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## **Environmental Persuaders and the 200 Daily Food Decisions**

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## **Environmental Persuaders and the 200 Daily Food Decisions**

### **Abstract**

How aware are people of the number of food-related decisions they make in a day and how the environment influences these decisions? Study 1 surveyed 139 people showed they grossly underestimated the number of food-related decisions they made – by an averaged of over 220 decisions – particularly in initiation and cessation of eating. Study 2 content analyzed 749 debriefing comments of controlled field studies. Although the people in these studies overserved and overate 31% more food as a result of having been given an exaggerated environmental cue (large bowl, large spoon, etc.), 52% denied having eaten more, and 45% attributed it to other reasons (such as hunger). These studies underscore two key points: First, we are aware of only a fraction of the food decisions we make. Second, we are either unaware of how our environment influences these decisions or we are unwilling to acknowledge it.

## **Environmental Persuaders and Today's 200 Food Decisions**

Many food-related decisions occur in distracting environments and may lead to relatively “mindless eating.” This would explain why people often cannot really explain why they ate six chocolates from the office candy dish, ate two bites of chicken for every one bite of cole-slaw at lunch, or why they consumed three helpings of potatoes for dinner (Wansink 2004).

Food choice decisions often focus on what is eaten, while food consumption decisions are a subset of food choice which focuses more specifically on volume decisions. The former determine *what* we eat (soup or salad); the latter determine *how much* we eat (half of the bowl or all of it). Yet environmental factors (such as package size, plate shape, lighting, variety, or the presence of others – Stroebele and de Castro 2004) can increase food consumption volume far more than many people realize.

Here we investigate one of the ironies of food consumption research. Whereas people will acknowledge that environmental factors influence others, they often wrongly believe they themselves are unaffected. This suggests environmental influences occur at a basic level at which people are not aware or do not monitor. Understanding these influences on consumption volume has immediate implications for research, nutrition education, and consumer welfare. This article examines two of the reasons environmental factors may influence consumption intake and why they do so.

## **Environmental Influences of Overserving and Overeating**

Environmental drivers of food consumption can be categorized as relating to the eating environment and the food environment (see Figure 1). The eating environment refers to the ambient factors that are independent of food, such as atmosphere, the effort of obtaining food, the time of day, the social interactions that occur, and the distractions that may be taking place, and others. In contrast, the food environment refers to the food itself and to factors that directly relate to the way food is provided or presented, such as its salience, structure, package or portion size, whether it is stockpiled, and how it is served.

An academic distinction has often been made between overserving and overeating. While the size of a serving bowl might offer a visual trick that influences how much a person serves oneself, a food-regulation perspective would argue that it has no influence on the actual amount consumed. That is, if one overserves himself, he will stop eating when full. In practice, there is a strong link between how much one serves and how much one eats. One study showed there is a 92% correlation between the two behaviors (Wansink and Cheney 2005).

**[Insert Figure 1]**

Both the eating and food categories of environments contribute directly to consumption volume. Additionally, they can also contribute indirectly because they suggest consumption norms and inhibit consumption monitoring. For instance, dining with a friend can have a direct impact on consumption because of the longer duration of the meal (Strobele and de Castro 2004; French, Story, Jeffrey 2001; de Castro 1994; 2000; de Castro and Brewer 1992). Communal eating can also have an indirect impact on consumption volume because of the intake norms set by the friend---who cleans his

plate and orders a dessert---and because the enjoyment of his or her company distracts one away from accurately monitoring consumption.

Although research has effectively identified many of the environmental factors that influence consumption (e.g., Stroeble and de Castro 2004; Wansink 2004), it has less effectively explained *why* they do so. Two promising starting points involve consumption norms and consumption monitoring. While consumption norms and consumption monitoring have been generally posited as mediating consumption intake (Wansink 2004), they have not been examined in detail to identify the extent to which they operate.

### **Are We Aware of How Many Food-related Decisions We Make?**

The ability to monitor consumption can help reduce discrepancies between perceived and actual consumption levels (see Figure 1). The influence of environmental factors on consumption is magnified because they can bias or confuse estimates of how much someone has eaten, or even the number of times someone thinks they are actively making decisions about starting or stopping an eating episode.

Not surprisingly, a major determinant of how much one eats is often whether the person deliberately paid attention to (or attempted to monitor) how much he or she ate (Arkes 1991; Polivy et al 1986; Polivy and Herman 2002). In lieu of monitoring how much one is eating, people can use cues or rules-of-thumb (such as eating until a bowl is empty) to gauge how much they will eat (Wansink, Painter, and North 2005).

Unfortunately, using such cues and rules-of-thumb can yield inaccurate estimates and surprises. In one study, unknowing diners were served tomato soup in bowls that were refilled through concealed tubing that ran through the table and into the bottom of the

bowls. People eating from these “bottomless” bowls consumed 76% more soup than those eating from normal bowls, but estimated that they ate only 4.8 calories more (Wansink, Painter, and North 2005).

### **Are We Aware of the Consumption Norms that Have Lead Us to Overeat?**

People can be very impressionable when it comes to how much they will eat. There is a flexible range in how much food an individual can eat (Herman and Polivy 1984), and someone can often “make room for more” (Berry, Beatty, and Klesges 1985) and be influenced by consumption norms around them (see Figure 1).

For many individuals, determining how much to eat or drink is a mundane and relatively low-involvement behavior that is a nuisance to monitor continually and accurately, so they instead rely on consumption norms to help them determine how much they should consume. Consumption can be further influenced by other norms or cues that are present in the environment. Many seemingly isolated influences of consumption---such as package size, variety, plate size, or the presence of others---may involve or suggest a perceptual consumption norm that influences how much individuals will eat or drink (Wansink 2004). The use of consumption norms, as with normative benchmarks in other situations, may be relatively automatic and may often occur outside of conscious awareness (Schwarz 1996; 1998).

The trouble with the impact of consumption norms is that they occur at such a low-level of consciousness that people may be unaware of how much influence they have. For this reason, we are likely to be less vigilant when consumption norms are being communicated. Even when consumption norms do influence us, there is anecdotal

evidence that people are generally either unaware of their influence or they are unwilling to acknowledge it (Wansink, Painter, and North 2005).

Past evidence of the presence or the absence of this awareness has sometimes been suggested in the context of lab experiments (Vartanian and Herman 2005; Wansink and Cheney 2005). The problem with trying to generalize from such artificial contexts is that people are generally aware that some manipulation has occurred, and their willingness to accurately acknowledge their duplicity may lead them to deny any influence, simply out of reactance (Meiselman 1992). This phenomenon can best be observed in the context of controlled field studies conducted in natural environments.

Building upon Figure 1, two studies investigated the two mediating factors of consumption monitoring and consumption norms. In addressing our ability to effectively monitor our consumption, Study 1 provides preliminary evidence about whether we are aware of how many food-related decisions we make. To address our awareness of the influence of consumption norms, Study 2 content analyzes debriefing data from seven studies of environmental cues.

### **Study 1.**

#### **Are We Aware of How Many Food-related Decisions We Make?**

The purpose of this study was to provide an initial examination of how many food-related decisions a person makes in contrast to how many they believe they make.

**Method.** One hundred and fifty adults who had been involved in earlier studies were contacted through email and were asked a series of questions related to food-related



decisions. They were initially asked to estimate how many total decisions about foods and beverages they make in one day. They were then asked six questions about snacks, six questions about meals, and six questions about beverages. The numbers from these 18 different questions were aggregated, and self-reported questions about height and weight were asked and used to calculate a relative weight as Body Mass Index (BMI) for each participant. Following the guidelines of the Center for Disease Control and the World Health Organization (WHO 1998), participants were classified as normal weight if their BMI was below  $25 \text{ kg/m}^2$ , as overweight if their BMI was higher than  $25 \text{ kg/m}^2$ , and obese if it exceeded  $30 \text{ kg/m}^2$ .

**Results.** Of the 150 participants recruited, 139 (93%) completed the study. The average participant initially estimated they made 14.76 food and beverage-related decisions in the day (see Table 1). Upon aggregating the total number of decisions they made upon greater reflection, it was found that they instead made 219.0 decisions, which is significantly higher ( $t=178, p<.001$ ) than their initial global estimate.

While the typical person estimated they made around 15 food and beverage decisions in a day, the average that was calculated from subsequent questioning was 219, approximately 200 more. Part of these inconsistencies are due to a tendency for people to consider only food choice decisions as actual food decisions. For example, a snack deliberation in front of a vending machine would not be counted as a food-related decision by many people unless it resulted in an actual purchase. In general, most of the food decisions people neglect to consider as decisions are those involving initiation and cessation.

**[Insert Table 1]**

Interestingly, these calculation estimates vary between BMI categories. There was a significant a J-shaped relationship between weight and food-related thoughts. A spline regression indicated that both the legs of this J-shaped relationship were significant at the  $p < .05$  level.

**[Insert Figure 2]**

**Discussion.** Given that people so dramatically underestimate the number of meal-related decisions they make in a day, perhaps it is not unfair to say we often engage in mindless eating. Each of these small decision points is a point where a person can be unknowingly influenced by environmental cues. Given the interest in better controlling our food intake, people need to be more aware of the number of decisions that influence what they eat as well as when they start and when they stop eating.

In addition, the possibility of a J-shaped relationship between weight and food-related thoughts merits more investigation. Although not significant, it still suggests that obese people (BMI > 30) may be qualitatively different than those who are simply overweight (BMI 25-30). When grouped together for analysis, which is often the case, aggregation of overweight and obese people could obscure important differences. For instance if the estimates of the two groups were collapsed, they would look almost identical to that of the normal weight people.

At the core of mindless eating is the idea that we make many more food-related decisions than we are aware of having made. While some decisions focus on the choice of particular foods, many more decisions involve the initiation and cessation of eating

(Rozin et al 2003). If people were more conscious of the number of food-related decisions they make in a day, they could be more vigilant of how their environment is influencing them (French, Story, Jeffrey 2001).

## **Study 2.**

### **Are We Aware of the Consumption Norms that Have Lead Us to Overeat?**

Study 1 suggested that we make a much larger number of food-related decisions than most of us realize. Each of these decisions that we are not consciously aware of provides an opportunity for being unknowingly influenced by environmental cues. In Study 2 we investigate whether people 1) are aware of overconsuming, or 2) aware of being impacted by these cues after the cues and their general impact is made salient.

**Method.** Study 2 involved a content-analysis of seven controlled field studies which investigated how environmental factors such as bowl size, spoon size, and glass shapes influenced how much people consumed in natural environments when randomly assigned to an exaggerated treatment condition. To assess the awareness of these factors, the qualitative data collected during the post-experiment debriefings was coded using content analysis procedures (Webber 1989; Neuendorf 2002). Across all of these studies, the same two questions were asked of those in the exaggerated (big bowl, big spoon, etc.) treatment conditions:

1. “How much did you eat compared to what is typical for you?”

2. “In this study, you were in a group that was given [a larger bowl]. Those people in your group ate an average of 20-50% more than the others. Why do you think you might have eaten more?”

The answers to the first question about amount eaten were coded as either “less than,” “about the same,” or “more than.” The second question about explanations for overeating was coded as to 1) they denied eating more, 2) they attributed it to hunger, 3) they attributed it to the intervention, or 4) an other explanation (being in an exciting situation, etc.).

**Results.** In total, 749 people were involved in these field studies with roughly half of them being in the exaggerated environmental cue conditions. Among this treatment group, although the average increase in consumption over the control was 31%. However, an average of 73% of the participants believed they ate as much as they normally ate. Of those remaining, an average of twice as many believed they had eaten less compared to those thinking they might have eaten more (19% vs. 8%). For the 8% of people to have eaten enough to fully account for this 31% increase (excluding those who claimed to have eaten less), each would have had to eat 387% more than the average member in the control group.

**[Insert Table 2]**

When told of their treatment groups’ bias, and when asked why they might have eaten more, an average of 52% claimed they did not eat more, and 31% said that if they did eat more, it was because they were hungry. An average of only 2% of the participants believed they had eaten more because of the environmental cue that had been specifically named. Fifteen percent claimed they ate more for miscellaneous reasons, such as because

it was a special occasion (the Super Bowl, or a celebratory ice cream social) or because it was “free.”

**Discussion.** Although the typical study in this sample lead the average participant to consume 31% more when presented with an exaggerated environmental cue, only 2% believed they had been personally influenced by this cue. Furthermore, only 9% of the participants believed they had eaten more than they normally would have eaten in that situation. Even when confronted with how much their group had overeaten, over half of the participants denied that they had been influenced. Of those remaining 48% of participants who did believe it conceivable that they had possibly overeaten, and 96% of these believed it must have been because they were hungry or for another reason unrelated to the actual environmental cue itself.

Lab studies have often found that people either do not believe they were influenced by external cues or to not want to admit this was the case (Vartanian and Herman 2005). While such studies have not been systematically evaluated, their anecdotal evidence has often been discounted because of their demand effects. Using field studies, we show here that people claim to be unaware of these factors increasing their consumption. Even when confronted with empirical findings, most participants in environmental manipulations continue to disavow the findings or to look for alternative explanations. Although these results do not fully disentangle unawareness from denial, the consistency of the findings across studies point to a strong systematic influence that goes beyond what people either know or will confess to.

## General Discussion

The environment influences food-related decisions consistently through the day. There are two problems with this. First, we are not aware of how many decisions we make that are being influenced. Second, we are not aware or unwilling to acknowledge that the environment has any impact on us at all.

These findings show that people tended to not acknowledge their own susceptibility to manipulations of the food environment. This is consistent with other psychological work that shows that people tend to have flawed self-assessments, be overconfident, and overestimate their own capabilities (Dunning 2005). Thus broader tendencies to be self-confident and competent reveal themselves in food intake decisions, which may lead to overconsumption and overweight.

These data suggest that many people engage in mindless eating where they are not consciously aware of the effects of the environment on how much food or beverage they consume. Other food research has found that people make “automatic” food choices where they unconsciously eat without considering what or how much food they select and consume (Furst et al 1996). Automaticity is an important part of everyday behavior (Uleman & Bargh 1989), and appears to be involved in food consumption as well.

Increasing mindfulness (Langer 1990) may facilitate healthier food choices.

Useful future research could characterize social and psychological characteristics that predict peoples’ perceptions of eating decisions and that acknowledge environmental influences. This type of investigation could help identify audiences and mechanisms that could be used to make eating more salient and make people more mindful of influences of the built environment on how much food and drink they actually consume.

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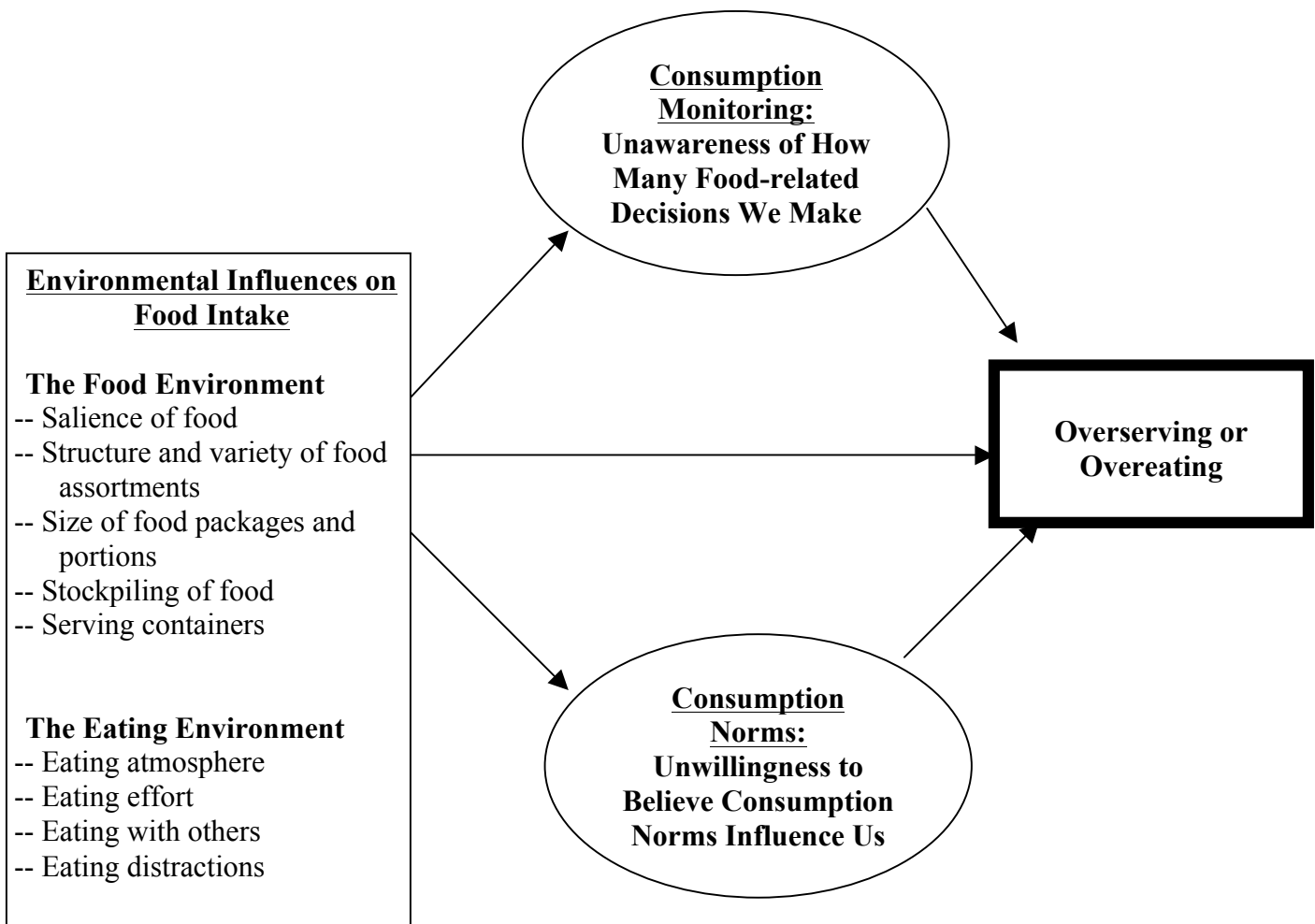
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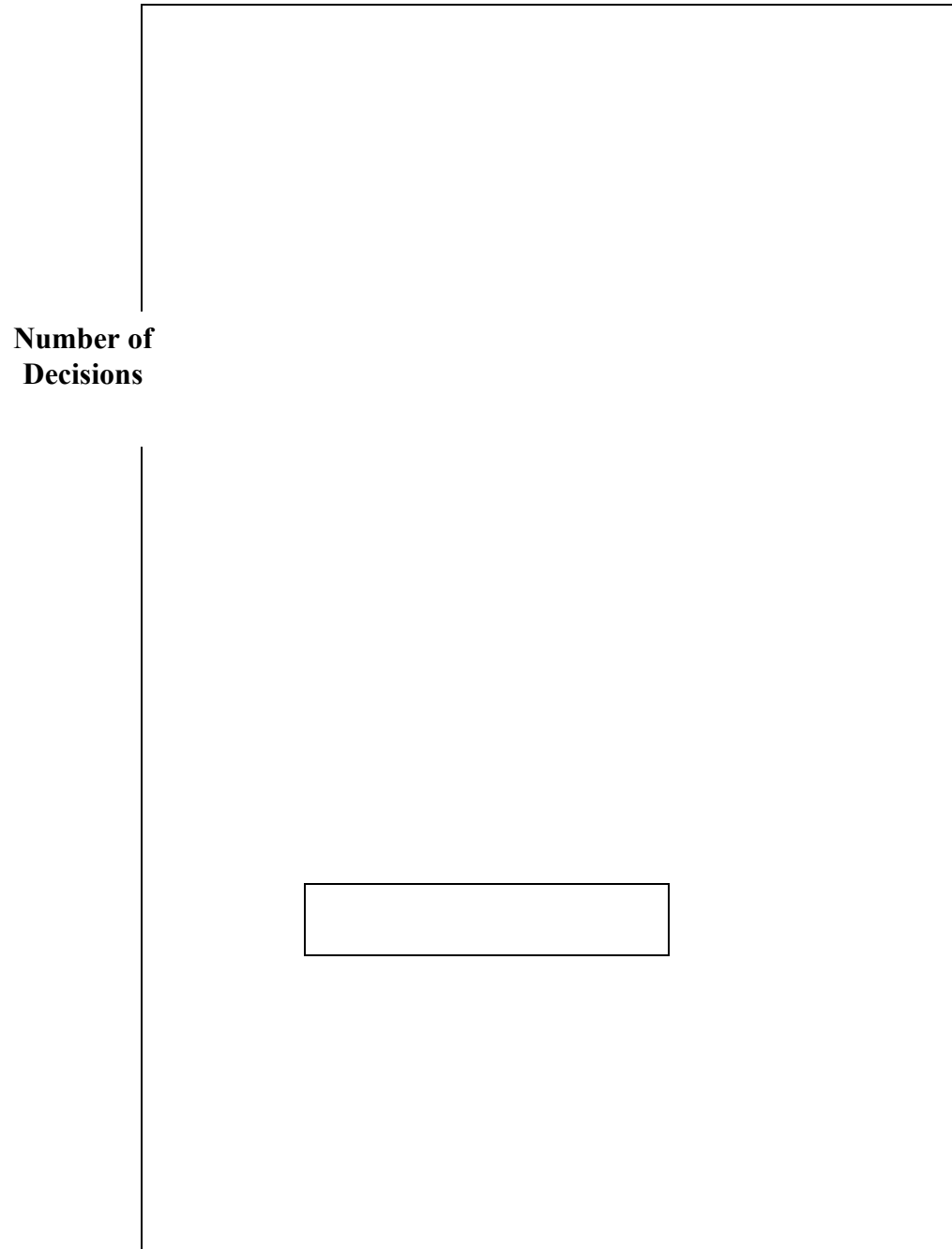
Figure 1.

**Environmental Influences on Overserving and Overeating**



**Figure 2.**

**The Calculated Number of Daily Food- and Beverage-related Decisions**



**Table 1.****All People Underestimate How Many Food-related Decisions They Make**

	Body Mass Index (BMI)				F-Value (p-value)
	Normal Weight (BMI< 25) (n = 71)	Over- weight (BMI 25-30) (n = 38)	Obese (BMI> 30) (n=30)	Average	
“How many total food- and beverage-related decisions do you make in one day?”	14.81	12.21	17.90	14.76	0.13 (.877)
Actual (calculated) number of snack-related decisions	52.5	28.4	53.5	46.1	0.59 (.554)
Actual (calculated) number of meal-related decisions	75.4	63.3	120.1	82.5	2.65 (.075)
Actual (calculated) number of beverage-related decisions	94.0	93.8	129.1	102.7	0.99 (.372)
Total (calculated) number of food- and beverage-related decisions	201.6	187.3	289.1	219.0	2.16 (.120)

**Table 2.**  
**Participants in Seven Field Studies Deny the Influence Interventions Have on their Intake Behavior<sup>1</sup>**

Sample and Context of Study	Intervention and Findings	“How much did you eat compared to what is typical for you?”			“In this study, you were in a group that was given [a larger container]. Those people in your group ate an average of 20-50% more than the others. Why do you think you might have eaten more?” <sup>2</sup>			
		Less	About the Same	More	“I didn’t eat more”	“I was hungry”	“The (intervention) influenced me”	Other
40 MBA students at a Super Bowl party in a bar (Wansink & Cheney 2005)	Those serving themselves Chex Mix from 4-liter bowls served 53% more than those serving from 2-liter bowls	23%	57%	20%	63%	31%	3%	3%
83 nutrition experts at an ice cream social to celebrate promotion of a colleague (Wansink, van Ittersum, and Painter 2006)	Those given 3 oz ice cream spoons served 14.5% more ice cream than those given 2 oz spoons.	25%	71%	4%	45%	34%	3%	18%
161 teenagers at a summer nutrition camp (Wansink & van Ittersum 2003)	Those given wide glasses poured 77% more juice than those given tall glasses holding the same	32%	65%	3%	78%	19%	0%	3%

	volume							
86 Philadelphia bartenders working at their bar (Wansink &van Ittersum 2005)	Those given 10 oz tumblers poured 25% more alcohol than those give 10 oz highball glasses	0%	97%	3%	88%	--	0%	12%
143 evening moviegoers in Feasterville, PA (Wansink &Kim 2005)	Those given large popcorn buckets ate 45% more than those given medium buckets	14%	78%	8%	12%	79%	2%	7%
161 afternoon moviegoers in Mt. Prospect, IL (Wansink &Park 2001)	Those given large buckets ate 48% more than those given medium buckets	19%	75%	6%	15%	77%	5%	3%
86 people in a Laundromat (Wansink 1996)	Those given large bottles of detergent used 32% more than those given medium bottles	19%	65%	11%	24%	--	11%	65%
<b>Average across all studies</b>		<b>19%</b>	<b>73%</b>	<b>8%</b>	<b>52%</b>	<b>31%</b>	<b>2%</b>	<b>15%</b>

<sup>1</sup> Answers are from those in the treatment group who received the intervention that resulted in greater consumption

<sup>2</sup> The specific intervention in the study was noted at this point. Here, the example of larger bowls was used.