARS CRIS; Janet King of Children's Hospital Oakland Research Institute	The consumption of both fructose- and glucose-sweetened beverages led to weight gain. However, the data suggest that dietary fructose specifically increases hepatic de novo lipogenesis, promotes dyslipidemia, decreases insulin sensitivity, and increases visceral adiposity in overweight/obese adults.
Type 2 diabetes	Montonen, J., Järvinen, R., Knekt, P, Heliövaara, M., Reunanen, A. (2007). Consumption of sweetened beverages and intakes of fructose and glucose predict type 2 diabetes occurrence. <i>J Nutr</i> , 137.6, 1447 - 1454.	National Public Health Institute, Helsinki, Finland; University of Kuopio, Finland; Social Insurance Institution, Helsinki, Finland; Turku, Finland	Of food items contributing to sugar intake, greater intakes of sweetened berry juice and soft drinks were associated with the increased risk of type 2 diabetes.
Type 2 diabetes	Vartanian, L. R., Schwartz, M.B., Brownell, K.D. (2007). Effects of soft drink consumption on nutrition and health: A systematic review and meta-analysis. <i>Am J Public Health</i> , 97, 667 - 675.	The Rudd Foundation	Soft drink intake is clearly associated with increased calorie intake and body weight, lower intakes of milk, calcium, and other nutrients, and an increased risk of several medical problems, such as diabetes. Studies funded by the food industry reported significantly smaller effects than did non-industry-funded studies.

Topic	Citation	Funder(s)	Conclusions
Type 2 diabetes	Yoshida, M., McKeown, N.M., Rogers, G., Meigs, J.B., Saltzman, E., D'Agostino, R., Jacques, P.F. (2007). Surrogate markers of insulin resistance are associated with consumption of sugar-sweetened drinks and fruit juice in middle and older-aged adults. <i>J Nutr</i> , 137, 2121 - 2127.	USDA, NIH	Consumption of SSBs and fruit juice in middle and older-aged adults is associated with surrogate markers of insulin resistance.
Type 2 diabetes	Schulze, M.B., Hoffmann, K., Manson, J.E., Willett, W.C., Meigs, J.B., Weikert, C., Heidemann, C., Colditz, G.A., Hu, F.B. (2005). Dietary patterns, inflammation, and incidence of type 2 diabetes in women. <i>Am J Clin Nutr</i> , 82.3, 675 - 684.	NIH; Deutsch Krebshilfe; American Diabetes Association; American Heart Association	Participants with diets high in SSBs, refined grains, diet soft drinks, and processed meats but low in wine, coffee, cruciferous vegetables, and yellow vegetables were at an increased risk of type 2 diabetes.
Type 2 diabetes	Schulze, M.B., Manson, J.E., Ludwig, D.S., Colditz, G.A., Stampfer, M.J., Willett, W.C., Hu, F.B. (2004). Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. <i>JAMA</i> , 292.8, 927 - 934.	NIH	Higher consumption of sugar-sweetened beverages is associated with a greater magnitude of weight gain and an increased risk for development of type 2 diabetes in women, possibly by providing excessive calories and large amounts of rapidly absorbable sugars.
Type 2 diabetes, obesity, cardiovascular disease	Odegaard, A.O., Choh, A.C., Czerwinski, S.A., Towne, B., Demerath, E.W. (2012). Sugar-sweetened and diet beverages in relation to visceral adipose tissue. <i>Obesity</i> , 20, 689 - 691.	n/a	Increased consumption of SSBs is associated with a greater percentage of abdominal fat. Greater abdominal fat is strongly associated with greater levels of insulin resistance, which is the hallmark condition of type 2 diabetes, a cluster of metabolic disorders, and cardiovascular disorders. There was no clear association between the consumption of diet beverages and abdominal fat.

Topic	Citation	Funder(s)	Conclusions
Type 2 diabetes, obesity, cardiovascular disease	Malik, V.S., Popkin, B.M., Bray, G.A., Després, J-P., Hu, F.B. (2010). Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. <i>Circulation</i> , 121, 1356 - 1364.	The Departments of Nutrition and Epidemiology, Harvard School of Public Health, and Channing Laboratory, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston; Centre de Recherche de l'Institut Universitaire de Cardiologie et de Pneumologie de Quebec,	SSB intake is a significant contributor to weight gain and can lead to increased risk of type 2 diabetes, and cardiovascular disease.
Type 2 diabetes, obesity, cardiovascular disease	Weed, D.L., Althuis, M.D., Mink, P.J. (2011). Quality of reviews on sugar-sweetened beverages and health outcomes: a systematic review. <i>Am J Clin Nutr</i> , 94.5, 1340 - 1347.	The Coca-Cola Company*	A review of studies published between 2001 and 2011 that linked SSB consumption with health risks found them lacking in scientific rigor and objectivity.

*Funding from food/beverage industry or organizations representing industry

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Updated 12/11/13