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Chapter 6

Hidden Persuaders: Environmental Contributors to Obesity

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Chapter Outline

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Hidden Persuaders: Environmental Contributors to Obesity
Brian Wansink

Everyone — every single one of us — eats the amount we eat partially because of what is around us. We overeat not only because of hunger, but also because of family and friends, packages and plates, names and numbers, labels and lights, colors and candles, shapes and smells, distractions and distances, cupboards and containers. This list is almost as endless as it is invisible to us.

Most of us are largely unaware of what influences how much we eat. This is one of the ironies of food consumption research. Dozens of studies involving thousands of people show that people wrongly think that what they eat is mainly determined by how hungry they are, how much they like the food, and what mood they are in (1). We all think we are too smart to be tricked by packages, lighting, or plates. This suggests that people may be influenced at a basic level of which they are not aware or which they do not monitor. Understanding these drivers of consumption volume has immediate implications for research, nutrition education, and consumer welfare (2, 3). This review aims to explain what environmental factors unknowingly influence eating and why they do so.

[h1] The Missing Environment

When we examine how much one eats, there are two common levels of analysis: a macro-level and a micro-level. At the macro-level, the focus is on government regulation, food industry incentives, school lunch programs, and advertising campaigns (4). At the micro-level, the focus is on making a choice, such as between fresh fruit or a sweet snack.

Within this broad ecological context, there is an intermediate level that is often overlooked because it lies between the policy arena and personal choice. This intermediate level is the environment in which we live and work. It is a level that can influence food intake without involving the taste, texture, or quality of the food itself. That is, regardless of whether one is eating an apple or an apple pie, these environmental factors can often unknowingly drive intake. To avoid having to continually make caveats about different food categories, it is useful to differentiate those drivers that are independent of the food being examined from those that are more dependent on it.

We will use the term "eating environment" to refer 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 (5-8) (See Figure 6-1). In contrast to the eating environment, the "food environment" refers to those 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 (9-11). The specific features of a food, such as its taste, texture, nutritional value, and so forth will not be directly examined here since they relate to the characteristics of a food category and not to the environment where the food is eaten (eating environment) or presented (food environment).

Although many of the influences of the eating environment and the food environment have been identified and listed by some scholars (12), other authors have focused on identifying the domain of their influence, such as the kitchenscape, tablescape, platescape, and foodscape (13). Perhaps a richer way to view the influence of these environments is by referring to *how* they influence our consumption. While the quantity of a food a person serves and eats is partly determined by personal norms (what they usually serve and eat), it can also be altered on any given occasion by the environmental cues around them. These cues can suggest an altered consumption norm, and can also interfere with our ability to monitor how much we have eaten. As Figure 6-2 indicates, two of the principal ways in which these environments influence how much we consume are through 1) the consumption norms they suggest, and 2) the way they disrupt our intake monitoring ability.

[Insert Figure 6-2 (environmental influences)]

Although the environmental factors outlined in Figure 6-2 will be discussed individually, it is important to realize that they operate simultaneously. Consider the end-of-the-year weight gain that many experience over the holidays (14, 15). For most, this weight gain is a combined result of both the eating environment and the food environment. The holiday *eating environment* directly encourages over-consumption because it involves long parties (long eating durations), convenient leftovers (low eating effort), friends and relatives (eating with others), and a multitude of distractions. At the same time, the

food environment — the salience, structure, size, shape, and stockpiles of food — simultaneously facilitates over-consumption.

[h1] Why Do Environmental Cues Make Us Overeat?

It has often been suggested that we overeat from larger portions because we have a tendency to "clean our plate (6)." While this may *describe* why many people eat what they are served, it does not *explain* why they do so or why they may over-serve themselves to begin with. Figure 6-2 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 portions.

[h2] Environmental Cues Bias Consumption Norms

People can be very impressionable when it comes to how much they eat. There is a flexible range as to how much food an individual can eat (16), and one can often "make room for more" (17). For this reason, a person may be quite content eating anywhere from 6 ounces to 10 ounces of pasta for dinner without feeling overly hungry or overly full.

A key part of Figure 6-2 is the role of *consumption norms* (18). For many individuals, determining how many ounces of pasta to serve themselves for dinner is a relatively low-involvement behavior which is a difficult nuisance to continually and accurately monitor. Sometimes, people 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. 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.

In one series of studies we are currently conducting, we ask people to serve the amount of four different foods (ice cream, popcorn, soup, and M&Ms) they thought would be typical, reasonable, and normal to consume. However, we vary the size of the bowls (medium vs. large) we give them. Regardless

of the food and regardless of the person, the larger the bowl people are given, the larger the consumption norm they believe is normal.

Large-size packages, large-size restaurant portions, and large-size dinnerware all have one thing in common — they suggest that it is appropriate, typical, reasonable, and normal to serve larger servings. These all influence our personal consumption norm for that situation, implicitly or at least perceptually suggesting that it is more appropriate to eat more food than smaller plates or smaller packages would suggest. The use of consumption norms, as with normative benchmarks in other situations, may be relatively automatic and may often occur outside of conscious awareness (19). This is what makes these norms so powerful.

An overview of studies in Table 6-1 indicates that, even when made aware of it, most people are unwilling to acknowledge that they could be influenced by anything 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, 98% of the diners in these field studies resolutely maintained that they were not influenced the size of package or plate they were given (20).

[Insert Table 6-1 (field study participants deny the influence of interventions)]

[h2] We Underestimate the Calories in Large Portions

The second key part of Figure 6-2 is the role of *consumption monitoring*. Not surprisingly, a major determinant of how much people eat is often whether they deliberately monitor or even pay attention to how much they eat (21, 22). When people pay close attention to what they eat, they tend to eat less. Our ability to monitor our consumption can help reduce discrepancies between how much we eat and how much we *believe* we eat. Our environment can have an exaggerated influence on consumption because it can bias or confuse estimates of how much one has eaten or how often one has been actively making decisions about starting or stopping an eating episode.

In lieu of monitoring how much they are eating, people can use cues or rules of thumb (such as eating until a bowl is empty) to gauge the amount of food consumed. Unfortunately, using such cues and rules of thumb can yield inaccurate estimates. 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 73% more soup than those eating from normal bowls, but estimated that they ate only 4.8 kcalories more (23).

Our ability to monitor or estimate how many calories we eat becomes increasingly less accurate as portion size increases. It used to be believed that obese people had a greater tendency to underestimate the calories in their meals than people of normal weight (24). This was even believed to be a contributing cause of their obesity (25). Recent studies have instead shown that this apparent effect is due to the size of the meals (the calorie content), not the size of people (26). All people of all sizes — even registered nurses and dieticians — are equally inaccurate in their estimations of calories from large portions (27). While it initially appears that heavier people are worse estimators of what they eat, a person of normal weight is just as inaccurate at estimating a 2000-kcalorie lunch as a heavy-set person. It is just that obese people eat a lot more 2000-kcalorie lunches. With any large-sized portion of food, a lot of calories can be eaten before there is any noticeable sign that the supply has decreased. It does not matter how accurate or how diligent a person is at estimating calories; larger portions obscure any such changes until it is almost too late.

[h1] Are We Aware of the Consumption Norms that Have Led Us to Overeat?

People can often "make room for more" (28) and be influenced by consumption norms around them (see Figure 6-2), possibly because determining how much to eat or drink is a mundane and relatively low-involvement behavior that is a nuisance to continually monitor (29). Many seemingly isolated influences on consumption — such as package size, variety, plate size, or the presence of others — may suggest how much is typical, appropriate, or reasonable to eat or drink.

As with normative benchmarks in other situations, benchmarks when eating may often be relatively automatic and occur outside of conscious awareness. Indeed, when asked how many food-related decisions they make in a particular day, the average person estimates between 15 and 30. In reality, a number of different studies have shown that the typical person makes between 200 and 300

food-related decisions a day (20). Moreover, this appears to vary by BMI. Those who are obese (BMI >30) make the most decisions, but estimate themselves as making the fewest (see Figure 6-3).

[Insert Figure 6-3 (number of daily decisions)]

Even when consumption norms do influence us, some evidence suggests that people are generally either unware of their influence or that they are unwilling to acknowledge it (30). Past evidence of the presence or absence of this awareness has sometimes been suggested in the context of lab experiments (31). The problem with trying to generalize from such artificial contexts is that people are generally aware that some manipulation has occurred, and they may be reluctant to acknowledge any influence, primarily because they react against it. This phenomenon can best be observed in the context of controlled field studies conducted in natural environments (2).

The basic organizing framework for such studies is that both the food environment and the eating environment directly contribute to consumption volume. Importantly, however, they also contribute to consumption volume *indirectly* through the mediated impact they have on consumption norms and on perceived consumption volume. For instance, while having dinner with a friend can have a direct impact on consumption (because of the longer duration of the meal), it can also have an indirect influence. This can be due to people following the consumption norms set by their friend or because their enjoyment distracts them from monitoring how much they consume. Although these factors will be discussed individually, they often operate simultaneously. For instance, the usual holiday weight gain of 0.37 kg (15) is probably a combined result of consumption norms, food salience and availability, group sizes, and other factors.

[h1] How the Food Environment Encourages Mindless Eating

When a craving for one of our favorite foods sets in, we often find it difficult to resist that temptation. Food consumption can often be related to the perceived taste or cravings associated with foods (32, 33), and such cravings can differ across gender and age groups (34).

Despite this link between palatability and consumption, people don't gorge exclusively on the tastiest, most appealing foods (35). Indeed, people can unknowingly overeat unfavorable foods as much

as they do their favorites. This section examines the food-related environmental factors that influence consumption volume but which are unrelated to palatability. They can be characterized as the "Five S's" of the food environment because they refer to a food's 1) salience, 2) structure, and 3) size, and also 4) whether it is stockpiled and 5) how it is served.

[h2] Salient Food Promotes Salient Hunger

Food has powerful effects on our visual and olfactory senses, and the mere presence of food can prompt unplanned consumption even when we aren't hungry (36, 37). For instance, when 30 chocolate kisses were placed on the desks of secretaries, 46% more were consumed from the clear candy dishes than the opaque ones (38). Similarly, people given sandwich quarters wrapped in transparent wrap were found to eat more than those who were given sandwiches in nontransparent wrap (39).

It had been believed that such increased intake of visible foods occurred because their salience served as a constant consumption reminder. While part of this may be cognitively based, part of it is also psychologically based. Simply seeing or smelling a favorable food can increase reported hunger (40-43) and can stimulate salivation (44, 45), which is correlated with greater consumption (46). Recent physiological evidence suggests that the visibility of a tempting food can enhance actual hunger by increasing the release of dopamine, a neurotransmitter associated with pleasure and reward (47). The effect of these cues can be particularly strong with unrestrained eaters (48).

Although the sight and smell of a food may be the most prominent reminders of its presence, salience can also be prompted by internal stimuli, like memories or other psychological connections (49). One food-recall study even suggested that eating episodes associated with internally-generated salience may ultimately lead to greater consumption than those associated with externally-generated salience (50). Another study manipulated the salience of canned soup by asking people to write a detailed description of the last time they ate soup, the idea being that those who hadn't eaten soup in a long time would be internally prompted to consume more. Those who increased the salience of soup in this way tended to consume 2.4 times as much canned soup over the next two weeks as did their counterparts in the control condition (51).

[h2] Structure and Perceived Variety Can Drive Consumption

Rolls and her colleagues have shown that if consumers are offered a plate with three different flavors of yogurt, they are likely to consume an average of 23% more yogurt than if offered only one flavor (52). The trend of greater consumption as prompted by a greater variety of a food (53, 54) has been found across a wide range of ages (55) and across sexes (56, 57).

Recently, however, Kahn and Wansink have shown that simply increasing the *perceived variety* of an assortment also can increase consumption (11). In one study they gave people an assortment of 300 chocolate-covered M&M candies that were presented in either seven or ten different colors. Although the candies were identical in taste, people who had each been given a bowl with ten different colors ate 43% more (91 vs. 64 candies) over the course of an hour than those who were given bowls with seven different colors. Interestingly, 10 colors is 43% more colors than 7. In another study, participants were offered two different assortments of six flavors of jelly beans, one arranged by color and the other mixed together. Those offered the disorganized assortment rated the assortment as having more variety, and they ate 69% more jellybeans (22 vs. 13) than those offered the organized assortment (11).

Thus, simply changing the arrangement of a food (such as the organization, duplication, and symmetry) without an actual increase in variety can increase consumption. One reason this occurs is because increases in perceived variety make a person believe he or she will enjoy the assortment more. A second reason this occurs is because increasing the perceived variety can concurrently suggest an appropriate amount to consume (the consumption norm) in a particular situation (11).

For researchers, it is important to know that perceptions of variety (46-48) – and not just actual variety – can influence consumption. For consumers, it is more important to keep in mind that our immediate food environments are malleable and can be adjusted and designed to better control intake (see Table 6-2).

[Insert Table 6-2 (changing environment changes consumption) about here]

[h2] The Size of Packages and Portions Suggest Consumption Norms

There is overwhelming evidence that the size of food packaging and portions has steadily

increased over the past 30 years (58, 59). While this is a trend in much of the developed world, it is particularly true in the United States and may help explain the greater obesity rate in the U.S (4, 60, 61). Rozin and his colleagues have shown that the size of packages and portions in restaurants, supermarkets, and even in recipes is much larger in the United States than in France, which is often considered to be a more food-centric country (62).

The implications that this trend has for consumption are myriad, as it well-known that the size of a package can increase consumption (63), as can the size of portion servings in kitchens (64, 65) and in restaurants (66). Interestingly, package and portion size have also been shown to increase consumption of unfavorable foods. For instance, when movie-goers in a Philadelphia suburb were given either medium-sized or large-sized containers of stale, 14-day-old popcorn, individuals provided large-sized containers ate 38% more despite its stale quality (11). An important program of child development research by Birch and Fisher has shown that portion size first begins to influence children between 3 and 5 years of age (6, 67). Because of its developmental indications, the tendency for children to let portion size influence their consumption volume has been referred to as the "clean-your-plate" phenomenon or the completion principle (68). However, neither of these psychological driver theories explains why large packages also increase the pouring of less-edible products such as shampoo, cooking oil, detergent, dog food, and plant food. Nor do they explain why large packages of M&Ms, chips, and spaghetti increase consumption in studies where even the smaller portions were too large to eat in one sitting (63, 69). In both situations, people poured or consumed more even though there was no possibility of "cleaning one's plate."

A more likely explanation of why large packages and portions increase consumption may be because they suggest larger consumption norms (recall Figure 6-2). These norms implicitly suggest what might be construed as a "normal" or "appropriate" amount to consume. Even if one does not clean his plate or finish the contents of a package, the amount of the food presented gives one liberty to consume past the point where he might have stopped with a smaller, but still unconstrained, supply.

[h2] Stockpiled Food is Quickly Consumed

The presence of large stockpiles of food products at home (such as multi-unit packages purchased

at wholesale club stores) can make those products more visible and salient than those contained in singular or smaller packages. Not only are stockpiled products by their very nature visually conspicuous, they are often stored in salient locations until they are depleted to more manageable levels (70). Because visibility and salience can stimulate consumption frequency, it is often alleged that bulk-buying or stockpiling causes over-consumption and may promote obesity.

To investigate this, Chandon and Wansink directly stockpiled people's homes with either large or moderate quantities of eight different foods. They then monitored each family's consumption of these foods for two weeks. It was found that when convenient, ready-to-eat foods were initially stockpiled, they were eaten at nearly twice the rate as non-stockpiled foods (an average of 112% faster) (70). After the eighth day, however, the consumption of these stockpiled foods was similar to that of the less-stockpiled foods, even though plenty of both remained in stock. Part of this eventual decrease was due to "burn-out" or taste satiation (71), but another factor was that the inventory level of these foods dropped to the point where they became much less visually salient (51).

To investigate the link between the visibility of stockpiled food and obesity, Terry and Beck (72) compared food storage habits in homes of obese and non-obese families. Curiously, while their first study showed that stockpiled food tended to be visible in the homes of obese families, their second study showed the opposite. In general, however, more studies have demonstrated that stockpiled products tend to be visually salient, and this is one important reason why they are frequently consumed.

[h2] Serving Containers that are Wide or Large Create Consumption Illusions

Nearly 72% of a person's calorie intake is comprised of foods dished out from serving aids such as bowls, plates, glasses, or spoons (73). Consider drinking glasses and the vertical-horizontal illusion. Piaget and others have shown that when people observe a cylindrical object (such as a drinking glass), they tend to focus on its vertical dimension at the expense of its horizontal dimension. Even if the vertical dimension is identical to that of the horizontal dimension, people still tend to overestimate the height by 18-21%. This general principle explains why many people marvel at the height of the St. Louis Arch but not at its identically-sized width.

In the context of drinking glasses, when people examine how much soda they have poured into their glass, there is a fundamental tendency to focus on the height of the liquid that has been poured and to downplay its width. To prove this, Wansink and van Ittersum conducted a study with teenagers at weight loss camps (as well as a subsequent study with non-dieting adults) and showed that this basic visual bias caused teenagers to pour 88% more juice or soda (and subsequently consume more) into short, wide glasses than into tall, narrow glasses that held the same volume (77). These teenagers believed, however, that they poured half as much as much as they actually did.

This tendency held true in a study conducted with veteran Philadelphia bartenders. When asked to pour 1.5 ounces of gin, whiskey, rum, and vodka into short, wide (tumbler) glasses, these bartenders poured 26% more than when pouring into tall, narrow (highball) glasses (77). Experience or confidence in one's estimations (the bartenders had both) cannot supersede the fundamental susceptibility to the vertical-horizontal illusion.

What about the size of plates and bowls? The size-contrast illusion suggests that if we spoon 4 ounces of mashed potatoes onto a 12-inch plate and 4 ounces onto an 8-inch plate, we will underestimate the total amount spooned onto the larger plate because of its greater negative space, even though they contain exactly the same amount (77). That is, the size-contrast between the potatoes and the plate is greater when the plate is 12 inches than when it is 8 inches.

A study at an ice cream social showed similar results. People who were randomly given 24-ounce bowls dished out and consumed 15%-38% more ice cream than those who were given 16-ounce bowls (78). If a person intending to cut back on consumption decides to eat half a bowl of cereal, he had better pay attention to the size of the bowl. "Half a bowl" only gains meaning when it is put into the context of the serving bowl being used, whose size acts as a perceptual cue influencing how much is served and consumed. Even if these perceptual cues are inaccurate, they offer cognitive shortcuts that can allow better serving behaviors with minimal cognitive effort.

The effect of spoon size on the amount taken appears to be similar. When cough medicine was given to health center patients, the size of the spoon they were given increased the dosage they poured by

41% over the recommended dosage level (79).

[h1] How the Eating Environment Stimulates Consumption

What causes us to begin eating and finally decide to stop? One study asked restrained dieters to maintain a consumption diary and to indicate what caused them to begin and stop eating (80). Aside from hunger, people claimed they started eating because of the salience of food ("I saw the food"), the social aspects of eating ("I wanted to be with other people"), or simply because eating provided them with something to do ("I wanted something to do while watching TV or reading"). When asked why they stopped eating, some of them pointed to environmental cues (such as the time or the completion of the meal by others) which served as external signals that the meal should be over (81). Others stopped eating when they ran out of food, and still others stopped because their television program was finished or because they were at a stopping point in their reading.

These findings are consistent with other research (82) that suggests people may have continued to eat had they been given more food, more time to eat, or more television to watch. These responses relating to consumption start and stop times illustrate four important consumption drivers in the eating environment: 1) eating atmospherics, 2) eating effort, 3) eating with others, and 4) eating distractions. These will each be discussed in turn.

[h2] Atmospherics Influence Eating Duration

Atmospherics refer to ambient characteristics — such as temperature, lighting, odor, and noise — that characterize the immediate eating environment. Consider the direct physiological influence that temperature has on consumption. People tend to consume more during periods of prolonged cold temperatures than during periods of hot temperatures (83). This is so because the brain sends signals to the body to eat or drink something in order to either raise body temperature or lower it. People eat more in prolonged cold temperatures precisely because the body needs more energy to warm itself and maintain its core temperature (84). In prolonged hot temperatures, the body needs more liquid to cool and maintain its core temperature (85), so the brain sends signals for the consumption of more liquids.

While temperature has direct physiological influences on consumption, other atmospherics — such as lighting, odor, and noise — have a much more indirect or mediated effect on consumption. These atmospherics are thought to influence consumption volume partly because, when favorable, they provide a more comfortable environment for consumption, increasing the time dedicated to eating (see Figure 6-4).

[Insert Figure 6-4 (atmospherics influence consumption volume) About Here]

[h3] Lighting. Dimmed or soft lighting appears to influence consumption in two different ways: 1) by increasing eating duration, and 2) by increasing comfort and disinhibition. It has been widely reported that harsh or bright illumination decreases the amount of time consumers spend in a restaurant (86), while soft or warm lighting (including candlelight) engenders relaxation and encourages the unplanned consumption of a dessert or an extra drink (87, 88). Because people are less inhibited and less self-conscious when the lights are low, they are therefore likely to consume more than they otherwise would (89).

[h3] Odor. Odor can influence food consumption through taste enhancement or suppression (90, 91). Unpleasant ambient odors are likely to shorten a meal and suppress food consumption. Yet the reverse is not necessarily true; it is not known whether favorable odors necessarily increase consumption volume. It has been found, for instance, that regardless of whether a person tastes a food or simply smells it, sensory-specific satiety can occur within a reasonably short period of time (92). This suggests that while foul odors can have a depressing effect on consumption, favorable odors might not necessarily increase consumption other than by simply influencing one's selection of the food in the first place.

[h3] Noise and the Sound of Music. Soft music generally contributes to a slower rate of eating, a longer meal duration, and a higher consumption of both food and drinks (93). The more pleasing or soothing the music, the more one tends to relax and let go of inhibitions (94). In contrast, when music (or ambient noise) is loud, fast, or discomforting, people tend to spend less time in a restaurant (95). In some cases, however, such an abbreviated meal can also lead people to quickly clean their plates and overeat without taking time to monitor the extent to which they are full (96, 97). Although more controlled field

work needs to be done in this area, it appears that both extremes (soft, comforting music as well as loud, irritating noise) can increase consumption, but in different ways.

[h2] Increased Effort Decreases Consumption

Effort is related to the ease, access, or convenience with which a food can be consumed and is one of the strongest influences on consumption (73, 98). The effort it takes to obtain food often reveals food preferences and predicts consumption volume (99). Cafeteria studies showed that people ate more ice cream when the lid of an ice cream cooler was left open instead of closed (100), that they consumed more milk when the milk machine was closer to the dining area (101), and that they imbibed more water when a water pitcher was sitting on their table than when it was further away (102).

Scores of studies have investigated effort and animal feeding (such as pressing bars for food pellets), but surprisingly few have been conducted with people (98). Notable exceptions showed that obese people were much more likely to eat almonds if the shells were already removed (39), and they were more likely to use silverware instead of chopsticks (which require more effort) when compared to normal-weight patrons in Chinese restaurants (103). The same effect of effort has also been found with non-obese secretaries who were given chocolate candies that were either placed on their desk or two meters away from their desk. When they had to only reach for them on their desk, secretaries ate 5.6 more chocolates a day then when they had to stand up and walk two meters for them (104). These results help corroborate the initial findings regarding effort (105), particularly when the foods are ready-to-eat (70).

While these studies focused on physical effort, psychological effort may also play a role in consumption. Recent plate waste studies among U.S. soldiers indicate that once any component of a field ration is opened, it is generally completely consumed. Although the physical effort to open the small component packages in a field ration is minimal, there may be a psychological barrier that prevents a person from opening another individual item. Follow-up lab studies suggest that people tend to eat less when offered multiple small packages than when offered a large package of the same volume. Part of the reason is because these smaller packages provide discrete stopping points for consumption (73).

[h2] Socializing Influences Meal Duration and Consumption Norms

It is clear that the presence of other people influences not only consumption content, but also consumption volume (see Figure 6-5). Eating with unfamiliar people can suppress food intake in situations where self-monitoring and self-awareness are high, such as during job interviews or first dates (106-108). Eating with familiar people, however, can stretch meal times well beyond the duration of the same meal consumed alone (109). As meals are made more relaxing, enjoyable, and slow-paced by the presence of familiar and friendly people, consumption volume increases. These relaxing and enjoyable meals can reduce one's ability or motivation to monitor how much is consumed.

[Insert Figure 6-5 (social interactions influence consumption) About Here]

In other cases, simply observing the eating behavior of another person — such as a role model (110), parent, friend, or stranger (111) — can provide a consumption norm that can also influence how much the observer eats. Studies have shown that individuals will alter the amount of cookies they eat (112) and the amount of water they drink (102) depending on how much others are consuming (113). These effects can be dramatic: De Castro has shown that meals eaten with one other person were 33% larger than those eaten alone (114), and increases of 47%, 58%, 69% 70%, 72%, and 96% have been associated with the presence of two, three, four, five, six, and seven or more people, respectively (115). Obese individuals can be particularly susceptible to these external social cues (116).

[h2] Distractions Can Initiate, Obscure, and Extend Consumption

Distractions such as reading or watching television can increase consumption by initiating, obscuring, or extending consumption. They can initiate script-related food consumption. A "script" is a cognitive construct we use to define our behavior within a certain context. With script-related food consumption, we engage in feeding behavior we perceive as appropriate based upon cues in our present context – whether or not one of these "cues" involves hunger is up to the individual. Using situational context cues in lieu of hunger to regulate feeding behavior can obscure one's ability to monitor consumption and can extend the duration of a meal.

It was noted earlier that a diary survey of obese people indicated that some had stopped eating simply because a television program was over or because they had finished reading a magazine (80). Just as the completion of a television show or magazine article can lead one to terminate consumption, a longer television show or a longer magazine article may prolong the duration of a meal past the point of satiation. Part of this distraction-induced over-consumption can be related to longer meals, but another important aspect is that these distractions tend to reduce one's ability to monitor consumption volume. One controlled study showed that people who ate lunch while listening to a detective story ate 15% more than those who ate their lunch in silence (117). Distractions such as television, reading, movies, and sporting events may simply redirect attention to the point where orosensory signals of satiation are ignored (29, 118). Similarly, another study showed that the key correlate of how much popcorn people ate in a Chicago movie theatre was whether they reported paying more attention to the movie or to how much they ate (119). The more attention they paid to the movie, the more popcorn they ate.

These distractions can not only divert attention to the outside environment, they can also trigger subconscious, internal cues that initiate consumption — consumption scripts that lead people to associate the distraction with food. These behaviorally ingrained eating scripts — be it a hotdog at a ballgame, popcorn during a movie, or cookies during a favorite television program — may act like Pavlov's bell, signaling salivation. That is, eating in these situations might be related more to habit than to hunger.

Both children (120, 121) and adults (122-124) tend to snack more when watching television, and they may do so even if they are not physically hungry. Indeed, people in a two-week panel study were asked to indicate how hungry they were each time they ate a meal or snack. People who ate meals or snacks while watching television reported themselves as being less hungry than those who ate when they were not watching television (106).

Even if they are not physically hungry, simply thinking it is time to have a meal or a snack is enough to cause some people to eat (81, 125). Rozin showed that amnesiac patients who were told it was dinner time ate a second complete meal only 10 to 30 minutes after having eaten a prior meal (126).

Although it is frequently found that television viewing, food intake, and obesity are related (127-129), these correlational results are often confounded with factors such as a general lack of physical inactivity. Nevertheless, they do suggest an important relationship between distracted inactivity and consumption (130). Obesity, however, may represent an even more fundamental connection between distractibility and food intake. Past work has indicated that obese people are more susceptible to distractions than are non-obese people (131). In a media-rich, food-rich environment, the consumption awareness of people who are distraction-prone suffers, and overeating often ensues. If obese individuals are indeed more distraction-prone than individuals of normal weight, then it follows that they will tend to consume more in a given distracting situation, whether it involves the lure of a television program, magazine, newspaper, or conversation.

[h1] Conclusions

In the past 30 years, reasonable advances have been made in "outcome-based" research regarding the environmental factors that influence intake. These studies have provided a convergent understanding along with important investigations into boundary conditions. The field of food consumption and intake is at a point, however, where the next evolutionary step needs to be in the direction of understanding the "whys" behind food intake. The focus needs to shift towards explaining why we do what we do and not just observing it. This will entail more of a focus on developing and testing process-models and theories of consumption. Doing so will allow more productive integration across studies and enable us to identify the more fundamental low-involvement drivers of consumption.

Two general mediators that appear to be promising starting points are the notions of consumption norms and consumption monitoring. As noted in Figure 6-2, both of these are likely to be factors that at least partially mediate the effects of seemingly disparate environmental cues on consumption (such as package size, variety, and social influences). The environment influences food-related decisions continuously throughout the day. There are two problems with this. First, we are not aware of how many decisions we make that are being influenced by the environment. Second, we are not aware or we are unwilling to acknowledge that the environment has any effect on us at all. Although we make over 200

food-related decisions a day more than we think we do, many of these are "automatic" food choices wherein we unconsciously eat without considering what or how much food we select and consume (131). This process is consistent with other psychological work that shows that people tend to have flawed self-assessments, leading to an unmerited overconfidence (131). With food intake decisions, overconfidence may lead to over-consumption and weight gain.

An important new area for environment and behavior research would be the examination of why environmental cues are so often discounted, and how the environment could be altered to work for us rather than against us. People are often surprised at how much they consume, and this indicates that they may be influenced at a basic level of which they are not aware or which they do not monitor. Consumption occurs within a context wherein understanding fundamental behavior has immediate implications for consumer welfare. Yet simply knowing the relationship between environmental factors and consumption will not eliminate its effects on consumers. Keeping a focus on the mechanisms or processes behind consumption — the "whys" behind it and the "hows" to influence it — will help the interdisciplinary topic of food consumption progress in ways that can raise its profile and its effect on academia, on health practitioners, and ultimately on consumer welfare.

We are at a point of development wherein much of the incremental improvement in our life span — and especially in our quality of life — is likely to come more from behavioral changes in our lifestyle than from new medical treatments. When it comes to contributing to the life-span and quality of life in the next generations, well-intentioned marketers may be in a prime position to help lead the movement toward behavior change. Whether we can reasonably expect this to have an important effect on the prevalence of obesity remains to be seen. If marketers do not play a leading beneficial role, we are left with trying to educate individuals to control their choices, an approach that has not been effective thus far. Since most food choices are made without awareness or monitoring of the factors that influence them, approaches that do not rely on such awareness and monitoring are needed.

Table 6-1.

Field Study Participants Deny the Influence Interventions Have on their Intake Behavior[1]

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?"[2]				
		Less	About the Same	More	Chi-Square	"I didn't eat more"	"I was hungry"	"The (intervention) influenced me"	Other	Chi-Square[4]
40 MBA students at a Super Bowl party in a bar in Champaign, IL (Wansink & Cheney 2005)	Those serving themselves Chex Mix from 4-liter bowls (n=19) served 53% more than those serving from 2-liter bowls	23%	57%	20%	10.6 (p<.01)	63%	31%	3%	3%	22.8 (p<.001)
98 adults preparing a spaghetti dinner for two in Hanover, NH (Wansink 1996)	Those given half-full 32-oz boxes of spaghetti (n=51) prepared 29% more than those given full 16-oz boxes.[3]	18%	73%	9%	70.4 (p<.001)	71%	27%	4%	8%	67.8 (p<.001)
161 afternoon moviegoers in a Chicago suburb (Wansink & Park 2001)	Those given 240-g buckets (n=82) ate 53% more than those given 120-g buckets	19%	75%	6%	128.8 (p<.001)	15%	77%	5%	3%	152.0 (p<.001)
158 evening moviegoers in Feasterville, PA (Wansink & Kim 2005)	Even when given stale, 14-day-old popcorn, those given 240-g popcorn buckets (n=40) ate 34% more than those given 120-g buckets of the same popcorn	14%	78%	8%	141.6 (p<.001)	12%	79%	2%	7%	179.4 (p<.001)
Average across all studies (Weighted by the number of subjects per study)		**19%**	**73%**	**8%**	**331,26 ?? (p<.001)**	**52%**	**31%**	**2%**	**15%**	**204 (p<.001)**

[1] Answers are from those in the treatment group who received the intervention that resulted in greater consumption

Table 6-2.
Changing Our Environment Changes Our Consumption
(Adopted from Wansink 2004)

How Environmental Factors Influence Consumption	How Environmental Changes Can Help Reduce Consumption
The Eating Environment	
Eating Atmospherics: Atmospherics Influence Eating Duration	• By having bread plates and entrees removed prior to completion, one car finish eating and still socially remain at the table. • While soft music and candlelight can improve one's enjoyment of a mea they have calorie intake consequences, and they can be enjoyed in lieu o dessert.
Eating Effort: Increased Effort Decreases Consumption	• Repackaging foods in smaller containers increases subsequent opening e and gives a person pause to reconsider. • Tempting foods that are stored in less convenient locations (such as in th basement or in a top cupboard) can be "too much trouble" to obtain and unnecessarily consume. • Leaving serving bowls and platters off the dinner table will decrease the amount consumed.
Eating with Others: Socializing Influences Meal Duration and Consumption Norms	• Pre-regulate consumption by deciding how much to eat prior to the meal instead of during the meal. • Order smaller quantities or have portions packaged "to-go" before the m completed.
Eating Distractions: Distractions Initiate, Obscure, and Extend Consumption	• Let food regulate the activity, not vice-versa. • Pre-allocating how much will be eaten prior to a distraction-related meal snack (such as during a television program) can help avoid "eating until over."
The Food Environment	
Salience of Food: Salient Food Promotes Salient Hunger	• Out of sight is out of mind. Tempting, less healthy foods should be store out of sight. • Increase the consumption of healthful foods of low energy density by making them more visible. Recall the popularity of fruit bowls in a less obese era.
Structure and Variety of Food Assortments: Perceived Variety Drives Consumption	• Decrease consumption in high-variety environments (such as buffets, potlucks, or large dinners) by putting the food into more organized patte Conversely, arranging food in less organized patterns may stimulate consumption of healthy foods in the cafeterias of retirement homes and hospitals. • Avoid multiple bowls of the same food (such as at parties, large dinners, buffets) because they increase perceptions of variety and stimulate consumption.
Size of Food Packages and Portions: Packages and Portion Size Suggest Consumption Norms	• Repackaging foods into smaller containers decreases consumption by suggesting smaller consumption norms. • Pre-plating smaller portions onto plates and leaving the serving bowl off dinner table will decrease consumption.
Stockpiling of Food: Stockpiled Food is Quickly Consumed	• Reducing the visibility of stockpiled foods will reduce consumption frequency (out of sight, out of mind). • Storing a stockpiled food in a less accessible place or boxing it up will reduce its convenience and thus how frequently it is consumed.
Serving Containers: Serving Containers that Are Wide or Large Create Consumption Illusions	• Replace short, wide glasses with tall, narrow ones. • Use smaller bowls and plates to help reduce serving sizes and consumpti

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Figure 6-1. Obtaining Food without Effort

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Figure 6-2.
Environmental Influences on Overserving and Overeating
(Modified from Wansink 2004 – *Annual Review of Nutrition*)

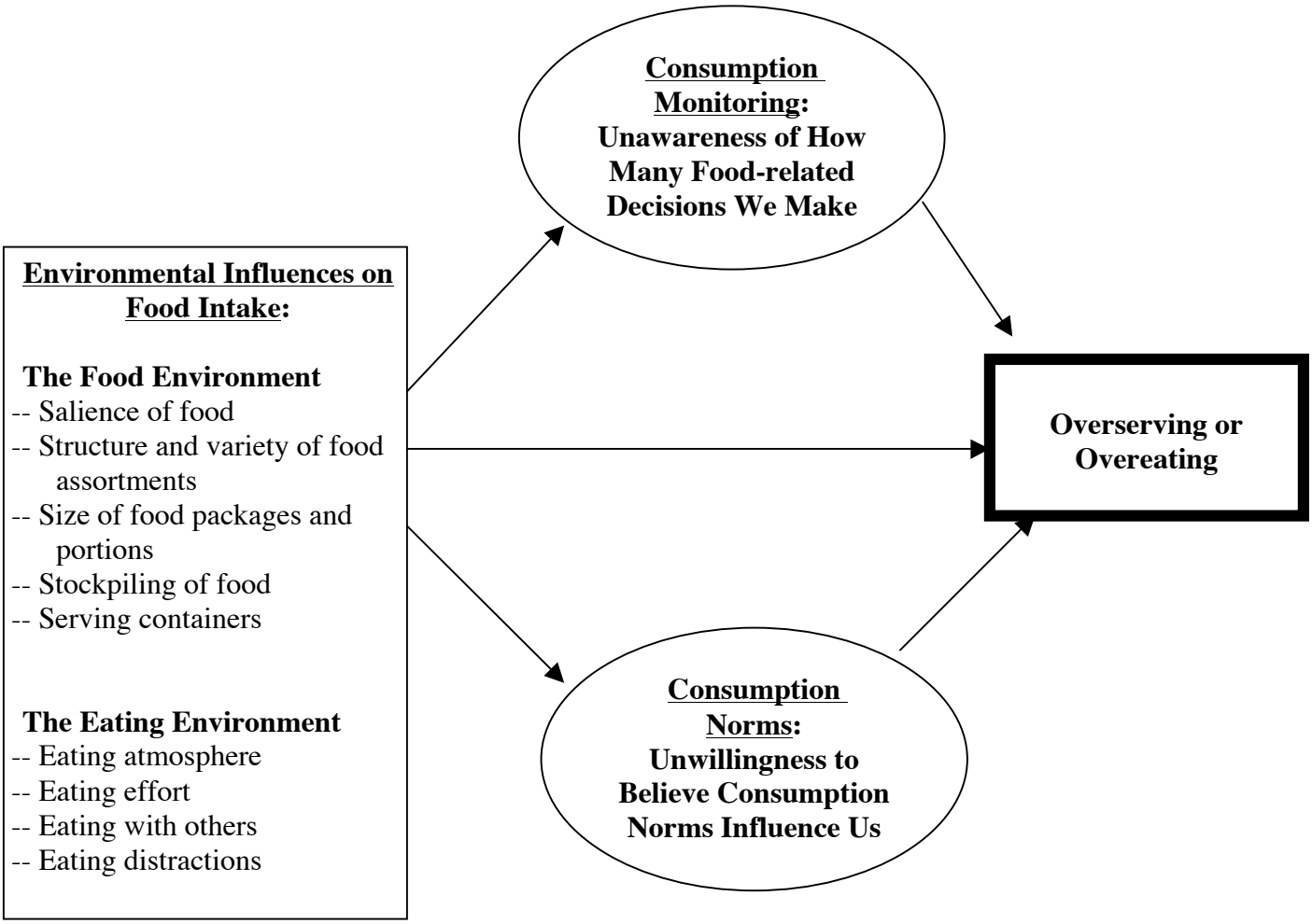

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Figure 6-3.
Number of Daily Food- and Beverage-related Decisions

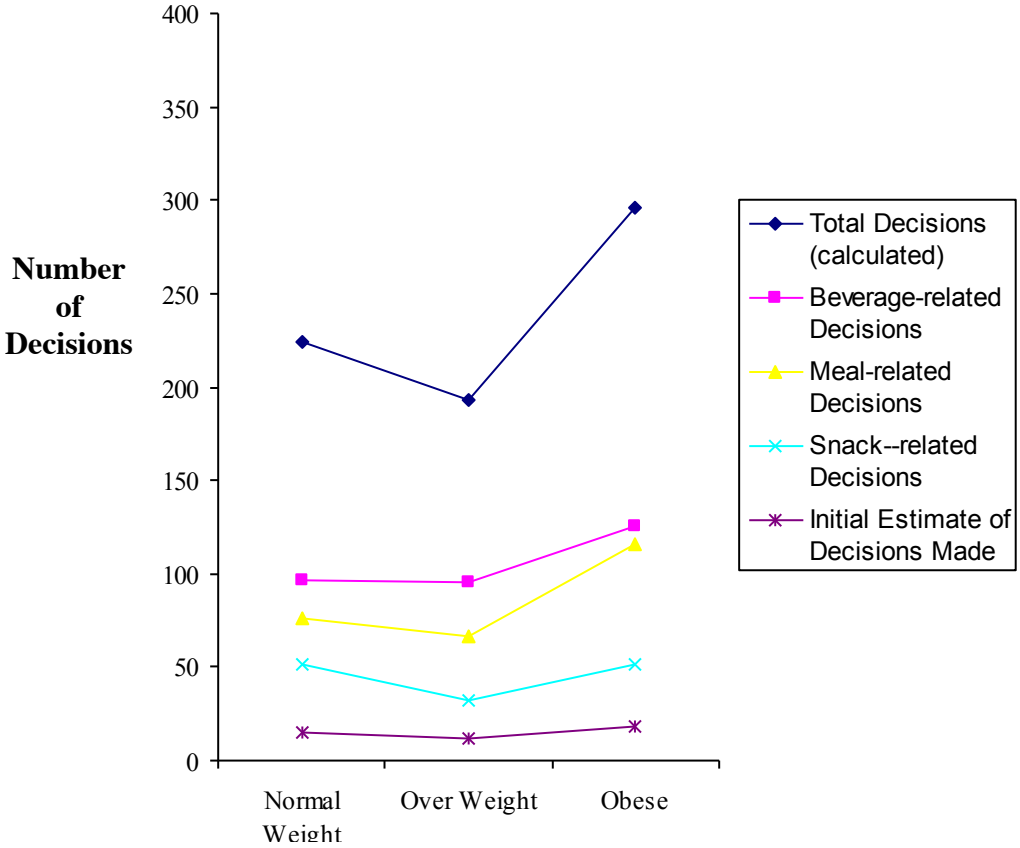

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Figure 6-4. How Atmospherics Influence Food Consumption Volume

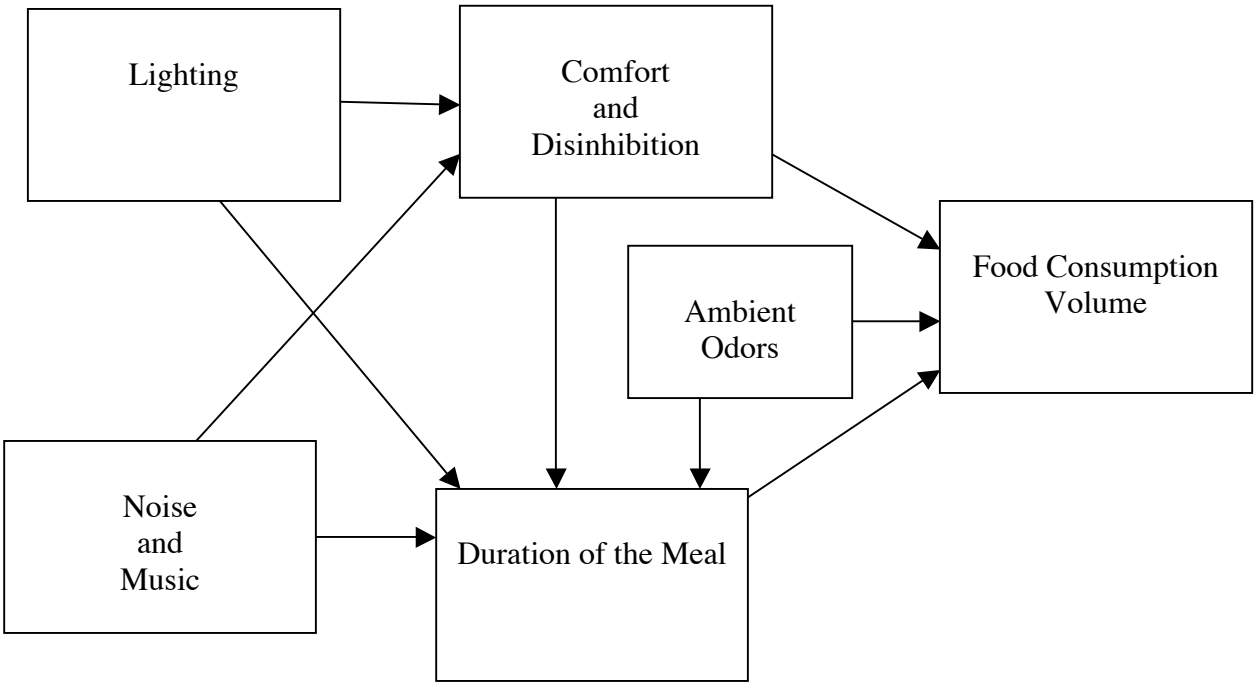

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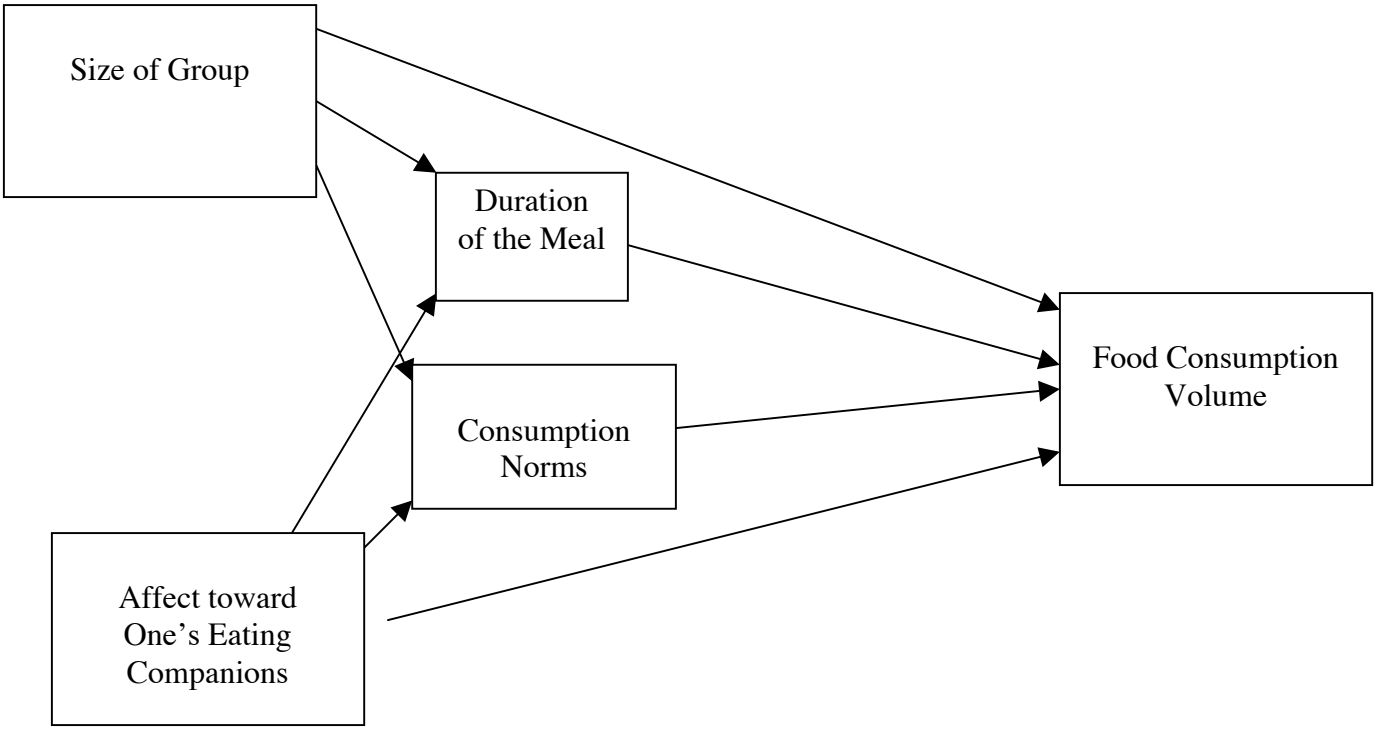
Figure 6-5. How Social Interactions Influence Food Consumption Volume



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