

the hidden cost of liquid calories

Why the silent culprit behind many a failed diet may be lurking inside those supersized beverage cups.

Do you find that it takes two hands to hold one of those convenience store 48-ounce soda troughs? Are you having a hard time squeezing your supersized “venti” coffee drink into your car’s cup holder? When it comes to beverage sizes and cup holders, more has become *much* more.

It wasn’t always this way. Back in 1977, the size of the average soft drink was about 13.1 fluid ounces; today’s typical beverage weighs in at a whopping 19.9 fluid ounces (Nielsen & Popkin 2003). While fast-food establishments and minimarts are known for their oversized beverage servings, these XXL drinks have become ubiquitous, offered up as normal fare in pricey restaurants, vending machines, cafeterias, places of entertainment and the average family home (French, Lin & Guthrie 2003).

In light of the popularity of these robust beverage servings, it should come as no surprise that many Americans have increased their calorie intake from beverages over the past decade. Once constituting a mere 2%–4% of our total calories, our average beverage intake now accounts for nearly 21% of the total, an all-time high (Nielsen & Popkin 2003; Popkin et al. 2005). This trend has been occurring among all age groups; a 2002 survey found that Americans ages 2 to 60-plus years increased their caloric beverage intake—along with their weight—between 1977 and 1996 (Nielsen, Siega-Riz & Popkin 2002).

As Americans continue to drink more of their calories, concern arises surrounding the health implications of this trend. Because sweetened beverages, such

as soft or fruit-flavored drinks, tend to be nutrient-poor and energy-dense from their generous sugar content, health experts worry that there will be a corresponding rise in the rates of obesity, type 2 diabetes, osteoporosis and other health risks. Trouble is, few people pay attention to what they drink each day or even realize that the calories in beverages can sabotage even the healthiest of diets.

Liquid Consequences

As fitness professionals well know, obesity rates have hit epidemic proportions in the United States. According to the American Obesity Association (AOA), 127 million people are overweight, 60 million obese and 9 million severely obese (AOA 2002). By now, we also know that several factors are contributing to this epidemic: genetics, sedentary lifestyle and excess energy consumption. The potential relationship between sweetened beverages and obesity development should be obvious: Americans are taking in too many calories, and more of those calories are coming from beverages. This invites the question: Does the body respond the same way to calories consumed in beverages as it does to calories gleaned from food?

Maybe, maybe not. There is evidence that a liquid carbohydrate is not as filling as a solid carbohydrate. Studies have shown that, with an extra beverage, it is easy for people to increase their overall energy intake without realizing it, because they do not feel as satiated as they would after a meal (DiMiglio & Mattes 2000). In other words, drinking a glass of apple juice at 150 calories may not be as filling as eating two small apples. There is also evidence that people are more likely to compensate for eating extra calories from food by consuming less afterward, yet they are less

inclined to make any adjustment after *drinking* a similar number of extra calories (DiMiglio & Mattes 2000). More research is necessary, but some studies suggest that the simple act of chewing solid food may trigger internal satiety signals.

Researchers from Purdue University sought to evaluate the difference between calories gained from solid and liquid foods by giving subjects a couple of favorites: jelly beans (solid) or soda (liquid) (DiMiglio & Mattes 2000). Fifteen subjects consumed 450 calories of assorted jelly beans or 450 calories of soda per day for a total of 4 weeks. The researchers found that the jelly-bean subjects ended up consuming *fewer* total calories than the soda subjects. The reason was that the jelly-bean subjects compensated by eating less throughout the day, whereas the soda subjects made no changes and kept eating as usual. Hunger rating scores were similar in both groups of subjects, but body weight and body mass index were significantly higher in the soda group after 4 weeks. Although it is difficult to pinpoint the absolute cause of this phenomenon, the researchers theorized that the act of chewing could be one explanation; there could be an early hormonal response to solids that causes subjects to feel full or a chemical response to solids that assists in satiety (DiMiglio & Mattes 2000).

Diabetes & Drinks

One disease that is now all too often linked to obesity is diabetes. According to the American Dietetic Association, approximately 20.8 million people—about 7% of the population—had diabetes in the United States in 2005 (ADA 2006). The factors most associated with diabetes—much like those associated

with obesity—include genetics, lifestyle, diet, impaired glucose metabolism, race and ethnicity. Soft drinks sweetened with sugar may be contributing to the rise in cases of type 2 diabetes because these drinks add significant quantities of calories and carbohydrate to the diet.

Sweetened-beverage consumption increased by 135% from 1977 to 2001 (Nielsen & Popkin 2004); last year, 1.5 million new cases of type 2 diabetes were diagnosed (ADA 2006). Sugar-sweetened soft drinks may lead to diabetes owing to their high content of high-fructose corn syrup, which raises blood glucose (Schulze et al. 2004). Since these drinks contain large amounts of rapidly absorbable carbohydrates, they may induce a fast and dramatic increase in both glucose and insulin concentrations, compared to drinks made with no sugar or a sugar substitute.

Got Less Milk?

Like their adult counterparts, children have increased the number of calories they get from beverages. Unfortunately, there has been a corresponding decrease in the amount of milk consumed by children; in fact, from 1977 to 2001, the largest milk consumption decrease occurred in kids. In 2- to 18-year-olds, calories from milk dropped from 13.2% of total energy to 8.3% during that time (Nielsen & Popkin 2004).

While less severe in adults, the decrease in milk consumption has affected people in all age groups; overall, the average energy intake from milk decreased from 8% to 5% between 1977 and 2001 (Nielsen & Popkin 2004). That means that when your clients replace a glass of milk with a can of soda or other sweetened beverage, they may not be getting as much calcium and vitamin D as they should.

Health experts have expressed concern as milk intake plummets and sweetened-beverage intake increases. If sweetened beverages displace milk on a regular basis, could this change adversely influence our overall nutrient intake?

To quantify the effect that dairy consumption has on overall nutrient intakes in the United States, researchers reviewed the Continuing Survey of Food Intakes by Individuals for 1994–1996 and 1998 (Weinberg, Berner & Groves 2004). Dairy foods were the main source of calcium in the subjects' diets (51% of total calcium ingested); subjects with higher dairy and

milk intakes had higher intakes of other important micronutrients (Weinberg, Berner & Groves 2004).

Better Beverage Guidelines

Although beverage intake is considered when dietary guidelines are written for overall food intake, rising beverage calorie intakes and infinite fluid choices have sparked a need for more guidance. In a 2006 issue of the *American Journal of Clinical Nutrition*, researchers outlined a system to help consumers plan for their daily fluid needs (Popkin et al. 2006).

To simplify the system, the researchers devised a simple graphic to guide healthier beverage choices, based on current research surrounding fluid intake and the health benefits of particular choices.

The chart at right shows daily beverage options listed in descending order from healthiest to riskiest. The purpose of this graphic is to underscore that all types of beverages can have a place in the diet, but that certain fluids—like water—ought to be our main hydration choice. When choosing beverages at the lower levels, people need to think in terms of moderation and watch serving sizes. Servings in each level are for individuals who ingest 2,200 kilocalories per day and want to consume 10% or less of their total calories from beverages—approximately 98 fluid ounces:

Level	Beverage Choice	Fluid Ounces per Day
1	water	50
2	tea or coffee (unsweetened)	28
3	low-fat milk	16
4	noncalorie-sweetened	0–32
5	fruit juices (sweetened, but have nutrients)	0–4
6	calorie-sweetened	0–8

Source: Popkin et al. 2006.

Healthy Hoisting

Here are some pointers to help your clients—and you—find healthier ways to stay hydrated:

Try Flavor Sans Calories! According to Christopher Mohr, PhD, RD, LD, a Louisville, Kentucky–based nutrition consultant at www.MohrResults.com, “There

are a variety of flavored waters on the market, and beverages like plain tea (iced or hot, green or black) provide a significant amount of antioxidants and other nutrients, without [adding] any calories—assuming you don't add cream and honey!” Mohr warns that even some of the noncalorie beverages contain added sugar, so keep an eye on those labels.

Opt for Light or Low-Calorie Beverages. Most manufacturers now offer noncalorie or artificially sweetened counterparts to their regular beverages. Jennie McCary, MS, RD, LD, wellness coordinator for Albuquerque public schools in New Mexico, has this advice for those concerned about extra calories: “Beverages sweetened with sugar substitutes, such as aspartame, are a good alternative to calorie-sweetened beverages.” So how much is too much? “Artificially sweetened beverages can be consumed in moderation as part of a healthy, well-balanced diet,” McCary says. “The Acceptable Daily Intake of aspartame is 50 milligrams per kilogram of body weight per day. This is equivalent to an outrageous amount of a diet soft drink, about 15 cans for females and 22 cans for males. But, as with anything, it's important to practice moderation.”

Make It 100% If It's Juice. If you love your morning OJ, awake easy, because it is nutrient-rich and can be a part of a healthy diet. The key is to look for juice labels that say “100% juice” and not “fruit drink” or “fruit beverage.” Experts recommend getting no more than 4 ounces of fruit juice each day (Popkin et al. 2006).

Don't Displace Dairy. You can have your cake and drink milk with it, too. All fluids can fit in a healthy diet in moderation. Just keep your sweetened-beverage intake under control, and avoid substituting soda for milk. This edict is especially important for kids and teens whose bones are still actively growing! Says McCary, “Soft-drink consumption has almost doubled in the last 20 years, and when [sodas are] gulped down in place of milk, children and adolescents miss out on valuable nutrients they need for their growing bodies, such as calcium and vitamin D.” McCary is worried that teens are not meeting their daily calcium needs, which can happen when they regularly skip the milk and get full on supersized soft drinks. “The good news is that there are efforts to limit high-calorie soft drinks in schools and move in the milk vending

machines,” says McCary. “Similar efforts should be considered at home.”

Consider Trade-Offs. Trying to fit all your favorite foods and drinks into your daily diet, while still fitting into your jeans? Mohr encourages clients to pick and choose what pleases them the most over the course of a day’s diet. If you opt for cold soda with your popcorn, then trade off with other caloric beverages—skip your usual sweetened juice drink in the afternoon. If a solid food sounds more satisfying, forego the sweetened beverage and go with pure water!

Save the Dough. Remember when water was free? Well, it still is. Just proceed to your nearest faucet and fill your favorite bottle without shelling out the big bucks.

Bottoms Up!

Trying to make the right liquid choices, without forfeiting taste and calories? See the chart “Lightening Your Liquid Load,” below, for more ideas on how to switch beverages and save on calories.

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References

American Diabetes Association (ADA). 2006. Statistics on incidence of type 2 diabetes and pre-diabetic conditions. www.diabetes.org; retrieved June 1, 2006.

American Obesity Association (AOA). 2002. Obesity in the U.S. www.obesity.org/subs/fastfacts/obesity_US.shtml; retrieved Aug. 10, 2006.

DiMaggio, D.P., & Mattes, R.D. 2000. Liquid versus solid carbohydrate: Effects on food intake and body weight. *International Journal of Obesity*, 24, 794–800.

French, S.A., Lin, B.H., & Guthrie, J.F. 2003. National trends in soft drink consumption among children and

Lightening your liquid load

Counting liquid calories is not rocket science. Here are some simple ways to substitute beverages and save calories in the process. But always remember to check the serving size and the number of servings in a bottle, can or pouch.

If you drink:	And switch to:	You save:
12 fluid ounces (oz) soft drink	12 oz diet soft drink	150 calories
12 oz Lipton® Sweetened Iced Tea	12 oz Lipton Unsweetened Iced Tea	90 calories
16 oz Starbucks® Frappuccino® Blended Coffee	16 oz Starbucks coffee	240 calories
8 oz whole milk	8 oz skim milk	60 calories
8 oz Minute Maid Original® orange juice	8 oz Minute Maid Light® orange juice beverage	60 calories
8 oz orange juice	1 orange	50 calories
9.6 oz Capri Sun® pouch	6.75 oz. Kool-Aid® Jammers 10 drink	100 calories
8 oz Gatorade® Thirst Quencher	8 oz Propel® Fitness Water	40 calories
12 oz regular beer	12 oz light beer	29 calories
8 oz lemonade	8 oz Crystal Light® lemonade	105 calories

adolescents age 6 to 17 years: Prevalence, amounts, and sources, 1977/1978 to 1994/1998. *Journal of the American Dietetic Association*, 103 (10), 1326–31.

Nielsen, S.J., & Popkin, B.M. 2003. Patterns and trends in food portion sizes, 1977–1998. *Journal of the American Medical Association*, 289 (4), 450–53.

Nielsen, S.J., & Popkin, B.M. 2004. Changes in beverage intake between 1977 and 2001. *American Journal of Preventative Medicine*, 27 (3), 205–10.

Nielsen, S.J., Siega-Riz, A.M., & Popkin, B.M. 2002. Trends in energy intake in U.S. between 1977 and 1996: Similar shifts seen across age groups. *Obesity Research*, 10 (5), 370–8.

Popkin, B.M., et al. 2006. A new proposed guidance system for beverage consumption in the United States. *The American Journal of Clinical Nutrition*, 83 (3), 529–42.

Schulze, M.B., et al. 2004. Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. *Journal of the American Medical Association*, 292 (8), 927–34.

Weinberg, L.G., Berner, L.A., & Groves, J.E. 2004. Nutrient contributions of dairy foods in the United States, continuing survey of food intakes by individuals, 1994–1996, 1998. *Journal of the American Dietetic Association*, 104 (6), 895–902.