

## Commentary

## Portion Size Me: Downsizing Our Consumption Norms

BRIAN WANSINK, PhD; KOERT VAN ITTERSUM, PhD

We are a nation of super-sized portions and super-sized people. When faced with the family-sized box of breakfast cereal, five sizes of french fries, or a 14-in dinner plate, it is easy to forget our world history. In 75 years we have gone from shivering in Depression breadlines and hoarding food-ration stamps to being an overweight, super-sized country. Most of us are now surrounded with a portion-distorted embarrassment of food.

We find portion distortions in supermarkets, where the number of larger sizes has increased 10-fold between 1970 and 2000 (1,2). We find portion distortions in restaurants, where the jumbo-sized portions are consistently 250% larger than the regular portion. We even find portion distortions in our homes (3), where the sizes of our bowls and glasses have steadily increased and where the surface area of the average dinner plate has increased 36% since 1960 (4). And if our bowls, glasses, and plates do not distort us, our recipes will. In the 2006 edition of the *Joy of Cooking*, the serving size of some entrées has increased by as much as 42% from some recipes in the first edition of 1931.

This commentary addresses four questions: (a) Who is portion-size prone? (b) Why do portion sizes lead us to overeat? (c) What caused portion distortion? and (d) How can we downsize our consumption norms?

**WHO IS PORTION-SIZE PRONE?**

Carefully controlled studies of portion size have been conducted with populations as diverse as economically disadvantaged, poorly educated children to affluent, highly educated professors (5,6). Recent studies even suggest that portion distortion begins as early as 3 years of age (7-9). Whether a child or an adult, whether a dieter or a nondieter, whether an American or a European, whether a 5th grader from Nova Scotia or a world-renowned nutrition researcher, the impact of portion size

*B. Wansink is the John S. Dyson Chair and director of the Cornell Food and Brand Lab at Cornell University, Ithaca, NY, and K. van Ittersum is an assistant professor of marketing at the Georgia Institute of Technology, Atlanta.*

*Address correspondence to: Brian Wansink, PhD, 110 Warren Hall, Cornell University, Ithaca, NY 14853. E-mail: Wansink@Cornell.edu*

*Published by Elsevier Company on behalf of the American Dietetic Association.*

*0002-8223/07/10707-0020\$0.00/0*

*doi: 10.1016/j.jada.2007.05.019*

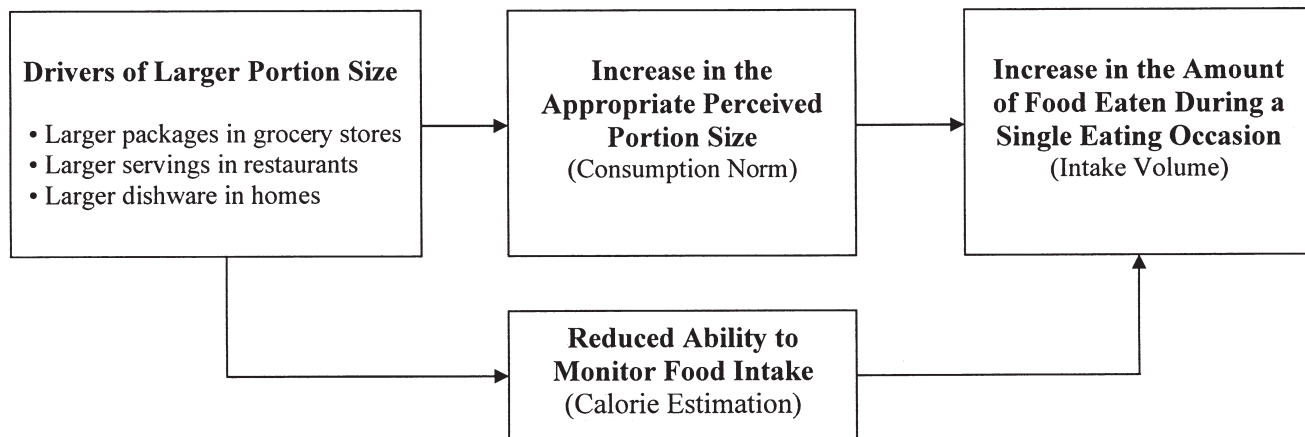
on intake is more similar than different: people tend to eat more from larger-sized restaurant portions (in the general range of 30% to 50% more) (10) and they tend to serve themselves, and eat more from larger-sized packages (in the general range of 20% to 40% more) (11).

When it comes to biasing how much food a person eats, portion size is no respecter of person, position, or profession. Although more affluent, informed, resolved individuals may be more able to avoid buying the larger size to begin with, once it is in front of them, or once they begin to serve themselves onto a 14-in plate, dozens of studies show they behave more similarly than not.

This was vividly illustrated in our recent study in the *American Journal of Preventive Medicine*, in which 85 graduate students and nutrition science professors—many of them internationally renowned—were invited to an ice cream social to share in a celebration for a colleague. On their arrival, they were given either a medium (17 oz) or large (34 oz) ice cream bowl and a medium (2 oz) or large (3 oz) ice cream scoop. Although they were not economically disadvantaged, uninformed, or uneducated, the experts who were given large ice cream dishes served themselves 31% more ice cream. Furthermore, those given the combination of the large dishes and the large scoops served themselves 53% more ice cream than those given small bowls and small scoops (12).

Although studies in the 1970s suggested that obese people might be more portion-size prone than less-obese people, most of the studies since then have shown that portion size influences people of all weights. Some recent studies, including the one published by Colapinto and colleagues in this issue of the *Journal* (13), suggest that income may relate to size-based preferences, but there is no evidence that lower-income people are more prone to overserving themselves from larger packages or overeating from larger portions than higher-income people with similar levels of dietary restraint. Package size, serving size, and dishware size all influence how much all of us eat.

Not only is portion size no respecter of person, it also seems to have no regard for whether a person is hungry or whether they even care for the food. During one study in a Chicago suburb, moviegoers who had just finished lunch were randomly given free medium-size or large-size buckets of stale popcorn to eat during their movie. Although they were not hungry and although the popcorn was stale, they ate 51% more popcorn from the large than the medium buckets (14). This was repeated in a Philadelphia suburb using 14-day-old popcorn at a nighttime movie. Again, although they were not hungry (they had eaten dinner before the movie) and although the food was



**Figure.** Why portion sizes lead us to overeat.

not good, those moviegoers given the large buckets ate 35% more of the stale, 14-day-old popcorn (15).

#### WHY DO PORTION SIZES LEAD US TO OVEREAT?

It has often been suggested that we overeat from larger portions because we have a tendency to “clean our plate” (16). Although this may seem to *describe* why many people eat what they are served, it does not *explain* why they do so or why they may have overserved themselves in the first place. The **Figure** suggests two reasons why portion size may have a ubiquitous, almost automatic influence on how much we eat. First, portion sizes create our consumption norms. Second, we underestimate the calories in large portion sizes.

#### Portion Sizes Create Our Consumption Norms

People can be very impressionable when it comes to how much they will eat. There is a flexible range as to how much food an individual can eat (17), and one can often “make room for more” (18). For this reason, if a person generally eats 8 oz of pasta for dinner, he or she may be quite content eating 6 to 10 oz of pasta for dinner without feeling either overly hungry or overly full.

A key part of the **Figure** is the role of *consumption norms*. For many individuals, determining how many ounces of pasta to serve themselves for dinner is a relatively low-involvement behavior that is a difficult nuisance to repeatedly and accurately monitor. As a result, people tend to rely on consumption norms to help them determine how much they should consume. Food-related estimation and consumption behavior can be based on how much one normally buys or normally consumes (19). Yet consumption can also be unknowingly influenced by other norms or cues that are present in the environment. An important theme of this commentary is that larger packages in grocery stores, larger portions in restaurants, and larger kitchenware in homes all suggest a consumption norm that very subtly influences how much people believe is appropriate to eat.

Large-sized packages, large-sized restaurant portions, and large-sized dinnerware all have one thing in com-

mon. They all perceptually suggest to us that it is more appropriate, typical, reasonable, and normal to serve and to eat more food than smaller plates or smaller packages would instead suggest (20). These all implicitly influence our personal consumption norm for that situation. This use of consumption norms, as with normative benchmarks in other situations, may be relatively automatic and may often occur outside of conscious awareness (21).

This is what makes these norms so powerful. Even when made aware of them, most people are unwilling to acknowledge that they could be influenced by something as seemingly harmless as the size of a package or plate. Even when shown that larger packages and plates lead them to serve an average of 31% more food than matched control groups, 94% of the diners in four of our field studies resolutely maintained that how much food they served and ate was not influenced by the size of package or plate they had been given (22).

#### We Underestimate the Calories in Large Portions

The second key part of the **Figure** is the role of *consumption monitoring*. When people pay close attention to what they eat, they tend to eat less. Unfortunately, large portion sizes can either bias people or confuse their estimate of how much they have eaten.

Not surprisingly, how much we end up eating in a distracting environment is partly determined by whether we pay attention to (or attempt to monitor) how much we eat (23). In lieu of monitoring how much we eat, we can instead use cues or rules of thumb (such as eating until a bowl is empty) to gauge how much is the appropriate amount for us to consume. Unfortunately, using such cues and rules of thumb can yield biased estimates and unexpected surprises. In one study, unsuspecting diners were served tomato soup in bowls that were being refilled from tubing that ran under the table, through the table, and into the bottom of the bowls. People eating soup from these “bottomless” bowls ate 73% more soup than those eating from normal bowls, but they estimated that they ate only 4.8 calories more (24).

Our inability to monitor or estimate how many calories we eat becomes increasingly less accurate as portion sizes

increase. It used to be believed that obese people were worse at estimating the calories in their meals than normal-weight people (25). This was even believed to be a contributing cause of their obesity (26). Our recent findings in the *Annals of Internal Medicine* have instead shown that this apparent bias is caused by the size of the meals, not the size of people (27). All people of all sizes—even registered nurses and dietitians—are inaccurate at estimating the calories from large portions (28). Although it initially seems that heavier people are worse estimators of what they eat, they are just as inaccurate at estimating a 2,000-calorie lunch as are their normal-weight colleagues. The answer is meal size, not people size.

With any large-size portion of food—such as a large bag of potato chips—a lot of calories can be eaten before there is any noticeable difference that the supply has decreased. It does not matter how accurate or how diligent a person is at estimating calories, larger portions can obscure any such changes, leading people to eat past the point where they wish they would have stopped.

#### WHAT CAUSED PORTION DISTORTION?

Portion distortion in American restaurants seems to have caught momentum in the late 1970s (2). This coincided with an increasing geographic saturation of fast-food franchises and its accompanying proliferation of inexpensive, convenient dining options (29). With a multitude of different places where one could quickly purchase a hamburger, soft drink, and french fries, an easy way for an ambitious franchise to position itself in the foodscape was by giving more food for only a small increase in price. Given the low food costs of french fries and drinks, they were natural targets for size escalation. Value sizes led to value meals, and value meals at one restaurant led to larger value meals at the restaurant across the street.

History repeated itself 20 years later with the mid-level casual dining restaurants. As their popularity and rivalry increased in the 1990s, so did their attempts to create perceptions of value. They too began trying to differentiate themselves by offering more and more food for less and less money.\*

Do these restaurants super-size their portions because they want us to become fat? No restaurant is specifically in business to make you fat. If you buy a super-sized meal and throw half of it away, it will make no difference to them or to their profitability. They are in business to sell you food, not to make you clean your plate.

The same portion distortion we see in restaurants can be found with the wide range of sizes offered in supermarkets. With the introduction of less expensive generic

products, the managers of many popular brands realized that the best way to compete was not through price wars, but through size wars. They could maintain their exclusive positioning, but “add value” by offering larger sizes that cost progressively less per ounce. This resulted in huge boxes of cereal and even double-packs that are often found in warehouse club stores. Our desire for value at the cash register led to larger sizes that cost us less and less.

The same super-sizing that has happened with serving sizes in restaurants and with package sizes in grocery stores also has been happening in our homes (30). As plate sizes, bowl sizes, and glass sizes have increased, by 36% in some cases, so have our assumptions of how much we need to eat and drink to be full (4). Escalations in dishware size lead to a dutiful escalations in how much people see as appropriate amounts to eat. Whereas 6 oz of pasta on an 8-in plate looks like a reasonable portion, the same 6 oz on a 12-in plate would look more like an appetizer. As a result, the typical person would add more pasta to the plate—as the research editorial in this issue of the *Journal* emphasizes (31).

Portion distortion was a predictable economic consequence of people wanting more value for their money (32). What becomes concerning is that it may gradually increase our own internal level of how much we think we need to eat before we are full (33). As 4-oz hamburgers paved the way for 5-oz and 6-oz burgers, so may our adaptation level of how much we think we need to eat in other contexts before we will be full. A real danger of portion distortion is how it may exaggerate how much we think we need to eat when eating at home.

#### HOW CAN WE DOWNSIZE OUR CONSUMPTION NORMS?

Most of us joined the American Dietetic Association because we believe in the importance of nutrition and we believe in the importance of education. The problem with the portion sizes suggested by large packages, large restaurant servings, and large dinnerware is that education is not the answer. Knowing we will serve and eat more will not prevent us—or our clients—from serving more and eating more.

Two years ago I spent 90 minutes explaining to 65 intelligent, motivated graduate students that if I presented them with a 1-gallon serving bowl of Chex Mix (General Mills, Inc, Minneapolis, MN) they would serve themselves and eat more than if I instead presented them with two half-gallon bowls. To make this point vividly clear, I lectured to them, showed them videotapes, asked them to go through a demonstration, and separated them into four-person groups to discuss strategies that they could use to prevent this from happening. In addition to being motivated and intelligent, they were now educated—highly educated—on one topic: If presented with a 1-gallon serving bowl of Chex Mix, they will serve themselves and eat more than if they were instead presented with two half-gallon bowls.

Six weeks after their 90-minute coaching session, I invited these same students to a Superbowl party at a local sports bar, complete with free snacks. On arriving, half were led to one room where they were presented with 1-gallon serving bowls of Chex Mix, and the other half were led to a different room where they were presented

\**Why do we not see the same degree of portion distortion in other countries, such as in Europe? One explanation has to do with the density of restaurant franchises in America versus abroad. Without the high density of “me too” franchises, European restaurants are more highly differentiated from each other. As a result, there is less attempt for consumers to try and compare them using a common denominator such as the size of the hamburger or the number of fries per Euro.*

with twice that number of half-gallon serving bowls of Chex Mix. Although intelligent, motivated, and highly educated about the danger of large serving bowls, those people serving themselves from the 1-gallon bowls served themselves 53% more Chex Mix and ate 92% of what they served (34). When asked at the end of the evening if the size of the serving bowl influenced how much they took, all but two denied the possibility.

Is education the answer? The answer is not in telling clients to remind themselves not to overeat from large packages, large servings, and large dinnerware. The answer is for them to eliminate large packages, large servings, and large dinnerware from their lives. It is much easier for a person to change his or her environment than to change his or her thinking.

This can be done painlessly and in small steps. A shopper can buy smaller sizes, or create his or her own single-portion servings by subdividing the bargain-size bag into smaller ones. A restaurant diner can split the fries, order two appetizers instead of an entrée, or have half the dinner packed to go. A home diner can replace large tableware with smaller plates, bowls, and glasses and can use smaller serving bowls and serving spoons, while also keeping the large packages or containers off the table and out of sight.

Just as larger portions have gradually led to oversized appetites, smaller portions may gradually lead to downsized appetites. We first need to change our personal environment. Only then do we change our minds.

## References

1. Young LR, Nestle M. Expanding portion sizes in the US marketplace: Implications for nutritional counseling. *J Am Diet Assoc.* 2003;103:231-234.
2. Young LR. *The Portion Teller: Smartsize Your Way to Permanent Weight Loss.* New York, NY: Morgan Road Books; 2005.
3. Schwartz J, Byrd-Bredbenner C. Portion distortion: Typical portion sizes selected by young adults. *J Am Diet Assoc.* 2006;106:1412-1418.
4. Wansink B. *Mindless Eating: Why We Eat More Than We Think.* New York, NY: Bantam Dell; 2006.
5. Rolls BJ, Morris EL, Roe LS. Portion size of food affects energy intake in normal-weight and overweight men and women. *Am J Clin Nutr.* 2002;76:1207-1213.
6. Ledikwe JH, Ello-Martin JA, Rolls BJ. Portion sizes and the obesity epidemic. *J Nutr.* 2005;135:905-909.
7. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: Conception to adolescence. *J Law Med Ethics.* 2007;35:22-34.
8. Fisher JO, Rolls BJ, Birch LL. Children's bite size and intake of an entree are greater with large portions than with age-appropriate or self-selected portions. *Am J Clin Nutr.* 2003;77:1164-1170.
9. McConahy KL, Smiciklas-Wright H, Mitchell DC, Picciano MF. Portion size of common foods predicts energy intake among preschool-aged children. *J Am Diet Assoc.* 2004;104:975-979.
10. Rolls BJ. The supersizing of America: Portion size and the obesity epidemic. *Nutr Today.* 2003;38:42-53.
11. Wansink B. Can package size accelerate usage volume? *J Marketing.* 1996;60:1-14.
12. Wansink B, Van Ittersum K, Painter JE. Ice cream illusions: Bowls, spoons and self-served portion sizes. *Am J Prev Med.* 2006;31:240-243.
13. Colapinto CK, Fitzgerald A, Taper LJ, Veugeler PJ. Children's preference for large portions: Prevalence, determinants, and consequences. *J Am Diet Assoc.* 2007;107:1183-1190.
14. Wansink B, Park S. At the movies: How external cues and perceived taste impact consumption volume. *Food Qual Preference.* 2001;12:69-74.
15. Wansink B, Kim J. Bad popcorn in big buckets: Portion size can influence intake as much as taste. *J Nutr Educ Behav.* 2005;37:242-245.
16. Birch LL, McPhee L, Shoba BC, Steinberg L, Krehbiel R. Clean up your plate: Effects of child feeding practices on the conditioning of meal size. *Learning Motivation.* 1987;18:301-317.
17. Herman CP, Polivy J. A boundary model for the regulation of eating. In: Stunkard AB, Stellar E, eds. *Eating and Its Disorders.* New York, NY: Raven; 1984:141-156.
18. Berry SL, Beatty WW, Klesges RC. Sensory and social influences on ice-cream consumption by males and females in a laboratory setting. *Appetite.* 1985;6:41-45.
19. Chandon P, Wansink B. How biased household inventory estimates distort shopping and storage decisions. *J Marketing.* 2006;70:118-135.
20. Wansink B. Environmental factors that unknowingly increase a consumer's food intake and consumption volume. *Annu Rev Nutr.* 2004;24:455-479.
21. Schwarz N. *Cognition and Communication: Judgmental Biases, Research Methods and the Logic of Conversation.* Mahwah, NJ: Erlbaum; 1996.
22. Wansink B, Sobal J. Mindless eating: The 200 daily food decisions we overlook. *Environment Behav.* 2007;39:106-123.
23. Polivy J, Herman CP, Hackett R, Kuleshnyk I. The effects of self-attention and public attention on eating in restrained and unrestrained subjects. *J Pers Soc Psychol.* 1986;50:1203-1224.
24. Wansink B, Painter JE, North J. Bottomless bowls: Why visual cues of portion size may influence intake. *Obes Res.* 2005;13:93-100.
25. Lichtman SW, Pisarska K, Berman ER. Discrepancy between self-reported and actual caloric intake and exercise in obese subjects. *N Engl J Med.* 1992;327:1893-1898.
26. Livingstone MBE, Black AE. Markers of the validity of reported energy intake. *J Nutr.* 2003;133:895S-920S.
27. Wansink B, Chandon P. Meal size, not body size, explains errors in estimating the calorie content of meals. *Ann Intern Med.* 2006;145:326-332.
28. Chandon P, Wansink B. Is obesity caused by calorie underestimation? A psychophysical model of fast-food meal size estimation. *J Marketing Res.* 2007;44. In press.
29. Wansink B, Huckabee M. De-marketing obesity. *Calif Management Rev.* 2005;47:6-18.
30. Sobal J, Wansink B. Kitchenscapes, tables, platescapes, and foodscapes: Influences of microscale built environments on food intake. *Environment Behav.* 2007;39:124-142.
31. Van Ittersum K, Wansink B. Do children really prefer large portions? Visual illusions bias their estimates and intake. *J Am Diet Assoc.* 2007;107:1107-1110.
32. Cutler DM, Glaeser EL, Shapiro JM. Why have Americans become more obese? *J Econ Perspectives.* 2003;17:93-118.
33. Pothullil JM. Role of oral sensory signals in determining meal size in lean women. *Nutrition.* 2002;18:479-483.
34. Wansink B, Cheney MM. Super bowls: Serving bowl size and food consumption. *J Am Med Assoc.* 2005;293:1727-1728.