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## Portion Distortion: Size Does Matter!

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**C**ompare the food and beverage offerings in supermarkets and restaurants of today with that of the past, and it will be readily apparent that the size of the portions has increased substantially. Indeed, yesterday's "large" is today's "medium."

As many researchers have indicated, the increase in the size of portions has more or less paralleled the increase in the number of people who are either overweight or obese. And it's no coincidence that the journal *Obesity* grew from six issues and 509 pages in its first year of publication in 1993 to 12 issues and 2,322 pages in 2006.

When portion sizes are much larger than normal, it's referred to as "portion distortion." This "supersizing" has skewed the perception of what constitutes proper servings. Since larger-than-normal portions are so ubiquitous, the implication is that they represent appropriate standards of consumption. Ultimately, portion distortion encourages people to eat and drink more.

A good bit of research has gone into portion distortion. Many of the studies paint a vivid portrait of the dynamics of portion distortion and the dramatic effect that it has on our everyday lives.

Let's take a look at how it influences caloric intake along with several strategies that our athletes can use to help them contend with portion distortion.

### WHAT THE RESEARCH SAYS

Numerous studies have shown that the availability of larger portions ensures the consummation of more calories. In a classic study, 51 subjects were randomly assigned to two groups: One group received macaroni and cheese on a plate and the other group received macaroni and cheese in a large serving dish and then self-served the food onto their plates.

On different days, the subjects were

given four different portion sizes for lunch (500, 625, 750, or 1,000 grams). When given the largest portion of food, the subjects consumed nearly 30% more calories compared to when given the smallest portion of food.

Also of note is that regardless of the amount of food that was consumed, their perceived ratings of hunger and satiety (fullness) didn't differ after the meal. Perhaps even more telling was the fact that 55% of the subjects didn't notice any differences in the portions that were served.

Without a doubt, portion size has a direct and dramatic impact on the number of calories that are consumed. This is particularly true in restaurant settings. Most restaurants offer a wide variety of low cost and large size foods. This combination is perceived as economical or a "value meal," but it has the potential to be a dietary disaster.

Researchers conducted a study in a public cafeteria-style restaurant on a university campus. On 10 days over a period of five months, the researchers covertly recorded the food intake of 180 customers who purchased an entrée of baked pasta in cheese sauce from a serving line at lunch.

On five of those days, the customers received a standard portion (248 grams; 422 calories) and on the five other days, they received a large portion (377 grams; 633 calories).

The two portions were served on different days so that the customers never saw both of them at the same time. (The price of the entrée was the same for both portions.)

The study found that the size of the portion had a significant effect on the intake of the entrée. Those who purchased the large portion consumed 43% more of the entrée and 25% more of the entire meal compared to those who purchased the standard portion. The two groups of customers showed no differences in their ratings of the appropriateness of the portion size or the amount that they ate in

comparison to their usual lunch – a clear indication that they were unaware of portion distortion.

It has been thought that the effects of portion size are specific to foods that don't have a distinct form or shape – such as macaroni and cheese – since this makes it all the more difficult to judge portion size.

The researchers have, however, investigated foods that were in clearly defined packages.

In one of these studies, 60 subjects reported to a laboratory on five different days to eat an afternoon snack and dinner.

For the afternoon snack, the subjects were given one of five packages of potato chips (28, 42, 85, 128, or 170 grams). They were instructed to eat as much or as little as desired (directly from the packages of potato chips were plain opaque bags of different dimensions). Three hours later, the subjects returned to the laboratory for a standard dinner. Again, they were instructed to eat as much or as little as desired.

The researchers found that as the size of the package increased, the subjects ate significantly more of the snack. As well, the subjects didn't reduce their caloric intake at dinner to compensate for the additional calories from the snack. When given the largest package, the subjects consumed 142 more calories at snack and dinner combined.

Something else worthy of note: The shape of a container distorts the perception of portion size. For example, people estimate that tall glasses hold more liquids than wide glasses of the same volume. As a result, people tend to pour more fluids into short, wide glasses than tall, narrow ones.

Researchers alternately assigned 198 college students to two groups: One group did one "practice pour" into a 1.5-ounce "shot" glass before the actual pouring and the other group did 10 "practice pours" before the actual pouring.

Half of the subjects were given tall, slender glasses and the other half were given short, wide glasses of the same volume (12 ounces). Their goal was to pour 1.5 ounces of fluid into their assigned glass. The students poured 30% more fluid into the short, wide glasses than into the tall, slender glasses.

A related study involved 86 bartenders in a university town who had 6.3 years of bartending experience. The bartenders were asked to pour 1.5 ounces of alcohol into glasses as in the previous study. They did so after either receiving no instructions or being told "please take your time."

Although they were quite experienced in the task, the bartenders still poured 20.5% more alcohol into the short, wide glasses than the tall, slender glasses. The effect was reduced – but not eliminated – when they paid careful attention.

Remember that just as larger servings of food increase caloric intake, so do larger portions of caloric beverages. Because of this, the size of a beverage can have an impact on the intake of total calories at a meal. One study involved 33 subjects from a university community.

The subjects ate lunch in a laboratory once a week for six weeks. Each time, they received the same foods but the beverage varied in type (regular cola, diet cola or water) and portion size (12 fluid ounces or 18 fluid ounces).

The subjects could eat and drink as much or as little as desired. It was found that as the size of the beverage increased, so did the amount of the beverage that was consumed.

This finding was a true irrespective of the type of beverage that was served. When the size of the caloric beverage (regular Coke) was increased from 12 ounces to 18 ounces, the women consumed 10% more calories and the men consumed 26% more calories. The type or portion size of the beverage

age didn't produce a significant difference in food intake. But when the subjects consumed the caloric beverage, their intake of total calories (the food plus the beverage) was significantly greater than when they consumed the non-caloric beverages.

In effect, then, the subjects consumed more calories from the caloric beverage but didn't eat any fewer calories from the food to offset the increase. And despite consuming a greater number of calories, there was no significant difference in their ratings of hunger and fullness.

Visual cues can also influence the amount of food that's consumed. Many of your athletes, for instance, base their food intake on eating until their plates are "clean" or bowls are empty. Researchers randomly assigned 54 subjects to eat tomato soup from either a normal bowl or a bowl that was modified to refill itself "slowly and almost imperceptibly" as its contents were consumed. (The bowls looked identical.) The subjects were told to "enjoy as much soup as they wanted."

Those who unknowingly ate from the self-refilling bowls consumed 73% more soup and calories than those who ate from the normal bowls. And although the subjects consumed 73% more soup, they didn't think that they had consumed more. In fact, they underestimated their intake by an astonishing 140.5 calories. In addition, the subjects didn't perceive themselves as more satiated than those who ate from the normal bowls.

Even highly educated individuals have trouble discerning appropriate portion sizes. One study involved members of a nutrition and food science department at a large university. In the study, 85 faculty, graduate students, and staff members – many of whom were "internationally renowned" – were invited to attend an ice cream social to celebrate the success of a colleague.

Unbeknownst to the participants,

they randomly received either a small (17 ounces) or large (34 ounces) bowl as well as a small (two ounces) or large (three ounces) spoon with which they scooped their own servings.

Those who were given a large bowl served themselves 31.0% more ice cream than those who were given a small bowl. Those who were given a large spoon served themselves 14.5% more ice cream compared to those who were given a small spoon.

More importantly, those who used a large bowl and a large spoon consumed 56.8% more ice cream than those who used a small bowl and a small spoon.

Food can be served as pre-portioned units – such as a cookie or sandwich – that can vary considerably in size. When people are served a pre-portioned food, they tend to eat the entire portion.

One study involved 75 subjects from a university community. The subjects ate lunch in a laboratory once a week for four weeks. Each time, they received one deli-style sandwich of different size (6, 8, 10 or 12 inches). The sandwiches were served as a single unit in a foil wrapper and contained the same proportions of ingredients. The subjects could eat as much or as little as desired.

The researchers found that as the size of the portion increased, so did the caloric intake. When the sandwich was increased from eight inches to 12 inches, for example, the women consumed 12% more calories and the men consumed 23% more calories.

Nevertheless, there was no significant difference in their ratings of hunger and fullness after eating the sandwiches.

Portion distortion makes self-serving a potential nightmare. The unfortunate truth is that people eat most of what they serve themselves. One study involved 40 graduate students who had been recruited to attend a Super Bowl party. The students were alternately assigned to one of two identical

buffet tables on opposite sides of an adjoining room where they were offered snacks.

One table had two snacks (assorted roasted nuts and a pretzel/chip variety mix) in two large (four liters) serving bowls; the other table had an equal amount of the same two snacks in four medium (two liters) serving bowls. Other than the size, the serving bowls were identical.

The students served the snacks to themselves onto the same-size plates with the same-size serving scoop. Afterwards, they were led to a table to watch the football game. The researchers discovered that those who self-served from the large bowls took 53% more snacks and consumed 56% more snacks than those who self-served from the medium bowls.

Interestingly, portion size is even a more salient factor in overeating than the taste and quality of food. This was graphically demonstrated in a study that involved 158 subjects who had independently elected to watch a movie at a theater in a suburb of Philadelphia.

After purchasing their tickets, the subjects were randomly given a medium (120 grams) or large (240 grams) bucket of free popcorn that was either fresh or 14 days old. (Prior to the movie, all of the subjects had eaten dinner.)

Those who received the fresh popcorn ate 45.3% more when it was in the large container compared to when it was in the medium container. The flavor did little to dissuade people from eating too much as evidenced by the fact that those who received the stale popcorn still ate 33.6% more when it was in the large container compared to when it was in the medium container.

Yet, nearly 85% of the people who ate the old popcorn later described it with negative remarks (such as "stale" and "terrible"). So it would seem that people even overeat foods that they dislike.



## WHAT TO DO?

An accumulating body of scientific evidence has shown that portion distortion encourages people to eat and drink more. So what can be done to temper these insidious effects?

For one thing, pressure must be put on the food industry to “reset” the standards for portion sizes. In a nutshell, the food industry needs to downsize portions – not “supersize” them – in order to return to the days when appropriate servings were available as tangible choices for consumers.

But what can be done by the athletic community? At the grassroots level, it’s of utmost importance for coaches and physical educators to serve as reliable sources of information. Educate your athletes and students about portion sizes. Teach them to be on the lookout for portion distortion and how it influences caloric intake.

Give your athletes and students specific tactics that they can employ in their battle against portion distortion. For example, even if portions come in larger sizes, they can repackaging the larger portions into smaller ones.

In addition, suggest that they use smaller plates, bowls, and glasses/cups. This will help them to limit the size of portions and, as a result, lower the number of calories

that they consume. It certainly makes sense that if someone simply decides to eat an entire bowl of potato chips, for example, a smaller bowl would yield fewer calories than a larger bowl.

Encourage your athletes and students to use tall, narrow glasses for beverages or ones on which levels are pre-marked. This will help them to avoid overpouring. And when they’re faced with larger sizes of beverages, recommend that they pursue low- or non-caloric options.

Portion distortion is especially problematic when people are distracted. In this case, they’re even less aware of differences in the size of portions. As such, inform your athletes and students to be particularly vigilant in social settings.

Finally, portion distortion can actually be used to our advantage. Here’s how: Some authorities suggest using larger plates, bowls, and glasses/cups to increase the consumption of less preferred healthful foods such as fruits and vegetables. ■

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