

**TO SERVE THE CUSTOMER: LEVERAGING FOOD SERVING CONTEXTS TO  
ENCOURAGE HEALTHIER EATING**

by

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A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
(Business Administration)  
in the University of Michigan  
2016

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## **DEDICATION**

To Ed, who believes in me more than I ever will.

## ACKNOWLEDGMENTS

I would like to thank Aradhna Krishna for taking me on as her student; for always keeping me on my toes—setting the highest standards in the business, encouraging me to read widely outside our discipline, challenging me to marry the joy of thorough understanding with the beauty of succinct argumentation, and insisting that I aim for my best at every try. Aradhna has been a role model of ambition and drive. From her, I learned the importance of determination and grit in this line of work, and I know it will serve me well throughout the future.

I am also very grateful to Brent McFerran, who has remained a great collaborator and advisor across time and distance, giving me space to make my own decisions (and mistakes) and approaching almost anything with an admirable equanimity. From Brent, I learned that there are many right ways to do things. I would also like to thank Katherine Burson; for always offering a very thoughtful perspective on my research and providing wise advice on all matters of life, starting before I even applied to Michigan and throughout the program. From Katherine, I learned to think with the big picture in mind and pursue what really matters.

I am also thankful for Phoebe Ellsworth's and David Mayer's willingness to offer their time and expertise to guide me through my dissertation. Sharing their perspectives has shaped my view of what my research may contribute and encourages me to connect amply with researchers in related disciplines.

Thanks are also in order to Martin Kumpf, who advocated for me at the Philipps-Universität Marburg, and to Norbert Schwarz, who went up to bat for me at the University of

Michigan. Both were absolutely instrumental in my being able to spend a year at the University of Michigan on a DAAD fellowship, and ultimately pursuing a PhD here at Ross.

Responsible for keeping me here, alive and kicking, are the friends I have made at Michigan. From passing down organizational knowledge to offering literature pointers, content perspective, statistics tutorials, and gentle corrections of my use of idioms, to emotional support and life advice they have contributed much more to my learning at Michigan than I could have ever wished for. At Ross, a heart-felt thank you goes to Jim Mourey, Rob Smith, Jason Stornelli, Laura Rees, Bea Pereira, Jenny Olson, Stephanie Carpenter, and Mike Palazzolo, as well as the rest of the marketing kids. Ally Skoog-Hoffman and Lauren Reed, your unrelenting passion for translational research in some of the most important areas of our society inspires me every day.

Lastly, I would not and could not have chosen this path if it was not for my parents; thank you for always letting me go. And finally, I am eternally grateful to Ed O'Brien; thank you for being my champion every step of the way. Words cannot express how much credit you deserve, but thankfully I have a lifetime to show you.

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## **ABSTRACT**

The consequences of unhealthy eating are one of today's most important societal issues. Accordingly, a growing area of research has started to examine how marketer-controlled variables impact food consumption. In this dissertation, I first highlight how food consumption research may benefit from more targeted research from a theoretical lens of motivated reasoning. Then, I empirically examine how two specific marketing actions—serving food to consumers versus letting them serve themselves, and serving portions that lead to larger versus smaller amounts of food leftovers—influence the extent to which consumers can downplay unhealthy eating, which in turn encourages healthier choices and behaviors. Focusing on processes that take place when consumers obtain their food, I find that whether oneself (versus a server) serves the food determines the opportunity for self-serving attribution of responsibility for one's eating, such that being served enables, but serving oneself disables, rejection of responsibility. Through rejecting responsibility, and consequently feeling better about oneself, being served food encourages consumers to choose unhealthy options as well as larger portions. Examining the period after consumers have completed their meal, I find that larger (versus smaller) amounts of food leftovers reduce perceived consumption, which improves consumers' self-evaluative feelings and dampens their motivation to compensate for their food consumption, as manifested in greater consumption and lesser exercise effort subsequently. Theoretical contributions and managerial and policy implications are discussed.

## **CHAPTER I:**

### **A NOVEL PERSPECTIVE ON FOOD CHOICE AND CONSUMPTION RESEARCH**

Today, the obesity epidemic is one of the most important societal issues facing the United States and nations around the world. At the individual level, overeating and weight-gain are not only major preventable risk factors for mortality and morbidity (World Health Organization 2014), they also affect people's emotional and social wellbeing (Puhl and Heuer 2009). At the societal level, too, obesity poses significant direct and indirect costs. Growing at current rates, weight-specific health care costs are predicted to rise over US\$956 billion by 2030, constituting 16-18% of all U.S. health expenditures (Wang et al. 2008), with indirect losses like reduced productivity of up to US\$65 billion (Trogon et al. 2009) adding to the economic burden. Interdisciplinary research is beginning to shed light on and potentially correct the physiological, psychological, and socio-economic antecedents of the observed collective weight-gain.

Although this complex phenomenon is clearly multiply determined, one especially promising remedy lies in marketing contexts, because marketers possess the power to change and redesign consumption environments in ways that directly affect the individual. With a general focus on the psychology of eating decisions and behaviors, I first review the extant research in marketing and related fields on food choice and consumption. Then I highlight gaps in the existing literature and encourage more targeted research to examine motivated reasoning processes in food decision making. To that end, I also offer a framework structuring conceivable manifestations of motivated reasoning along the progression of food consumption processes (this

chapter). Subsequently, I examine empirically how two specific marketing actions—serving food to consumers versus letting them serve themselves (chapter II), and serving portions that lead to larger versus smaller amounts of food leftovers (chapter III)—influence consumers’ psychological and behavioral reactions to food. These manipulations are subtle, simple, and often costless, but I demonstrate that they have a significant impact on facilitating healthier choices in the real world.

Chapter II focuses on how consumers obtain their food. A critical distinction in the marketplace is who prepares and serves the food—a US\$783 billion industry is made up of services revolving around preparing and serving food to consumers (National Restaurant Association 2016). I investigate how merely outsourcing the act of serving a given food to another person affects consumers’ psychological and behavioral reactions to their food and eventually leads to unhealthier eating outcomes. People eat much more unhealthily when they eat out (Gregory, Smith, and Wendt 2011), and I examine how a previously unstudied factor in eating contexts, who serves the food, contributes to this overeating. I propose that whether oneself (versus a server) serves the food determines the opportunity for self-serving attribution of responsibility for one’s eating, such that being served enables, but serving oneself disables, rejection of responsibility. Through this process of rejecting responsibility, and consequently feeling better about oneself, being served food drives unhealthy eating.

Five experiments provide support for this proposition. First, when people are served food (compared to when they serve themselves), they are more inclined to consume unhealthy foods and to select larger portions of unhealthy foods. Then, process evidence shows that this behavior occurs because being served allows people to reject responsibility for unhealthy eating and thus to feel better about themselves following indulgent consumption.

Theoretically, this work enriches the psychological literature on motivated reasoning in general, and on self-serving attributions in particular, by demonstrating a subtle but powerful boundary to people's ability to make self-serving attributions of responsibility. As such, this work not only extends the growing literature on "nudges" (Thaler and Sunstein 2008) affecting food consumption and other health-related behaviors, but also informs other consumer research domains like vice consumption and consumption guilt. Most importantly, these findings have substantive practical implications for how marketers and policy makers can effectively help reduce unhealthy eating.

Chapter III focuses on processes that occur after consumers have completed their meal. Countless factors have been shown to influence when people finish eating (Wansink 2007). However, I go beyond those and turn to the consequences of leaving leftovers. Specifically, I examine how simply having more leftovers impacts consumers' psychological and behavioral reactions to their eating, and eventually leads to healthier outcomes. I test the effect of having larger (versus smaller) amounts of food leftovers. Portion sizes have been growing over time (Nielsen and Popkin 2003), and larger portion sizes have been shown to increase consumption (Herman et al. 2015). However, because the increase in consumption from larger portions is much smaller than the increase in portion size (Zlatevska, Dubelaar, and Holden 2014), consumers today are faced with larger amounts of food leftovers on their plates than before. To date, the unique impacts of food leftovers have not yet been examined, so I test a novel framework for the affective, motivational, and behavioral consequences of having larger (versus smaller) amounts of food leftovers, given equal actual consumption. Specifically, I suggest that larger amounts of leftovers reduce perceived consumption, which improves consumers' self-evaluative feelings and dampens their motivation to compensate for their food consumption.

Four experiments show that larger (versus smaller) amounts of food leftovers cause people to feel they ate less despite equal actual consumption. Larger leftovers also lead to increased subsequent consumption and reduced exercise effort later on. This undermining effect of food leftovers on compensation behaviors is mediated by a sequence of lower perceived consumption and enhanced self-evaluative feelings. This work reveals an additional mechanism by which larger portions contribute to obesity and suggests how consumers may prevent the subversive effect of leftovers.

Finally, Chapter IV offers a unifying conclusion. In sum, my dissertation research contributes theoretical advancements to important research domains with substantive implications for promoting consumer health and welfare and seeks to inform policy with novel, subtle, and virtually costless interventions to make a lasting contribution to consumer wellbeing.

## **FACTORS INFLUENCING FOOD CHOICE AND CONSUMPTION**

This section gives an overview of the literature on food choice and consumption that considers peripheral influences on food consumption—that is, literature that deals with factors other than metabolic effects on food consumption. The findings presented come from a great variety of disciplines, including marketing, psychology, nutrition, medicine, physiology, and neuroscience. This range of disciplines reflects the broad interest in food consumption across academic and applied fields, and speaks to the need for interdisciplinary exchange and collaboration to study this topic comprehensively. The findings are organized along the (simplified) progression of processes involved in food consumption, starting with aspects of sensation and perception, moving on to cognition, and finally covering affect.

## Sensation and Perception

External influences on food consumption begin long before the consumer even touches the food in question. Sensory input—that is, physical and chemical stimulation, such as light—arrives at the person’s sensory receptors (sensation), at which point the mind combines various pieces of sensory information and derives a more meaningful (though not necessarily accurate) interpretation of the information (perception, see Krishna 2012 for a review). This mere perception of the food already begins to shape people’s food and portion choice, and eventually their consumption. Aspects of taste, smell, haptics, and especially vision have been shown to impact whether and how much consumers end up eating.

*Taste and smell.* One of the first things that comes to mind when thinking about what drives people’s food and consumption choices may be taste. On the one hand, it is true that foods featuring a combination of sweetness and fattiness are generally preferred, and bitterness is generally dispreferred, presumably for evolutionary reasons (Birch 1999; Drewnowski 1987; Drewnowski and Greenwood 1993; Rozin and Vollmecke 1986). On the other hand, taste explains surprisingly little of people’s food consumption when considered in isolation (see Drewnowski 1997 for a review). For instance, if supply is ample, people have been shown to consume almost exactly the same amount of palatable fresh popcorn and unpalatable stale popcorn (Wansink and Kim 2005; Wansink and Park 2001).

With respect to smell, research suggests that the actual (Fedoroff, Polivy, and Herman 1997, 2003; Rogers and Hill 1989; Schifferstein and Verlegh 1996) as well as the imagined scent

(Krishna, Morrin, and Sayin 2014) of a particular palatable food can increase consumers' desire for and subsequent consumption of this food. That being said, while much research has been conducted on the relationship between smell and cognitive functions (such as memory: Krishna, Lwin, and Morrin 2010) and between smell and affective processes (such as evaluative semantic associations: Bosmans 2006), its role in food consumption appears to be less prominent than one might expect. Overall, taste and smell seem to have less unique impact on food consumption than another sense: vision.

*Vision.* In contrast to taste and smell, the impact of vision on food consumption has been documented extensively. Indeed, people's consumption may be driven more by their visual estimates of their consumption than by their actual consumption. Unfortunately, visual perception is subject to a variety of biases. More often than not, people mis- and specifically underestimate amounts of food, eventually leading to overconsumption (Harnack et al. 2004).

For instance, people are fairly accurate at gauging small amounts of food, but the larger a given amount of food, the more people underestimate its size (Chandon and Wansink 2007). This is partly because in three-dimensional perception people rely primarily on one dimension (Chandon and Ordabayeva 2009; Krider, Raghurir, and Krishna 2001) or entirely disregard the third dimension (Ordabayeva and Chandon 2013). Such overweighting of certain dimensions leads people to underestimate the volume of three-dimensional shapes (Raghurir and Krishna 1999), which in turn leads them to consume more from short wide containers compared to tall thin containers (Yang and Raghurir 2005). Similarly, visual perception is subject to optical illusions. For example, size-contrast illusions are created when food is placed on a much larger plate (van Ittersum and Wansink 2012; Wansink and van Ittersum 2013; Wansink, van Ittersum,

and Painter 2006) or a thin-rimmed plate (McClain et al. 2014). As a result, consumers perceive the amount of food on the plate to be smaller and eat more.

The importance of visual cues for portion size (mis)perception will be discussed more extensively in chapter III, where it is particularly pertinent. However, the present overview highlights that the shapes and sizes that marketers impose on food products critically shape consumers' perceptions of the amount of food they are confronted with, and thereby impact their consumption.

## Cognition

The translation from sensation to perception posits an important transformation: pure stimulation is turned into a more informative (if biased) interpretation. However, even after sensation has been transformed into perception, additional, cognition-based translation takes place to generate a more comprehensive understanding of the target stimulus. Several branches of literature indicate that cognitive mechanisms such as attention, inferences, and lay theories further alter people's beliefs about target foods and thereby influence consumption.

*Attention and monitoring.* Recently, it has been suggested that the majority of environmental effects on food consumption can be ascribed to a lack of attention or monitoring (Wansink and Chandon 2014). Many findings agree with this idea.

First, salience appears to increase consumption. By way of making foodstuffs salient, seeing attractive food increases consumers' desire for it as well as their likelihood to consume it (Deng and Srinivasan 2013; Marcelino et al. 2001; Wansink, Painter, and Lee 2006). From this



perspective, a good proportion of food advertising effects may be simply due to calling attention to food products. The more candy (Gorn and Goldberg 1982) and other sugary snacks (Goldberg, Gorn, and Gibson 1987) children see on TV, the more likely they are to choose candy or sugary snacks instead of wholesome snacks or fruit. Indeed, exposure to *any* kind of snack in advertising may compel consumers to eat more of both healthy and unhealthy snacks afterwards (Harris, Bargh, and Brownell 2009). Conversely, seeing the remnants of one's own consumption, such as candy wrappers (Polivy et al. 1986) or meat bones (Wansink and Payne 2007), turns people's attention to how much they have already eaten and thereby curbs their subsequent consumption. In fact, mere recall of prior consumption is sufficient to reduce current consumption (Rozin et al. 1998).

Relatedly, the amount of effort required to obtain foods can influence people's consumption. When candy dishes (Maas et al. 2012; Painter, Wansink, and Hieggelke 2002) or beverage dispensers (Engell et al. 1996; Lieux and Manning 1992) are placed closer to a target individual, both the incidence and the amount of consumption go up. As much as leaving the lid of an ice cream container open can initiate spikes in consumption (Wansink 1996).

Second, distractions also lead to greater consumption, whether they be caused by loud music (Garlin and Owen 2006; Woods et al. 2011), watching TV (Bellisle et al. 2004; Hetherington et al. 2006), playing games (Brunstrom and Mitchell 2006), or additional cognitive demands (Ward and Mann 2000). Some even attribute the finding that being with other people enhances consumption to distraction (Hetherington et al. 2006), even though social facilitation effects may evolve mainly by setting social norms around consumption.

*Inferences about social norms.* Much work has documented social facilitation effects on

food consumption (Herman and Polivy 2005; Herman, Roth, and Polivy 2003), and it is possible that these stem partly from distraction associated with holding a conversation and keeping eye contact. However, most of the work in this domain suggests that social modeling and inferences about norms drive social facilitation effects. People match their consumption to the amounts they observe other people eating (Herman et al. 2003). They follow others' lead especially closely when they seek to be accepted (Robinson et al. 2011), and conversely, they adjust their own portion size away from the portion sizes of other people who they do not aspire to (McFerran et al. 2010; Stel and van Koningsbruggen 2015). In line with these findings, obesity may spread along social network connections (Christakis and Fowler 2007).

*Inferences about appropriateness.* In the marketplace, consumers do not only infer norms from other people around them, but also from the portion sizes offered to them. Larger portion sizes (Fisher and Kral 2008; Geier, Rozin, and Doros 2006; Rolls, Morris, and Roe 2002) as well as package sizes (Hieke et al. 2016; Rolls et al. 2004; Wansink and Cheney 2005) robustly lead to increased food intake. Mere exposure to larger portions increases consumers' estimates of what size would be "normal" (Kerameas et al. 2015), and consumers readily accept portion size labels that imply relatively smaller sizes (Aydinoğlu and Krishna 2011). Even while actually eating enlarged portions, substantial increases in portion size are accepted as appropriate (Diliberti et al. 2004) and do not typically lead to greater satiety (Scheibehenne, Todd, and Wansink 2010) or lower subsequent food intake (Rolls, Roe, and Meengs 2006, 2007).

In the same way, greater variety of food options can also encourage consumption. The more actual variety (for example, different yogurt flavors: Rolls 1986) and the more perceived variety (for example, different colored candies: Kahn and Wansink 2004), the more consumers

eat. Although this effect is probably partly due to slowed down sensory-specific satiation, variety may additionally imply that it is normative to select multiple foods.

Overall, a vast amount of research agrees that portion size effects operate chiefly by altering consumers' inferences of what would be appropriate—apparently people assume that whatever marketers offer them must be “right.” The impact of enlarged portion sizes on consumption, too, will be discussed extensively in chapter III, where it is particularly pertinent. However, this digest showcases that the portion size that marketers set exerts formidable impact on consumers' food consumption by pushing around what they infer as appropriate.

*Lay theories and health halos.* Consumers make inferences about what is acceptable to eat based on other people and marketplace offerings. However, they also approach the food arena with preconceived notions about foods. For example, people seem to hold a lay theory that unhealthy food is tastier than healthy food, and this intuition prompts them to choose unhealthy options when hedonic goals are activated and health cues are provided at the same time (Raghunathan, Naylor, and Hoyer 2006). Likewise, people associate healthy food with being less filling. As a result, when a healthy option is imposed on consumers, they feel hungrier and eat more later on (Finkelstein and Fishbach 2010).

Consumers' food and consumption judgments can also be clouded by so-called health halos. Ironically, the mere addition of a healthy ingredient to an otherwise unhealthy dish triggers people to judge the whole meal as containing fewer calories—despite the fact that *more* food was added (Chernev 2011; Chernev and Gal 2010). Analogously, adding just one healthy option to a menu induces consumers to choose a less healthy option, presumably because they feel that the mere presence of a healthy option fulfills their health goals (Wilcox et al. 2009).

Moreover, labeling foods as “organic” (Schuldt and Schwarz 2010) or “fair-trade” (Peloza, Ye, and Montford 2015; Schuldt, Muller, and Schwarz 2012) reduces consumers’ calorie estimate for the item. By the same token, “low-fat” labels induce consumers to assume larger normative serving sizes and thus to eat more (Wansink and Chandon 2006). More generally, framing of any specific food (Geyskens et al. 2007; Provencher, Polivy, and Herman 2009) or an entire food outlet (Chandon and Wansink 2007) as healthy leads consumers to underestimate the calories in said food or on the entire menu, respectively, which ultimately results in greater consumption.

## Affect

Beyond cognitive evaluation of foods, incidental as well as eating-related affect has been shown to impact food choice and consumption.

*Mood and Stress.* Popular media frequently associates negative affect, such as sadness, with binge eating of unhealthy foods. However, research has found that only in restrained eaters is a negative mood associated with unhealthy snacking (Gardner et al. 2014; Garg, Wansink, and Inman 2007; Wansink, Cheney, and Chan 2003). For unrestrained eaters, a positive mood has been shown to spur intake (Bongers et al. 2013; Collins and Stafford 2014; Evers et al. 2013).

As such, the effects of incidental affect on eating have not been established unequivocally. What has been demonstrated more consistently is the effect of inherent—that is, eating-related—affect on food consumption.

*Self-evaluative feelings.* For many consumers, at least some food decisions are afflicted

with the potential for guilt about over-indulging. A majority of consumers hold healthy eating goals, and many feel bad for choosing unhealthy foods or overeating more generally (Bublitz, Peracchio, and Block 2010)—after all, overeating poses a setback to these goals. There are many possible reasons why a consumer might feel negatively about his or her indulgent food consumption: jeopardizing one’s health, compromising one’s dieting or exercising progress, or setting a suboptimal example for one’s children are just a few possible reasons why unhealthy eating may cause a consumer to feel queasy. As a result, many actively try to resist the urge to consume tempting but unhealthy foods by altering their food choice and consumption behavior (Vohs and Heatherton 2000), presumably to avoid feeling guilty or regretful. Accordingly, the greater the potential for guilt, the less likely it is that consumers will choose the unhealthy option, and vice versa. For instance, side-by-side presentation of healthy and unhealthy options, which saliently contrasts vice and virtue, reduces the choice share of unhealthy options (Okada 2005). Further, larger choice sets make it more difficult to justify any specific choice. Thus, when healthy and unhealthy options are presented together in a set, the choice share of unhealthy options is lower in large sets than in small sets (Sela, Berger, and Liu 2010).

*Self-licensing.* In line with the aforementioned findings, when consumers perceive a so-called “license” to indulge, which counteracts feelings of guilt, they are more likely to choose unhealthy options. For example, after having expended effort (Kivetz and Zheng 2006) and after having exerted restraint (Mukhopadhyay and Johar 2009; Mukhopadhyay, Sengupta, and Ramanathan 2008), consumers become more likely to indulge in unhealthy treats. Indeed, just mentally committing to future virtuous activities facilitates vice choices in the present (Fishbach and Dhar 2005; Khan and Dhar 2006; Werle, Wansink, and Payne 2011).

What is more, people readily fabricate such licenses. For instance, people distort their memories of prior behavior, specifically exaggerating the remembered progress they have made towards a self-regulatory goal, such as dieting (May and Irmak 2014), presumably to deflect feelings of guilt for goal-inconsistent behaviors. Further, it has been suggested that consumers utilize the mere presence of a healthy option on the menu as a license to excuse an unhealthy choice (Wilcox et al. 2009), despite the fact that they never chose the healthy option in the first place. In general, to the extent that consumers anticipate negative affect from choosing and consuming unhealthy indulgences, they will avoid these treats—unless they have a license at hand that helps alleviate feelings of guilt (Khan and Dhar 2006, 2007). Consumers’ drive to protect a positive sense of self will be discussed at greater length in Chapter II, where it is especially relevant.

In sum, along the entire path from sensation to behavior, food choice and consumption research has successfully identified circumstances that cause consumers to mis- and especially underestimate the volume and the unhealthiness of the foods they are confronted with. Seeing this vast amount of literature, what is left to do? The following section highlights a neglected perspective on consumers’ food decisions and introduces a framework for conceptualizing the consumer as motivated to maximize consumption pleasure while minimizing negative consumption-related affect. It also identifies specific gaps within this framework that warrant future research and situates the two empirical papers of this dissertation within the literature.

## **TOWARD A CONCEPTUALIZATION OF CONSUMERS AS MOTIVATED REASONERS**

The keen reader will notice that most of the reviewed literature treats the consumer as a passive recipient, subjected to the overpowering tools wielded by the environment or, worse even, the marketer. Growing three-dimensional packages prevent consumers from accurately estimating food volume; distracting technology foils their ability to precisely monitor their intake; biased labels distort portion size standards and play up dubious health benefits. It is not until one considers the work on self-licensing that it becomes evident that consumers may in fact not solely be subject to situational factors, but also actively utilize them in motivated ways.

One of the hallmark findings of psychology is the fact that people possess a vast array of cognitive strategies to help them bounce back when they encounter threats to their otherwise positive self-view, or forestall such threats altogether (Gilbert et al. 1998; Gross 1998; Kunda 1987, 1990). Be it dissonance reduction, self-serving attribution, or downward social comparison, motivated reasoning takes many forms, but the overarching goal of the “psychological immune system” (Gilbert et al. 1998) is to arrive at a desired conclusion: that one is a valuable (i.e., consistent, competent, successful, moral) person (Kunda 1990; Vaillant 1993).

For a large proportion of consumers, food decision making poses a stark tradeoff between pleasure from indulging and negative affect from worrying about their health or weight (Bublitz et al. 2010). Given this conflict inherent in food consumption, it is likely that consumers actively engage in motivated reasoning tactics. However, as the next section will discuss in more detail, a surprisingly large proportion of current consumer research on food choice and consumption has neglected to consider or systematically test (rather than assume) the possibility that consumers might actively seek to maximize indulgence while minimizing negative affect.

Within this dissertation, I argue that consumer researchers, policy makers, and marketing managers passionate about food decision making would benefit from augmenting their

perspective on consumers and conceptualizing them as motivated to find ways to de-problematize and facilitate indulgent eating decisions. A more in-depth examination of when and how consumers engage in motivated reasoning tactics in food consumption contexts will not only reveal critical theoretical insights, but also qualify and refine practical implications. This will ultimately enable a more rigorous and effective application of research findings.

To this end, I first introduce a framework of motivated reasoning in consumer food decision making that offers a basic schema for which types of motivated reasoning tactics may occur where along the processes involved in food consumption. This framework also suggests a nomenclature to structure existing and future work within these sub-domains. Then, moving along these potential leverage points for motivated reasoning, I systematically highlight gaps in the current literature as well as potential future research questions. Lastly, I situate the two empirical papers of this dissertation within this framework and foreshadow how they experimentally investigate unexplored aspects of motivated reasoning in food consumption.

#### Framework Structuring Leverage Points for Motivated Reasoning in Food Consumption

The preceding literature review already hinted at the fact that consumers' thoughts about their eating decisions may be distorted by a motivation to enjoy tasty but unhealthy foods without feeling bad afterwards. Findings of this flavor included that consumers overweight healthy cues compared to unhealthy cues (e.g., Chernev and Gal 2010) and that they draw on, or fabricate, licenses to justify indulging (e.g., Fishbach and Dhar 2005; Kivetz and Zheng 2006; May and Irmak 2014). However, here I argue that these are by no means the only forms that motivated reasoning can take along the processing steps involved in food consumption.



Specifically, I suggest ways in which the translation from sensation to perception of foods may be altered by *motivated perception*; how the combination of various perceptions into a cognitive evaluation of foodstuffs may be skewed by *motivated integration*; how the impact of cognitive evaluations of a food's healthiness on consumers' affect may be modified by *motivated vindication*; and how affective reactions to food can give rise to specific behaviors by way of *motivated compensation* (see figure 1). For each of these categories, I highlight examples of specific potential processes that have not yet been studied and point to the implications that the suggested prospective research may have on marketing practice.

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Insert figure 1 about here

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*Motivated Perception.* The first potential leverage point for motivated reasoning is perception. Some research in psychology has indicated that motivations may have the power to impact people's perception. That is, in a way, people "see what they want to see" (Balci et al. 2006). First, this is reflected in people's tendency to *attend to* what they want to see. When viewing images, people direct their attention selectively towards elements related to primary motive states (such as safety or sexual activity: Bradley et al. 2003); when performance is incentivized, people pay more attention to discrimination tasks (Ashare, Hawk, and Mazzullo 2007); and when financially deprived, consumers' attention to scarce goods is heightened (Sharma and Alter 2012), to highlight just a few examples. In these cases, motivated attention supports people in fulfilling their motives.

In turn, to the extent that *not* paying attention facilitates the pursuit of a motive, it is conceivable that consumers may exhibit motivated *inattention*, too, to avoid information about the size of their portion or their prior consumption. For instance, if a consumer would like to

enjoy some potato chips but does not want to feel guilty for eating such a salty, fatty snack, he or she might divert visual attention away from the emptying chips bowl. A better understanding of the role of motivated inattention would be instructive, as it would help design interventions that (re)engage consumers' attention while eating unhealthy foods.

Other research in this domain has found that people may *perceive* what they want to see. For instance, objects that are highly desired are perceived as closer (Balcetis and Dunning 2010) and larger (Velkamp, Aarts, and Custers 2008). Inducing a sense of powerlessness leads people to perceive the size of power symbols (such as money) as significantly larger (Bruner and Goodman 1947; Dubois, Rucker, and Galinsky 2010). Importantly, some findings in this domain also suggest that these skewed perceptions are not solely about representing desire, but rather about motivating action. For instance, one study found that the more difficult it was for an individual to cross a certain distance to achieve a goal (based on their body shape), the shorter she perceived that distance to be—supposedly to heighten the perceived feasibility and thereby encourage the individual to attempt the crossing (Cole, Balcetis, and Zhang 2013).

Given these prior findings, it is possible that if a consumer wants to facilitate action towards an indulgent food, he or she may distort their perception of the size of a food portion or food leftovers, mentally minimizing the former and exaggerating the latter. Pinning down factors that increase or decrease the likelihood of such motivated distortions in size perception would be very insightful. For example, it is possible that complexly shaped packages or foods (such as a Santa-shaped versus rectangular candy container; a letter-shaped versus round cookie) lead to stronger motivated size misperception, because correct volume estimates for such shapes are more ambiguous. A better understanding of what expedites and impedes motivated size perception of foods would aid in designing package and product shapes to limit underestimation.

*Motivated Integration.* As described previously, after sensation is translated into perception, further higher-level integration of information occurs to form a more comprehensive interpretation of a target stimulus or situation. By virtue of requiring the combination of many different cues, this step is ripe with opportunities for what may be called *motivated integration*—the selective incorporation of information to generate a stronger evaluation as “healthy.”

Some of the studies mentioned previously indicate that consumer selectively integrate information on healthiness and portion size (e.g., based on nutritional claims, health branding, or size labels) to arrive at favorable conclusions. For example, consumers seem to overweight the health value of healthy ingredients and consequently arrive at a much healthier overall evaluation of meals when they contain (versus do not contain) an additional healthy ingredient (Chernev 2011; Chernev and Gal 2010).

However, much of the work in this area has not yet parsed out how much of a role motivated reasoning plays in the observed effects. For instance, essentially all papers finding health halo effects on calorie estimation have only used principally unhealthy foods: cookies (Schuldt and Schwarz 2010; Provencher et al. 2009), chocolate (Schuldt et al. 2012), candy bars (Schuldt 2013), hamburgers, bacon-cheese-waffles, beef chili, and meatball pepperoni cheesesteaks (Chernev 2011), M&Ms (Wansink and Chandon 2006), potato chips (Geyskens et al. 2007), fast food chains (Chandon and Wansink 2007), and menus comprised of fries, chicken nuggets, loaded potatoes, and cheeseburgers (Wilcox et al. 2009). The few experiments that also included ambiguous foods found a similar swaying effect of health labels on consumption (pretzels and “small” labels: Aydinoglu and Krishna 2010; granola and “low fat” labels: Wansink and Chandon 2006). While these findings are consistent with consumers engaging in

motivated reasoning, the mechanism is not definitive.

Yet, both theoretically and practically, it matters a great deal whether “organic” and “fair-trade” labels only cast halos over unhealthy food products and “small” size labels are believed only in unhealthy eating contexts, or if these effects hold for healthy foods, too. If health halos and label effects do *not* hold for healthy foods, this would be further evidence for the importance of motivated reasoning in eating contexts. On the positive, this would mean that methods known to attenuate motivated reasoning, such as being aware of one’s self-deception (Balcetis and Dunning 2006; Gilbert et al. 1998) or giving recommendations to someone else (Jonas, Schulz-Hardt, and Frey 2005), may serve as effective interventions. On the negative, it would mean that labeling healthy foods as “organic” or “small” will probably not suffice to increase their consumption. Conversely, if halo and labeling effects *do* hold for healthy foods, this would indicate that interventions to curb motivated reasoning would likely not do the trick, but that labels may actually help increase healthy consumption. As malnutrition with vitamins and minerals is a growing problem (Via 2012), encouraging consumption of fruits and vegetables is as important as ever, and establishing effective tools to do so will benefit both society and firms. However, to give comprehensive managerial and policy advice, clarifying the processes is vital.

*Motivated Vindication.* Even though consumers may have motivated perception and motivated integration tools at their disposal, obviously not all judgments of foods will magically return a cognitive evaluation as “healthy.” As unfavorable healthiness evaluations may threaten people’s positive affect, they may resort to tactics that fall under the umbrella of *motivated vindication*—selectively drawing on circumstances that sanctify an unhealthy eating decision.

In this regard, one concept has already received attention, self-licensing. As described

previously, even made-up past (May and Irmak 2014) and planned future (Werle et al. 2011) healthy choices can be used to balance out an unhealthy decision to put the mind at ease. However, self-licensing is not the only way in which people may vindicate their choosing or consuming unhealthy options and portion sizes. Specifically, consumers might also re-attribute responsibility for their unhealthy eating behavior away from themselves. Such self-serving attribution may become accessible when others choose for the consumer (e.g., when a consumer orders a surprise menu at a restaurant or eats a boxed lunch packed by a family member), or even when others merely serve the consumer (e.g., when consumers dine at a table-service restaurant). The latter hypothesis will be tested extensively in chapter II.

Moreover, consumers might also turn to downward counterfactuals, so as to render their actual consumption less problematic in comparison. There is evidence that people sometimes exaggerate the severity of counterfactual outcomes in order to self-enhance. For instance, they may inflate the calories of a cookie that they did not eat (Effron et al. 2013). What is unclear, however, is what spurs such downward counterfactuals. It is conceivable that consumers become more likely to draw upon downward counterfactuals if unchosen options are represented more vividly. For instance, menus that depict (versus do not depict) photos of an extremely unhealthy option may increase the choice share of other, less extreme unhealthy options by making a downward counterfactual more accessible. Similarly, having food leftovers may provide consumers with a convenient downward counterfactual: they clearly could have eaten more, but did not; therefore, their consumption can be considered to be less. The connection between leftovers, counterfactuals, and perceived consumption will be treated in chapter III.

Lastly, consumers may not only deny the premise that a target food is unhealthy to begin with (see section on motivated integration), but possibly also the consequences associated with

unhealthy choices, such as its impact on blood sugar or weight. In healthcare contexts, it has been found that when patients receive unfavorable test results they often underestimate or deny how serious the health consequences of their test result will be, even if they accept the result itself as accurate (Lazarus 1983). Given that the relationship between nutrients, calories, and weight gain is complex, consumers may consider different unhealthy consumption occasions as differentially consequential. For instance, a consumer may be fully aware that a slice of Red Velvet Cake from the Cheesecake Factory runs at 1,570 calories a slice, thanks to new menu labeling policies. Yet, he or she may underestimate more strongly how much these calories slow down her weight loss progress when she eats the dessert on vacation (versus on a regular day). Understanding which types of situations are likely to promote denial or underestimation of the consequences of unhealthy eating would aid in deciding if and when consequence-related information (such as the percent increase in morbidity associated with excessive intake) is more suitable than purely nutrition-related information (such as grams of carbohydrates).

*Motivated Compensation.* While some situations may make it easier to prevent or reduce negative feelings about eating indulgent foods, oftentimes consumers still experience those negative feelings (Ramanathan and Williams 2007; Steenhuis 2009). In these cases, a consumer may engage in a variety of behaviors that can be summarized as *motivated compensation*—behaviors that directly or indirectly repair one’s unhealthy decisions.

Ample research has shown that negative self-conscious emotions, such as guilt, can serve as a strong motivator for reparative action (Frijda 1994). Direct reparative effects of guilt have been found in the domains of prejudice (Amodio, Devine, and Harmon-Jones 2007), donations (Basil Ridgway, and Basil 2008; Baumeister, Stillwell, and Heatherton 1994), and

reciprocity in retail services (Dahl, Honea, and Manchanda 2005). In the eating domain, sporadic findings suggest that for maladjusted dieters feeling bad for indulging may lead not to reparation but rather to even greater indulgence (“what-the-hell-effect,” see Polivy and Herman 1985). However, it is quite possible that for well-adjusted eaters, negative feelings about overeating or unhealthy choices may encourage reparative behaviors. For instance, if a consumer feels regretful over the large amount of nachos eaten during a football game, he or she may opt for a healthier dinner or work out at the gym the next day. The role of negative self-evaluative affect in encouraging compensatory healthy behaviors is demonstrated in chapter III.

In addition to such direct reparation, consumers may also compensate more indirectly for prior unhealthy eating. Recent research has demonstrated consumers’ capacity to compensate for self-threats in a specific life domain with self-enhancing symbolic consumption in the same domain (e.g., Gao, Wheeler, and Shiv 2009; Kim and Rucker 2012; Rucker and Galinsky 2008; Wicklund and Gollwitzer 1981; see Rucker and Galinsky 2013 for a review) or even in unrelated domains (Allard and White 2015; Lisjak et al. 2015). As such, consumers might compensate for their overeating or unhealthy eating by consuming products that signal high power, intellectual competence, or pro-sociality. A more pertinent question, however, is presented by the fact that for food consumption direct, within-domain compensation (i.e., making healthier choices at the inevitable next meal) should be relatively feasible compared to other contexts examined before, such as socio-economic status or academic achievement (i.e., raising one’s income and education level). This raises the question of what drives consumers toward indirect compensation as opposed to arguably more effective direct compensation.

In sum, there are many opportunities for consumers to use motivated reasoning tactics in the process of food decision making. Studying the consumer more deeply through the theoretical

lens of motivated cognition could greatly expand our insights into the substantive area of food decision making and also help resolve open theoretical questions with regards to motivated reasoning. The theoretical framework proposed in this dissertation (see figure 1) provides a structure to organize research on motivated reasoning in food consumption contexts, identifies gaps in the literature, and exemplifies the value of filling each of these gaps.

Within this dissertation, I examine separately two previously unstudied manifestations of how consumers' drive to feel good about themselves interacts with marketing variables to impact their food choices, portion size selection, and consumption. These two empirical essays identify the impact of processes contributing to unhealthy eating and begin to address distinct gaps.

## Overview of the Present Research

Aside from offering a general framework to facilitate systematic research into motivated reasoning in food consumption, within this dissertation I also empirically test two specific influential marketing-related factors: who serves food (the consumer versus another person) and the amount of food leftovers (a small versus large amount). The specific theoretical contributions and substantive implications of each examination are described in detail with each chapter, but a brief overview is given next.

First, chapter II is motivated by the fact that people increasingly consume food served to them by others. Based on psychological theories of agency, motivated reasoning, and self-serving attributions, we propose that being served (versus serving oneself) encourages unhealthy eating. We test this proposition in five studies. We demonstrate that when people are served food (compared to when they serve themselves), they are more inclined to consume unhealthy foods,



and to select larger portions of unhealthy foods. Process evidence shows that this behavior occurs because being served allows people to reject responsibility for unhealthy eating and thus to feel better about themselves following indulgent consumption. These findings reveal that merely being more physically involved in the act of serving food impedes the reattribution of responsibility and thus advances our understanding of self-serving attributions. This work also contributes to the growing research on “nudging” consumers towards healthier decisions (Thaler and Sunstein 2008).

Next, chapter III takes on the fact that portion sizes have been growing over time. Larger served portions are known to increase consumption, but the increase in consumption is smaller than the increase in the amount served. As such, consumers now have larger amounts of food leftovers on their plates than they used to. To date, the unique impacts of food leftovers have not yet been examined, so we propose and test a novel framework for the affective, motivational, and behavioral consequences of having a larger (versus smaller) amount of food leftovers, given equal actual consumption. Specifically, we suggest that larger amounts of leftovers reduce perceived consumption, which improves consumers’ self-evaluative feelings and dampens their motivation to compensate for their food consumption. Four experiments show that larger (versus smaller) amounts of food leftovers cause people to feel they ate less despite equal actual consumption. Larger leftovers also lead to more subsequent consumption and less exercise effort later on. This undermining effect of leftovers on compensation behaviors is mediated by a sequence of lower perceived consumption and enhanced self-evaluative feelings. This work reveals an additional mechanism by which larger portions contribute to obesity and suggests how consumers may prevent the subversive effect of leftovers. Lastly, chapter IV provides an integrative conclusion across the preceding chapters.

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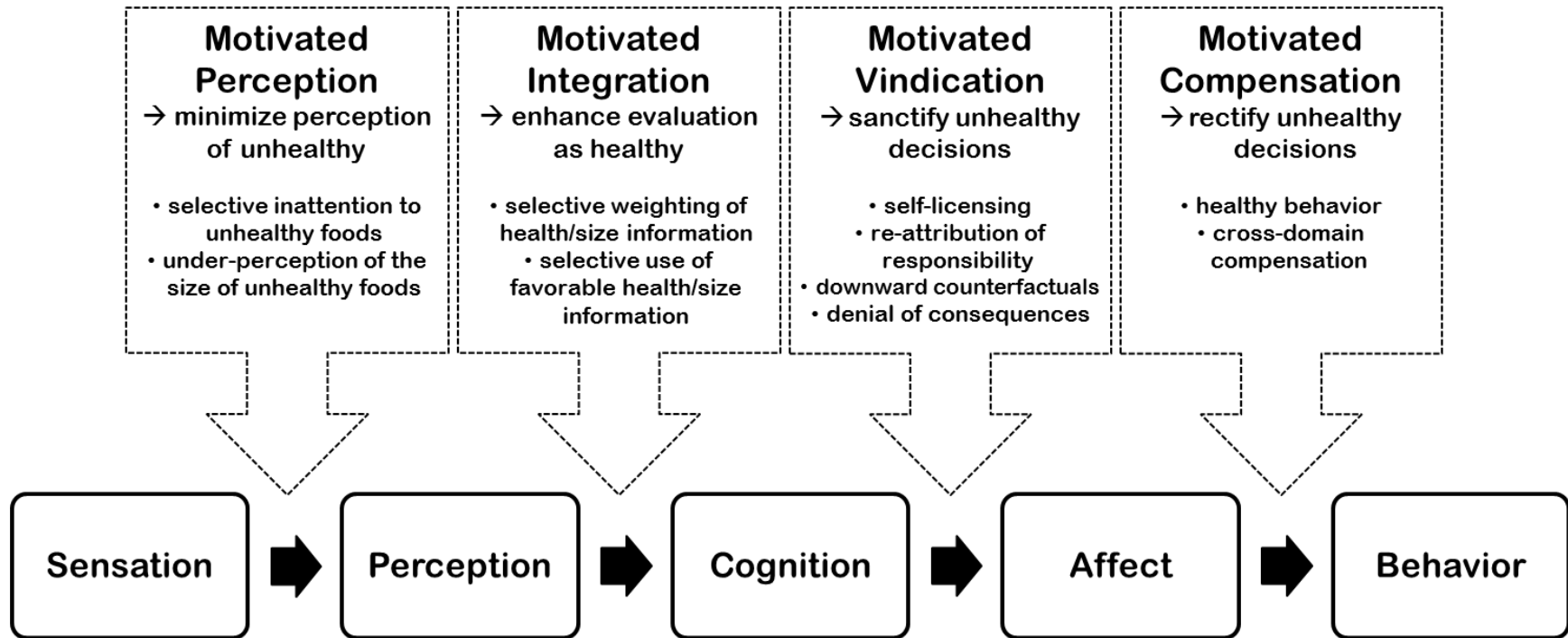
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**FIGURES**

**FIGURE 1:**

**FRAMEWORK ORGANIZING LEVERAGE POINTS FOR MOTIVATED REASONING IN FOOD CONSUMPTION**



**Figure 1: Framework organizing leverage points for motivated reasoning in food consumption**

**CHAPTER II:**  
**CATER TO ME: BEING SERVED FOOD ENCOURAGES UNHEALTHY EATING BY  
LOWERING CONSUMERS' SENSE OF RESPONSIBILITY<sup>1</sup>**

Fifty percent of meals are eaten “out-of-home” (Hyman 2011) and two-thirds of Americans dine out at least every other day (Stewart, Blisard, and Jolliffe 2006). Eating out has become pervasive across all types of dining establishments, including fast food places, cafeterias, quick service, and gourmet restaurants (Harris Interactive 2012). Dining out brings benefits, saving the consumer time and effort. But, does it come at a price for one’s health?

While at home people predominantly serve themselves their own food, when dining out others most frequently serve them. For instance, patrons are served at restaurant tables, over cafeteria counters, or even at drive-through windows. In some establishments, consumers do serve themselves from a buffet or from bowls that are shared family-style, but being served is the prevailing serving set-up when eating away from home. It has also been shown that consumers eat much more unhealthily when they eat out versus at home (Gregory, Smith, and Wendt 2011). This begs the question of whether who serves food affects consumers’ eating behavior. If being served food (rather than serving it oneself) instigates people to eat more unhealthily, it may play a role in the obesity epidemic facing many countries.

Prior research comparing eating at home versus outside the home has focused on the

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<sup>1</sup> This chapter is based on a paper by Hagen, Krishna, and McFerran that has been conditionally accepted at the *Journal of Marketing Research*.

healthiness of the food itself, pointing to the greasiness of fast food or the opulence of haute cuisine (Bezerra, Curioni, and Sichieri 2012; Guthrie, Lin, and Frazao 2002; Todd, Mancino, and Lin 2010). We investigate a different characteristic typical of eating away from home: being served the food by someone else. Could being served (versus serving oneself) actually cause people to eat more unhealthy food all else being equal? Could a subtle difference in how actively the consumer participates in the food-serving process alter how good or bad she feels about her eating behavior? We show evidence for affirmative answers to both of these questions.

We suggest that consumers are motivated to make self-serving attributions of responsibility for their eating, that is, to reject responsibility for unhealthy eating. They are motivated to do so in order to feel good about themselves. However, the latitude for relegating responsibility to others is affected by whether consumers serve the food themselves or someone else serves them, that is, by their degree of physical agency. Critically, we predict that how healthy or unhealthy the food is interacts with who serves it (the consumer herself or someone else) to affect consumers' ascription of responsibility. As an extension of prior work on self-serving attributions, we show that the healthiness of food determines the *necessity* or motivation for self-serving attributions—only unhealthy eating motivates consumers to reattribute responsibility. As a novel contribution to motivated reasoning research and consumer self-deception, we demonstrate that who serves the food determines the *opportunity* for such attribution—being not actively engaged in serving offers a chance to deny responsibility. Our research also enriches the specific research domains of vice consumption and consumption guilt.

Substantively, our findings have important practical implications for marketers' and policy makers' efforts to reduce unhealthy eating and the associated obesity epidemic. Whereas other work has shown that the general presence of others promotes eating (Herman, Roth, and

Polivy 2003) and that the body type of a server can increase or decrease food consumption (McFerran et al. 2010a), the distinction between self and other in serving—despite being an important one—has not been studied. Thus, we extend existing work on food consumption, health behaviors, and obesity, which has focused on other contextual influences on food consumption. We also examine how such a context factor influences consumers’ feelings, an important factor in the food consumption process (Gardner et al. 2014; Garg, Wansink, and Inman 2007).

First, we draw on theories of agency, motivated reasoning, and self-serving attributions to derive our prediction that being served (versus serving oneself) encourages unhealthy eating by allowing consumers to reject responsibility. Then, five studies provide evidence that when people are served food (versus when they serve themselves) they are more likely to consume unhealthy foods and to select larger portions of those unhealthy foods, and that this behavior occurs because being served allows people to reject responsibility for unhealthy eating and to protect their positive self-evaluation. Lastly, we discuss implications and future directions.

## **THEORETICAL BACKGROUND**

We begin with literature on agency, narrowing our focus down to self-serving attributions and the relevant literature on motivated reasoning. Next, we discuss the pertinent research on food consumption. These literatures provide the conceptual background for our hypotheses.

### *Agency*

Humans tend to assume intent and agency rather than randomness as the cause of events

(Rosset 2008), and beliefs of whether or not an action was driven by agency strongly influence judgments about actor and outcomes. Probably the most crucial impact of a sense of agency, however, emanates from the notion of *self*-agency, pertaining to the responsibility for one's *own* actions. Abundant research demonstrates that when individuals perceive personal agency, their emotional responses to the given event are amplified, ostensibly because people associate more strongly with its consequences (Landman 1987). For example, consumers evaluate self-selected (Brehm 1956) and self-assembled (Norton, Mochon, and Ariely 2012) products more positively, and problem-solvers judge self-generated solutions more favorably (Sussman et al. 1991).

At the same time, personal responsibility is also associated with negative emotions. For example, personal agency is a necessary condition for the emotion of guilt (Smith and Ellsworth 1985). Accordingly, individuals considering their active (versus passive) behavior as the cause of negative consequences (e.g., opting into a vaccination that causes complications versus omitting the vaccination and falling ill) judge their decision more negatively (Baron and Ritov 1994) and experience stronger immediate regret (Gilovich and Medvec 1995; Kahneman and Tversky 1982). In sum, research suggests that a sense of personal agency and responsibility for actions and outcomes pivotally affects human thoughts and feelings.

### Self-serving Attributions of Agency

People's thoughts are also heavily shaped by 'what one would like to be' (Heider 1958, p. 121); consequently, reasoning and inferences are distorted as a function of individual goals. A major instantiation of motivated reasoning is the self-serving attribution, which occurs to preserve one's self-concept—an important goal for all humans (Campbell and Sedikides 1999; Greenberg, Pyszczynski, and Solomon 1982; for a review see Shepperd, Malone, and Sweeny



2008). As such, attributions of responsibility are biased to position the individual in a favorable light in order to make her feel good and to avoid feeling bad. For instance, a large body of research demonstrates that individuals take credit for success, but overwhelmingly deny accountability for failures (see Fletcher and Ward 1988 for a review). Faced with favorable outcomes, people assume responsibility even for pure chance events (Langer and Roth 1975; Wohl and Enzle 2002). Conversely, faced with unfavorable outcomes, they reassign responsibility if their own agency is ambiguous (Bandura 1990; Hinrichs et al. 2012).

However, the motivation to explain away negative outcomes tends to be stronger than the motivation to claim positive outcomes (Bohner et al. 1988). Reactions to the negative are typically more intense than to the positive: negative information weighs more into impression formation (Anderson 1965), negative events affect people longer (Sheldon, Ryan, and Reis 1996), and negative emotions receive more attention and regulatory efforts (Baumeister, Heatherton, and Tice 1994; for a review see Baumeister et al. 2001).

### Eating and Self-evaluation

Motivated reasoning, such as self-serving attributions, occurs only under motivational pressures (Kunda 1987). One domain where motivational pressures are high is the context of eating (Chernev 2011). Food and eating behaviors are focal in today's society. Ideology-laden diets feature prominently in popular media, and headlines admonish consumers about their eating habits. Even brand names imply eating-related judgment (e.g., "Guiltless Gourmet"). Whether a cause or a consequence of such press and product offerings, many consumers want to eat more healthily, as evidenced in intentions to change their diet, propensity to reach for foods with healthy labels, and greater willingness to pay for healthy options (Nielsen 2015). Beyond these

casual observations, research corroborates the notion that food choice is an important subject of consumers' self-appraisals, in at least two distinct ways.

First, eating is inseparably linked with body shape, and thus with the increasingly important self-appraisals of physical attractiveness. A majority of Americans aim to lose weight (IFICF 2014) and make an effort to self-regulate and restrict their consumption when faced with tempting but unhealthy foods (Vohs and Heatherton 2000; for a review see Bublitz, Peracchio, and Block 2010). Second, many view diet control as a sign of willpower (IFICF 2011). This conceptualization connects eating with character strength. Success in controlling one's diet is a desirable quality (Chaiken and Pliner 1987). Relatedly, eating can be tied to morality. People rigorously categorize food into "good" and "bad" (Chernev and Gal 2010; Rozin, Ashmore, and Markwith 1996), and describe other consumers' eating with moral referents (Stein and Nemeroff 1995). Public health campaigns suggest that healthy eating is a civic duty, giving credence to the notion that eating is used as an indicator for how "good" a person is (Petersen et al. 2010).

Against this backdrop, it is not surprising that eating is intricately linked with self-evaluative feelings (Ramanathan and Williams 2007); many consumers feel guilty for unhealthy consumption (Wansink and Chandon 2006). As in other domains of "vice" and emotion-laden consumption, motivated reasoning is likely to occur (Khan and Dhar 2006, 2007; Mukhopadhyay and Johar 2009; Okada 2005). As detailed above, the tendency to make self-serving attributions tends to be stronger for the negative (compared to the positive). Thus, self-*protecting* attributions (e.g., in the case of unhealthy consumption) may be more powerful than self-enhancing attributions (e.g., in the case of healthy consumption). In other words, consumers may seek to reject responsibility for eating unhealthy food, as a mechanism to protect their positive self-evaluation. At the same time, they may seek to claim responsibility for healthy food choices and

consumption, although this effect may be weaker.

## Who Serves Food and Motivated Reasoning

Research suggests that consumers cannot make themselves believe *anything* they want. People attribute responsibility in self-serving ways, but only if they can muster some credible evidence to support those claims (Kunda 1990; Schlenker, Weigold, and Hallam 1990; Weary et al. 1982). We propose that physical involvement in procuring food (i.e., serving a food oneself versus being served by someone else), functions as a potential driver of motivated reasoning. Specifically, we propose that high physical involvement (i.e., serving oneself) poses “irrefutable” evidence of one’s agency, forestalling alternative ascriptions of responsibility. In contrast, low physical involvement (i.e., being served by someone else), allows the consumer leeway for self-serving attributions, or perhaps even facilitates them.

Previous consumer research has found that, all else equal, physically interacting with an object impacts people’s perceived relationship with it. For example, merely touching a product—such as a mug or pencil—increases consumers’ sense of ownership (Brasel and Gips 2014; Peck and Shu 2009; Peck, Barger, and Webb 2013). Similarly, the more physical activity an actor exerts to obtain an object, the more ownership is credited to her. This effect is driven by greater ascribed responsibility for the possession (Palamar, Le, and Friedman 2012). Indeed, greater effort in any activity enhances an individual’s sense of self-agency (Demanet et al. 2013).

## Conceptual Framework

We suggest that being more or less physically involved in serving food strongly affects

consumers' capacity to make self-serving attribution of responsibility. The diner who seizes a serving bowl, takes hold of a serving spoon, and ladles a helping of food onto her plate incriminates herself more to obtain the food than the diner who merely is handed a filled plate by a server. Actively serving food may enforce attributions of responsibility to oneself, whereas passively being served by others may open up the opportunity for making the most preferable attribution of responsibility, to self or other, depending on how virtuous the food is.

Note that we are not suggesting that *choosing* one's food has no impact, nor are we testing the relative impact of choosing versus serving one's food, on consumers' ability to make favorable attributions of responsibility. Instead, we are proposing that in the typical circumstance that a consumer chooses her own food to eat, whether she serves it to herself or is served by someone else will deny or allow her to reject responsibility for unhealthy eating. Given the importance of sense of agency, and the significant influence that physical activity appears to have on aspects of agency, we predict that more actively exerting her choice (i.e., serving her own food) will affect a consumer's attribution of responsibility more strongly than merely indicating the choice by vocalizing it to a server or taking a prepared plate (i.e., being served). Further, the finding that verbally stating one's choice favors impulsive decisions (Klesse, Levav, and Goukens 2015) suggests that verbal choice is not necessarily associated with greater deliberation and, as such, responsibility.

Importantly, we expect that such attributions of personal responsibility drive actual consumption behavior. Specifically, relieved of responsibility, consumers may find it more acceptable to indulge in unhealthy foods, resulting in their allowing themselves healthier food, or larger portions thereof. We propose that:

**H1:** People are more likely to make unhealthy eating decisions (e.g., choosing to eat

foods perceived as unhealthy versus not; choosing larger portions of food perceived as unhealthy<sup>2</sup>) when they are served by others (versus when they serve the food themselves).

We propose an attributional account to explain these unhealthy food choices, in which who serves the food (self versus other) affects attribution of responsibility for food consumption, which in turn drives how consumers feel about themselves. As detailed above, people's sense of responsibility, and subsequently their self-appraisal after food consumption, should be a function of two factors: how healthy the food is (determining the *necessity* for assuming or attributing away responsibility) and who serves it (determining the *opportunity* for attributing away responsibility). We propose that when others serve food, the consumer can take or relegate responsibility depending on what suits her better. When the consumer serves herself, however, the margin for reassigning responsibility and alleviating negative feelings is much smaller. This motivated reasoning should drive consumers' feelings about her food decisions, so that people's feelings about themselves are impacted interactively by the food's healthiness and who serves it. More specifically:

**H2:** Being served by others (versus serving themselves) allows people greater latitude to reject responsibility for eating (the same) foods perceived as unhealthy, and thus to feel better about themselves (e.g., more positive, less guilty) for their food consumption.

**H3:** Being served by others (versus serving oneself) has stronger effects on eating decisions when the food is perceived as unhealthy rather than healthy, because people are less likely to feel good about themselves (e.g., less positive, more guilty) after eating foods perceived as unhealthy.

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<sup>2</sup> Note that evaluations of healthiness are subjective and relative by nature. Much work shows that it is the *perception* that a food is (un)healthy that drives behavior (e.g., Raghunathan, Naylor, and Hoyer 2006), and, moreover, that food-related information is often interpreted in self-serving ways (Chernev 2011; Wansink and Chandon 2006). Thus, this chapter focuses on consumer reactions to foods they *perceive* as healthy or unhealthy. For ease of reading, throughout this manuscript we are using "healthy" and "unhealthy" to mean perceived-to-be-healthy and perceived-to-be-unhealthy, as established by pretesting of the stimuli.

H1-H3 suggest a moderated mediation model (see figure 2). Note that the model has two sub-figures (as in Valsesia, Nunes, and Ordanini 2016) for two different types of eating situations: when consumers choose their portion size (panel A) and when portion size is held constant (panel B). The two figures are separated because we examine each process element in a separate study before testing the full model. The reason for this is as follows: for any particular portion size (i.e., people receive and consume a fixed portion of food), who serves the food and the healthiness of the food jointly determine people's sense of responsibility, which in turn impacts their self-evaluative feelings post-consumption, given this particular portion size. In other words, the lowered sense of responsibility ameliorates people's guilt from eating unhealthy food and thus elevates their positive self-evaluative feelings post-consumption (panel B). However, if people can choose their portion size, feeling less (more) responsible for their selections when they are served by someone else (versus when they serve themselves) leads them to choose a larger (smaller) portion size of unhealthy food (panel A). This occurs because they can "get away with" choosing a larger portion without compromising their positive feelings. Hence, when people choose portion sizes, their self-evaluative feelings may be no different in the condition where they are served versus where they serve themselves. This overarching model (combination of panel A and panel B) can be tested by statistically controlling for portion size choice, which we do in our final study.

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Insert figure 2 about here

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The reasoning above also implies unique mediation patterns for each panel. When consumers choose portion sizes, being served by another person (versus serving oneself) will result in lower perceived responsibility, and responsibility will mediate the effect of who serves unhealthy food on portion size (panel A). When portion size is fixed, being served by another

person (versus serving oneself) will result in lower perceived responsibility and higher self-evaluative feelings, and perceived responsibility will mediate the effect of who serves unhealthy food on self-evaluative feelings (panel B). Lastly, combining these steps, when consumers choose portion size, portion size will be chosen in a manner to maintain self-evaluative feelings (i.e., smaller portions of unhealthy food when one is serving oneself versus being served by someone else), and thus responsibility will mediate the effect of who serves unhealthy food on self-evaluative feelings, controlling for portion size chosen. Figure 3 shows a flow chart of the programmatic succession of studies and the hypotheses tested in each.

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Insert figure 3 about here

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## **PILOT STUDY: FIELD TEST – CHOOSING AND FORGOING FRUIT VERSUS CANDY**

In a pilot field study, we first examined the basic idea that people may be more inclined to consume unhealthy food when it is served to them (versus when they serve themselves) (H1); and that this will be attenuated for healthy food (H3).

### **Method and Procedure**

The setting for this study was a small lobby in the business school of a large public university in the Midwest, where students typically wait for experimental sessions. The study ran over the course of two days during which eight groups of 21 to 25 business undergraduates (N = 189, 46% female) waited in the lobby before entering the laboratory for an unrelated

management study. This setting ensured that each condition included unique individuals.

We installed an innocuous small table with a letter-sized poster reading “Mmh, Fall Snack Bar – Have yourself a little snack.” On this table, we placed a fall-themed snack that was either healthy (mixed dried fruits) or unhealthy (Reese’s Pieces). The respective snack was available for people to serve themselves, or it was already served in sampling cups, making this a 2 (healthiness: healthy vs. unhealthy) × 2 (server: self vs. other) between-subjects design. For each of the four conditions was run once earlier and once later in the day.

Note that the snacks were selected based on a pretest in which 34 students from the same university had rated various snacks for their healthiness and liking on 1–7 point scales. Results indicated that students viewed mixed dried fruits as healthier ( $M = 5.62$ ,  $SD = 1.39$ ) than Reese’s Pieces ( $M = 1.44$ ,  $SD = .61$ ;  $t(33) = 16.85$ ,  $p < .01$ ), but liked dried fruits ( $M = 4.53$ ,  $SD = 1.88$ ) just as well as Reese’s Pieces ( $M = 4.85$ ,  $SD = 1.76$ ;  $t(33) = -.68$ ,  $p > .5$ ). Further, the Reese’s rating was significantly below the midpoint of the healthiness scale ( $t(33) = -19.60$ ,  $p < .01$ ), whereas the dried fruit rating was significantly above ( $t(33) = 9.17$ ,  $p < .01$ ).

In conditions where people served themselves, approximately 1.7 kilograms of the snack were set out in a large bowl with a serving spoon, and several stacks of ten 4oz sampling cups were placed next to it. In conditions where the snack was served by someone else, thirty 4oz sampling cups were set out on the table, each filled with 45 grams of the respective snack. Importantly, this amount filled half of the cup, allowing ample opportunity for the groups that served themselves to serve more (or less) into their cups than other-served groups received.

Students entered the waiting room at their own leisure, typically 5 to 10 minutes before the scheduled start time. They remained uninstructed and unobserved until the experimenter who conducted the management study opened up the door to the laboratory room. During their wait



time, the students had the opportunity to take a cup of the snack. The critical dependent measure was the total number of cups that were taken across all students in a given wait period. Note that we did not observe any individual's specific choice, but we observed the total number taken in each wait period and we knew the number of people in the wait room.

## Results and Discussion

A chi-square test indicated a significant relationship between condition and choice,  $\chi^2 (3, N = 189) = 22.83, p < .01$ . For the unhealthy Reese's, 0% (0 out of 46) of the waiting students took a cup when they had to serve themselves from the bowl, but 31.9% (15 out of 47) took one when it was already served into cups. Thus, as predicted, people were significantly more likely to take the unhealthy snack when it was served to them versus when they had to serve it for themselves,  $\chi^2 (1, N = 93) = 17.51, p < .01$ . For the healthy snack, however, 6.4% (3 out of 47) of the waiting students took a cup when they had to serve themselves, and 16.3% (8 out of 48) took a cup when the snack was already served into cups. This difference was not significant; people were similarly likely to have the healthy snack regardless of it being served or having to serve it,  $\chi^2 (1, N = 96) = 2.34, p > .12$ . (Time of day did not impact this interaction pattern.)

These results support the hypothesis that being served unhealthy food encourages people to take it, compared to when they have to serve it themselves. The fact that this effect operates selectively on unhealthy food suggests that this is not because being served may take less effort. Serving oneself involved equal amounts of effort in both the healthy and the unhealthy food conditions, but it only shifted people's propensity to have the unhealthy snack.

The pilot study suggests that who serves the food (self or other) may have quite a powerful effect. On the one hand, only a minority of people opted into having the snack.

However, note that a waiting room context is not a meal occasion; people did not enter the situation expecting to eat anything. This type of situation is interesting and important to consider, as much human consumption is unplanned (Wansink 2007).

The pilot study provided initial evidence that being served may drive consumers towards unhealthy choices. While our design ensures that the effect does not require an experimenter's social presence, one limitation of this naturalistic setting is the use of aggregate data. Further, this study examined only choice of taking food versus forgoing it as the focal outcome, whereas portion size may be more crucial in contributing to the obesity epidemic than specific food choice (Chandon and Wansink 2012). We now turn to more controlled laboratory experiments in which we collect responses at the individual level and measure portion choice.

### **STUDY 1A: PORTION SIZE DECISIONS FOR BREADS VERSUS CAKES**

The pilot study demonstrated that being served (versus serving oneself) increases people's likelihood of partaking of an unhealthy food (H1). Studies 1A and 1B test whether being served also causes people to select and consume larger portions (H1) and whether this will be attenuated for healthy food (H3).

#### **Method and Procedure**

One hundred and eighty-four undergraduates at a Canadian university (56.8% female) participated in the study for partial course credit. The average age in the sample was 21.28 years, with ages ranging from 19 to 37 years. Participants were randomly assigned to a 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) between-subjects design. Under the guise of a

taste test for a cafeteria, they read that they would have the chance to sample one of two food options. People in the healthy [unhealthy] condition could choose between multigrain and flaxseed bread [cranberry-orange and banana-chocolate cake].

Note that the foods were selected based on a pretest in which 30 students from a different university had rated various foods for their healthiness and liking on 1–7 point scales. Students viewed breads as healthier ( $M = 5.20$ ,  $SD = 1.35$ ) than cakes ( $M = 2.03$ ,  $SD = 1.19$ ;  $t(29) = 8.82$ ,  $p < .01$ ), but liked breads ( $M = 4.63$ ,  $SD = 1.71$ ) just as well as cakes ( $M = 4.80$ ,  $SD = 1.47$ ;  $t(29) = -.39$ ,  $p > .7$ ). Further, the cakes rating was significantly below the midpoint of the healthiness scale ( $t(29) = -9.06$ ,  $p < .01$ ); the bread rating was significantly above ( $t(29) = 4.87$ ,  $p < .01$ ).

They read: “When you have decided, please cut and serve yourself [let the researcher serve you] a slice of the bread [cake].” They also read that they would have to leave any uneaten food in the laboratory after the session and could only try one of the two options. Next, those in the serve-yourself conditions cut themselves a slice of the cake [bread] they selected. Those in the other-served conditions were served a pre-cut slice of their chosen cake [bread] by a research assistant. Lastly, participants completed mock taste evaluation questions and demographics.

We measured the weight of the slice each participant served herself by recording the weight of the loaf of bread [cake] was recorded pre- and post-session. We pre-determined the weight of the other-served slice by closely matching popular café chains: 100g cake slices (based on Starbucks’ 100-126g for slices of loaf cakes), and 45g bread slices (based on Panera Bread’s 55g slices of whole grain breads). Note that the slightly lower weights for the other-served slices make a more conservative test. If people serve themselves an amount of cake that is even smaller than this modest pre-selected other-served size, we can be more confident in our effect.

Additionally, we measured the amount each participant actually consumed, subtracting

the weight of each person's leftovers from the amount served. (Since the specific choice between the two healthy [unhealthy] options is irrelevant to the hypothesis it was not analyzed.)

## Results and Discussion

We conducted 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) ANOVAs on the healthiness index, the amount (grams) served, and the amount (grams) consumed.

*Amount served.* For amount served, the analysis yielded a main effect for healthiness of the food ( $F(1, 180) = 90.5, p < .01$ ), such that the portions of those tasting unhealthy cake ( $M = 73.19g, SD = 37.08$ ) were larger than of those tasting healthy bread ( $M = 44.56g, SD = 16.43$ ). There was also a main effect of server ( $F(1, 180) = 96.27, p < .01$ ), such that the portions of those serving themselves ( $M = 43.46g, SD = 30.76$ ) were smaller than the portions of those served by the research assistant ( $M = 67.20g, SD = 26.72$ ). More important, the predicted interaction between healthiness and server was significant  $F(1, 180) = 65.13, p < .01$ ).

Following up on the significant interaction, planned contrasts showed that when tasting healthy bread people's portion size were about equal, whether they served themselves ( $M = 41.21g, SD = 26.34$ ) or were served by someone else ( $M = 46.57g, SD = 3.40; F(1, 180) = 1.68, p = .2$ ). In contrast, when tasting unhealthy cake, people's portions were significantly smaller when they served themselves ( $M = 45.65g, SD = 34.72$ ) than when they were served by someone else ( $M = 100.72g, SD = 4.82; F(1, 180) = 145.53, p < .01$ ). This result supports H1 and H3.

*Amount consumed.* Not surprisingly, amount served and amount consumed were strongly related ( $r(183) = .69, p < .01$ ). For amount consumed, the analysis yielded a main effect for healthiness of the food ( $F(1, 180) = 62.91, p < .01$ ), such that those tasting unhealthy cake ( $M = 51.39g, SD = 39.39$ ) ate larger amounts than those tasting healthy bread ( $M = 17.08g, SD =$

17.83). There was also a main effect of server ( $F(1, 180) = 4.72, p < .05$ ), such that those served by the research assistant ate larger amounts ( $M = 33.22g, SD = 36.55$ ) than those serving themselves ( $M = 30.37g, SD = 29.80$ ). More important, the predicted interaction between healthiness and server was significant ( $F(1, 180) = 19.37, p < .01$ ).

Following up on the significant interaction, planned contrasts showed that when tasting healthy bread people ate marginally more when they served themselves ( $M = 22.90g, SD = 23.20$ ) than when they were served by someone else ( $M = 13.58g, SD = 12.62; F(1, 180) = 2.78, p = .1$ ), suggestive of a slight self-enhancement effect, although we do not find this in subsequent studies. In contrast, when tasting unhealthy cake, they ate significantly larger amounts when served by someone else ( $M = 65.13g, SD = 40.18$ ) than serving themselves ( $M = 37.65g, SD = 33.79; F(1, 180) = 19.67, p < .01$ ). This result supports H1 and H3.

Building on the choice results from the pilot study, these results suggest that consumers' portion size and eating decisions also depend jointly on whether the food is healthy or unhealthy and who serves it. When the food was healthy, consumers' portion and consumption amounts were less affected by who served (self versus other) than when the food was unhealthy. When faced with unhealthy food, both portion sizes and consumption amounts were significantly larger when participants were served by someone else, compared to when they served themselves. This pattern emerged even though participants had chosen the food themselves. These results are in line with the idea that being served may enable self-serving rejection of responsibility, causing consumers to increase the amount of unhealthy food they are served and subsequently eat.

Although it is most ecologically valid to pre-determine the other-served amounts based on common real portions in the restaurant industry, one may be concerned that our results could be affected by the industry-set amounts being overly large. However, portion oversizing affects

both healthy and unhealthy foods (Smiciklas-Wright et al. 2003), meaning that the focal interaction result should be unaffected. Second, the results hold similarly for actual consumption, not just amount served. Nonetheless, in the next study both those who serve themselves and those who are served all choose their portion size from a range of options.

### **STUDY 1B: PORTION SIZE DECISIONS FOR ALMONDS VERSUS M&MS**

Study 1B also tests if being served (versus serving oneself) leads consumers to select larger portions (H1) and if this will be reduced for healthy food (H3), but here everyone chooses from discrete portion sizes.

#### Method and Procedure

Seventy-five undergraduates at a large public university in the Midwest (40% female) participated in the study in exchange for partial course credit. The average age in the sample was 20.77 years, with ages ranging from 19 to 47 years.

Participants were randomly assigned to a 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) between-subjects design. Participants first imagined a situation in which they were about to buy a snack perceived as healthy or unhealthy from a snack bar with a specific serving set-up—pre-served containers or a station where people serve themselves. Note that both types are common options on campus. The snacks, almonds and M&Ms, were selected based on a pretest in which 35 student volunteers had rated various snacks for their healthiness and liking on 1–7 point scales. They viewed almonds as healthier ( $M = 6.29$ ,  $SD = .99$ ) than M&Ms ( $M = 1.43$ ,  $SD = .56$ ;  $t(34) = 24.11$ ,  $p < .01$ ), but liked almonds ( $M = 4.34$ ,  $SD = 1.73$ )

just as well as M&Ms ( $M = 4.97$ ,  $SD = 1.89$ ;  $t(34) = -1.34$ ,  $p > .15$ ). Further, the M&M rating was significantly below the midpoint of the healthiness scale ( $t(34) = -22.00$ ,  $p < .01$ ), whereas the almonds rating was significantly above ( $t(34) = 16.69$ ,  $p < .01$ ). Participants read:

Imagine you are getting a snack at a snack bar (e.g., in a cafeteria). You are really looking forward to a snack right now and you decide to go for almonds [M&Ms]. As this is the type of place where you serve yourself the snack into a container [the snack comes filled into containers] of a specified size (paid by weight), you will need to select which one of the available serving sizes you would like to take [get].

Next, participants chose a portion size from seven ordinal response options ranging from 4oz to 16oz (increasing in 2 ounce increments) and a no choice option 0=*none at all* (adapted from McFerran et al. 2010b). To ensure that students understood these sizes, we also provided the corresponding volume expressed in measuring cups along with each ounce label. Lastly, participants reported demographics and noted food allergies and dietary restrictions.

## Results and Discussion

We conducted a 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) ANOVA on our dependent variable, portion size choice. Seven participants indicated restrictions relevant to the food in their condition (e.g., nut allergy in the almond condition, lactose intolerance in the M&M condition) and were excluded from the data set, leaving 68 data points for the analysis.

Neither the main effect for server ( $F(1, 64) = 1.69$ ,  $p > .15$ ) nor for the snack's healthiness ( $F(1, 64) = .84$ ,  $p > .3$ ) were significant. However, the predicted interaction between the snack's healthiness and server was significant ( $F(1, 64) = 6.18$ ,  $p < .05$ ).

Following up on the interaction, planned contrasts showed that when people thought about getting a healthy snack, almonds, they selected similar portions whether they had to serve themselves the food ( $M = 6.11\text{oz}$ ,  $SD = 2.87$ ) or the snack was already served for them ( $M =$

5.29oz,  $SD = 2.22$ ;  $F(1, 64) = .72$ ;  $p > .4$ ). By contrast, when people thought about getting an unhealthy snack, M&Ms, they selected a significantly smaller portion when they had to serve themselves ( $M = 3.77oz$ ,  $SD = 2.64$ ) than when the snack was already served for them ( $M = 6.38oz$ ,  $SD = 3.52$ ;  $F(1, 64) = 6.96$ ,  $p = .01$ ; see figure 4). This result supports H1 and H3.

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Insert figure 4 about here

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These results align with and complement those from the pilot study. Being served nudged people towards unhealthy choices by encouraging them to select larger portions of an unhealthy snack. Note that the pre-packaged nature of the other-served snack and the portion description in ounces ensured unambiguous expectations of what subjects would receive. Further, as in the pilot study, the effect emerges selectively for the unhealthy snack; therefore, the larger portion choice of the other-served participants is not attributable to a fear of being under-served.

The finding that being served encouraged people to choose the candy is suggestive of the idea that being served may attenuate guilt for unhealthy eating, given that feeling guilty is a common response to unhealthy foods and is one factor that restrains consumers from overeating (Vohs and Heatherton 2000). In the next two studies, we test the hypothesized process: rejection of responsibility to maintain positive self-evaluative feelings. In study 2, we use fixed portion sizes to examine how responsibility and self-evaluative feelings vary by who serves (self versus other) and healthiness for a given food. In study 3, we allow people to make their own portion decision to examine how the process observed in study 2 influences their consumption choices.

## **STUDY 2: TEST OF PROCESS USING FIXED PORTIONS OF SALADS VERSUS CHEESEBURGERS**



The goal of study 2 was to investigate the proposed process and test our hypotheses that people feel more positively about themselves when are served (versus when they serve themselves) unhealthy food, and that this is because they attribute lower responsibility to themselves for their consumption (H2). In other words, we tested a moderated mediation model in which being served (versus serving oneself) leads people to reject responsibility for unhealthy (but not healthy) eating, which in turn allows them to feel more positively about themselves (see figure 2, panel B). We use a fixed, equal portion of food in both conditions, to test the effect of being served (versus serving oneself) on self-evaluative feelings.

#### Method and Procedure

One hundred and sixty U.S.-based participants were recruited through Amazon's Mechanical Turk platform (31.9% female) for nominal payment. The average age in the sample was 28.03 years, with ages ranging from 18 to 74 years. Participants completed the study on their personal computer and were randomly assigned to a 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) between-subjects design. First, they were instructed to imagine friends had invited them for a meal they cooked from scratch, and that they are ready to eat. Next, participants in the serve-yourself [other-served] conditions read:

Once you have sat down at the dinner table, you serve yourself [your friend serves you] the food onto your plate. Imagine that you fill [your friend fills] your plate with a portion of the food that they cooked. After you have helped yourself [your friend has helped you] to the food, you start eating from your plate. This is what you served yourself [what your friend served you]:

At this point, participants saw a photograph of a plate with either a plate of healthy foods (grilled chicken, vegetables, wild rice, and a granola bar) or a plate of unhealthy foods (cheeseburger, French fries, baked beans, and a cookie). Portion size was held constant whether one served the

food oneself or was served (see figure 5). (Note that to do this it is essential to use hypothetical studies. It is unethical to force people to eat and finish a sizable portion of food. Further, *enforcing* portion size without any choice in the matter risks impacting sense of control in additional ways. Having people *imagine* choosing and eating any particular portion, however, avoids these issues.)

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Insert figure 5 about here

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## Measures

*Healthiness.* Subsequently, participants rated on a 0–100 scale how healthy, nutritious, and wholesome they thought the food was, yielding a “healthiness index” ( $\alpha = .95$ ). They also estimated how many calories this meal had.

*Responsibility.* Next, respondents rated on a 0–100 scale how much responsibility they felt for their consumption.

*Positive self-evaluative feelings.* Then they rated on a 0–100 scale how good as well as how justified, how guilty, and how shameful they would feel about themselves after eating this meal, which yielded a composite index for “positive self-evaluative feelings” ( $\alpha = .91$ ).

Lastly, participants were asked to recall who had served the food in the scenario and what kind of food it had been, serving as an attention check, and reported demographic information.

## Results

We conducted 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) ANOVAs on the healthiness index, calorie estimate, the positive self-evaluative feelings index, and responsibility.

*Manipulation checks.* With regards to the healthiness index, the analyses yielded the predicted main effect for healthiness of the food ( $F(1, 156) = 779.57, p < .01$ ). As anticipated, the food was perceived as significantly healthier in the healthy condition ( $M = 85.61, SD = 10.02$ ) than in the unhealthy condition ( $M = 28.45, SD = 15.41$ ). Neither the main effect of server ( $F(1, 156) = .26, p > .6$ ) nor the interaction between healthiness and server ( $F(1, 156) = .63, p > .4$ ) were significant. There was a similar significant main effect for food healthiness on calorie estimation ( $F(1, 154) = 78.96, p < .01$ ), such that people expected more calories for the unhealthy meal ( $M = 1115.12, SD = 417.23$ ) than the healthy meal ( $M = 627.35, SD = 286.64$ ). Moreover, the cheeseburger rating was significantly below the midpoint of the healthiness scale ( $t(76) = -12.27, p < .01$ ), whereas the grilled chicken rating was significantly above ( $t(82) = 32.39, p < .01$ ). As such, the healthiness manipulation was successful.

*Responsibility.* For responsibility, the analysis revealed a significant main effect for server ( $F(1, 156) = 6.45, p < .05$ ), such that people who imagined serving themselves assumed greater responsibility ( $M = 87.32, SD = 14.77$ ) than those who imagined being served ( $M = 80.80, SD = 18.62$ ). There was also a main effect of healthiness ( $F(1, 156) = 4.39, p < .05$ ), such that people assumed greater responsibility for healthy chicken ( $M = 86.72, SD = 14.70$ ) than for unhealthy cheeseburgers ( $M = 81.02, SD = 19.03$ ). More important, these two main effects were qualified by a significant interaction ( $F(1, 156) = 4.07, p < .05$ ).

Following up on this interaction, planned contrast tests showed that for healthy chicken, those who imagined being served by someone else assumed virtually as much responsibility ( $M = 86.02$ ,  $SD = 12.73$ ) as those who imagined serving themselves ( $M = 87.44$ ,  $SD = 16.62$ ;  $F(1, 156) = .15$ ,  $p > .6$ ). Conversely, for unhealthy cheeseburgers, those who imagined being served by another person accepted much less responsibility ( $M = 75.33$ ,  $SD = 22.12$ ) than those who imagined serving themselves ( $M = 87.19$ ,  $SD = 12.64$ ;  $F(1, 156) = 9.96$ ,  $p < .01$ ; see figure 6), signaling self-serving attribution. These results are consistent with H2 and H3.

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Insert figure 6 about here

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*Positive self-evaluative feelings.* For positive self-evaluative feelings, the analysis yielded a main effect for healthiness of the food ( $F(1, 155) = 176.36$ ,  $p < .01$ ), such that those who thought about eating healthy chicken felt better about themselves ( $M = 86.28$ ,  $SD = 17.77$ ) than those who thought about eating unhealthy cheeseburgers ( $M = 48.99$ ,  $SD = 17.73$ ), but this effect was qualified by a significant interaction between healthiness and server ( $F(1, 155) = 3.88$ ,  $p = .05$ ). The main effect for server was not significant ( $p > .2$ ).

Following up on the significant interaction, planned contrasts showed that for healthy chicken, people expressed similarly high positive self-evaluative feelings whether they imagined serving themselves ( $M = 87.36$ ,  $SD = 17.86$ ) or being served by someone else ( $M = 85.20$ ,  $SD = 17.82$ ;  $F(1, 155) = .30$ ,  $p > .5$ ). In contrast, for unhealthy cheeseburgers, they had more positive (or rather, less negative) self-evaluative feelings when they imagined being served by someone else ( $M = 53.51$ ,  $SD = 17.71$ ) versus serving themselves ( $M = 44.47$ ,  $SD = 17.76$ ;  $F(1, 155) = 4.97$ ,  $p < .05$ ; see figure 7). These results support H2 and H3.

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Insert figure 7 about here

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*Test for mediation.* We tested a moderated mediation model in which feelings of responsibility for one's consumption mediate the effects of who serves food (self versus other) on positive self-evaluative feelings; and healthiness moderates the effect of who serves the food on feelings of responsibility (figure 2, panel B). Accordingly, we submitted our data to a moderated mediation analysis employing Hayes' (2013) process macro, specifically testing a model in which path *a*, from independent variable to mediator, is moderated (model 7).

In line with our theory, a bootstrap analysis testing the indirect effect of server through feelings of responsibility on positive self-evaluative feelings, conditional on healthiness of the food, confirmed this hypothesis: At the level of unhealthy food, responsibility mediated the observed effect ( $b = 17.76$ ,  $SE = 9.26$ ; 95% CI = 4.03 – 40.50). In contrast, at the level of healthy food, responsibility did not mediate ( $b = 1.84$ ,  $SE = 5.08$ ; 95% CI = -6.49 – 13.88).

## Discussion

Study 2 shows that in order to feel better about their eating decisions people make self-attributions of responsibility, rejecting responsibility selectively for unhealthy eating when they were served by someone else<sup>3</sup>. In study 2, we held portion size constant to isolate the impact of being served (versus serving oneself) on self-evaluative feelings for a given portion of food. Having established that being served a given amount of unhealthy food allows people to reject responsibility and thus feel better, the next study tested a logical downstream consequence. That

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<sup>3</sup> One concern with the scenario used here is that participants may have had the perception that they had little choice in whether or not to take the food. It is customary not to refuse food at someone else's home. In another study, we used a catered event scenario and the results were conceptually replicated. Details of this study are available from the authors upon request.

is, we examined if being served leads people to choose larger portions of unhealthy food because they “can get away with it.” Accordingly, in study 3, we allow people to choose their own portion size to test whether a lowered sense of responsibility when being served (versus serving themselves) unhealthy food allows them to choose larger portions while feeling no worse.

### **STUDY 3: FULL TEST OF PROCESS USING PORTION CHOICE OF MAC ‘N CHEESE AND ROASTED VEGETABLES**

The pilot showed that being served encourages consumers to partake of unhealthy food, and studies 1A and 1B that it leads them to choose larger portion sizes of unhealthy foods. Study 2 showed that, for a fixed portion of food, being served allows consumers to reject responsibility for unhealthy eating, and thus to feel more positive about themselves. In line with these results, we had hypothesized that the choice effects in the first two studies occur because when consumers are served, they can essentially “get away with” a larger portion without feeling any worse. Study 3 formally tests this overarching idea, unifying H1, H2, and H3 in one model.

#### Method and Procedure

One hundred seventy-nine undergraduates at a large public university in the Midwest (61.5% female) participated in the study in exchange for partial course credit. The average age in the sample was 20.60 years, with ages ranging from 19 to 30 years.

Participants were randomly assigned to a 2 (healthiness: healthy vs. unhealthy) × 2 (server: self vs. other) between-subjects design. First, participants were instructed:

Imagine you are invited to a catered event. It is time to eat, so you walk up to the food station. You check out what is offered, and you decide to have some macaroni and cheese [roasted vegetables]. Then you serve yourself [a server serves you] the macaroni and cheese [roasted vegetables] onto your plate. Imagine taking the serving spoon and [the server] scooping macaroni and cheese [roasted vegetables] onto your plate.

## Measures

*Portion size choice.* Subsequently, participants indicated which portion size they would choose in this situation by selecting one of ten images that depicted a white plate with one, two, (.), ten, scoops of the respective food (see figure 8). This visual depiction ensured that people across conditions had the same understanding of the portion sizes, and it helped us eliminate any potential uncertainty regarding portion size, inferences about servers' motivation to over- or underserve, or personal skills with respect to being able to serve oneself a desired portion size.

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Insert figure 8 about here

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*Responsibility.* Subsequently, participants rated on a 0–100 scale how responsible they felt for their consumption and to what degree they felt in control over their consumption. These two items were combined into a “responsibility index” ( $r = .41, p < .001$ ).

*Positive self-evaluative feelings.* They also rated on a 1–9 scale how good, how justified, how guilty, and how shameful they would feel about themselves after eating this meal, yielding the composite index for “positive self-evaluative feelings” ( $\alpha = .6$ )<sup>4</sup>.

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<sup>4</sup> While these items are the same used with high internal consistency in study 2, here, “justified” appeared to fit less well with the other items. Without “justified” Cronbach's  $\alpha$  is .66, and the results remain robust with a 3-item Positive Feelings index.

*Healthiness.* Lastly, participants indicated on a 0–7 scale how healthy they thought the food in the scenario was, serving as a manipulation check. Finally, they reported demographic information and any dietary restrictions and food allergies.

## Results

We conducted 2 (healthiness: healthy vs. unhealthy)  $\times$  2 (server: self vs. other) ANOVAs on our dependent variables; healthiness, portion choice, and the responsibility and positive self-evaluative feelings indices. Five participants indicated dietary restrictions pertaining to the food in their condition (e.g., gluten- or dairy-free diet in the macaroni and cheese condition) and were excluded from the data set, leaving 174 data points for the analysis.

*Manipulation check.* With regards to the healthiness rating, the analyses yielded the predicted main effect for healthiness of the food ( $F(1, 170) = 297.90, p < .05$ ). As anticipated, the food was perceived as significantly healthier in the healthy condition ( $M = 5.90, SD = 1.05$ ) than in the unhealthy condition ( $M = 2.33, SD = 1.02$ ). Neither the effect of server ( $F(1, 170) = .21, p > .7$ ) nor the interaction between healthiness and server ( $F(1, 170) = 1.72, p > .15$ ) were significant. Further, the macaroni and cheese rating was significantly below the midpoint of the scale ( $t(83) = -10.46, p < .01$ ); the vegetable rating was significantly above the midpoint of the scale ( $t(89) = 21.69, p < .01$ ). As such, the healthiness manipulation was successful.

*Portion choice.* For portion choice, the analyses revealed a main effect for healthiness ( $F(1, 170) = 10.44, p = .001$ ), such that people selected larger portions of the unhealthy macaroni



and cheese ( $M = 4.58, SD = 2.25$ ) than of the healthy roasted vegetables ( $M = 3.71, SD = 1.38$ ). The main effect of server was also significant ( $F(1, 170) = 5.50, p < .05$ ), such that people chose larger portions when they were served by a server ( $M = 4.44, SD = 2.11$ ) than when they were serving themselves ( $M = 3.83, SD = 1.61$ ). More importantly, the interaction between healthiness and server was also significant ( $F(1, 170) = 4.76, p < .05$ ).

Following up on the interaction, planned contrasts showed that for healthy vegetables, people selected similar portions regardless of whether they had to serve themselves the food ( $M = 3.69, SD = 1.49$ ) or the food was served for them ( $M = 3.73, SD = 1.29; F(1, 170) = .01; p > .9$ ). By contrast, for unhealthy macaroni and cheese, people selected a significantly larger portion when they were served by a server ( $M = 5.22, SD = 2.55$ ) than when they had to serve themselves ( $M = 3.98, SD = 1.74; F(1, 170) = 9.90, p < .01$ ; see figure 9). These results are consistent with studies 1A and 1B and with our proposed H1 and H3.

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Insert figure 9 about here

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*Responsibility.* For responsibility, the analysis revealed a main effect of server ( $F(1, 170) = 8.28, p < .01$ ), such that people felt less responsible when served by a server ( $M = 76.63, SD = 23.91$ ) than when they were serving themselves ( $M = 85.34, SD = 15.70$ ). The main effect of healthiness was not significant ( $F(1, 170) = 2.37, p > .1$ ), but more important, the interaction between server and healthiness was significant ( $F(1, 170) = 5.51, p < .05$ ).

Following up on the interaction, planned contrasts showed for healthy vegetables, people felt similarly responsible for their consumption regardless of whether they had to serve themselves the food ( $M = 83.81, SD = 15.63$ ) or the food was served for them ( $M = 82.21, SD = 20.05; F(1, 170) = .15; p > .7$ ). By contrast, for unhealthy macaroni and cheese they accepted

significantly less responsibility when they were served by a server ( $M = 70.51$ ,  $SD = 26.44$ ), compared to when they had to serve themselves ( $M = 86.24$ ,  $SD = 15.85$ ;  $F(1, 170) = 13.19$ ,  $p < .001$ ; see figure 10). These results replicate study 2 and support H2 and H3.

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Insert figure 10 about here

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*Positive self-evaluative feelings.* For positive self-evaluative feelings, there was a main effect of healthiness ( $F(1, 170) = 7.72$ ;  $p < .01$ ), such that people felt less positively about themselves when having unhealthy macaroni and cheese ( $M = 6.45$ ,  $SD = 1.50$ ) than when having healthy roasted vegetables ( $M = 7.01$ ,  $SD = 1.14$ ). However, there was no significant main effect for server ( $F(1, 170) = .24$ ,  $p > .6$ ), and no interaction between server and healthiness ( $F(1, 170) = 1.4$ ,  $p > .2$ ). This result is consistent with our theory—when people feel responsible for their consumption (as they do when they serve themselves), they should choose smaller portion sizes so that they can *maintain* positive self-evaluative feelings. This proposed process (as depicted in figure 2, panel B) is tested next.

*Tests for mediation.* We tested the two moderated mediation models, corresponding to figure 1, panels A and B respectively. First, we tested the basic model depicted in figure 2, panel A, in which portion choice is variable and up to the consumer. We tested whether feelings of responsibility mediate the effect of who serves (self versus other) on portion choice, and healthiness moderates the effect of who serves on feelings of responsibility. We submitted our data to a moderated mediation analysis employing Hayes' (2013) process macro, specifically testing a model in which path  $a$ , from independent variable to mediator, is moderated (model 7).

In line with our theory, a bootstrap analysis with 10,000 iterations testing the indirect

effect of server through feelings of responsibility on portion choice, conditional on healthiness, supported this hypothesis: At the level of unhealthy food, responsibility mediated the observed effect ( $b = -.29$ ,  $SE = .14$ ; 95% CI =  $-.66 - -.08$ ). In contrast, at the level of healthy food, responsibility did not mediate ( $b = -.03$ ,  $SE = .08$ ; 95% CI =  $-.22 - .10$ ). These results are consistent with H1, H2, and H3.

Next, we tested the model depicted in figure 2, panel B, in which portion choice must be either held constant or taken into account, because per our theory it covaries with who serves and the food's healthiness. That is, we tested whether feelings of responsibility mediate the effect of who serves (self versus other) on positive self-evaluative feelings, contingent on the change in portion choice induced by who serves. Note that there is no direct effect of server self-evaluative feelings, just as predicted by our model, which states that the (in)ability to reject responsibility for unhealthy eating causes people to adjust their portion choices in order *to maintain and keep equal* their positive evaluation. As such, we are testing an indirect-only effect (Zhao, Lynch, and Chen 2010). For an overview of mediation without a direct effect, or "indirect-only" effects, please refer to Hayes (2009), Zhao et al. (2010), or examples such as Lee et al. (2015), Spiller (2011), or Wilcox, Block, and Eisenstein (2011).

We conducted moderated mediation analysis as detailed before (model 7), but took into account portion choice by using it as a covariate on path *b*. In line with our theory, a bootstrap analysis with 10,000 iterations testing the indirect effect of server through feelings of responsibility on self-evaluative feelings, conditional on healthiness and using portion choice as a covariate, supported this hypothesis. In the case of unhealthy food, responsibility mediated the observed effect ( $b = .29$ ,  $SE = .10$ ; 95% CI =  $.13 - .52$ ). In contrast, for healthy food, responsibility did not mediate ( $b = .03$ ,  $SE = .07$ ; 95% CI =  $-.12 - .18$ ). These results are

consistent with H2 and H3.

## Discussion

Study 3 tested and provided comprehensive evidence for the full conceptual process model that we propose. Being served (versus serving oneself) unhealthy (versus healthy) food caused people to reject responsibility, leading them to choose larger portions but enabling them to hold a more positive self-evaluation. Indeed, mediation analysis established that it is due to the lowered sense of responsibility that people can allow themselves to choose larger portions of unhealthy foods, and doing so does not compromise their self-evaluation. As such, study 3 cogently supports the overall model suggested by our theory.

## **GENERAL DISCUSSION**

Consumers are increasingly eating food prepared and served to them by others (Harris Interactive 2012; Stewart et al. 2006). At the same time obesity is on the rise (Hill et al. 2003). Findings converge that eating out is associated with more extensive consumption and weight-gain (Bezerra et al. 2012; Todd et al. 2010) and the complex connection between eating out and obesity has been studied from a variety of angles. In this paper, we propose one additional factor of eating away from home that can contribute to obesity, but that has been neglected thus far: the mere circumstance of being served by another person rather than serving oneself.

Based on the literature on self-serving attributions we made the novel prediction that being served, through lower physical involvement in the process, enables people to attribute responsibility away from themselves. As a result, being served (versus serving themselves)

unhealthy food causes consumers to feel better about themselves. We predicted that anticipating these effects should lead consumers to adjust their consumption, including their (a) decision to consume or forego unhealthy foods and (b) portion size selection.

Five experimental studies provide support for this model. First, we demonstrated the predicted behavioral effects: people are indeed more likely to partake of unhealthy foods instead of forgoing them (pilot) and they also choose larger portions of unhealthy foods (studies 1A and 1B) when they are served (versus when they serve themselves). Next, we provided evidence for the hypothesized process: consumers reject responsibility while being served (versus serving themselves) a fixed portion of unhealthy food, and as a result they feel more positive self-evaluative feelings (study 2). Correspondingly, we showed that consumers' larger portion choices of unhealthy foods when the food is served to them (versus when they serve themselves) occur precisely because they can allow themselves larger portions without feeling any worse (study 3). Although these psychological mechanisms were measured in hypothetical studies the consistent pattern across studies, including the moderation by healthiness, provides strong process evidence. One limitation may be that in studies 2 and 3, people rated their sense of responsibility before their self-evaluative feelings, so it is not entirely clear to what degree the impact on self-evaluative feelings is spontaneous. However, the effect on portion choice did emerge spontaneously when people made their portion size choice without (studies 1A and 1B) or before (study 3) rating responsibility. This suggests that at least the ascription of responsibility and likely the impact on self-evaluative feelings occur extemporaneously.

Critically, these effects of being served on choice, attributed responsibility, and self-evaluative feelings arose independent of making a choice, emerging even when people choose food or portion size themselves. This research offers theoretical insight into consumers' eating

decisions and suggests a new and actionable tool to nudge consumers towards healthier eating.

The asymmetrical nature of the findings across healthy versus unhealthy food is also consistent with the self-serving attribution. People engage in more extensive causal reasoning for negative (compared to positive) events (see Alicke and Sedikides 2009; Bohner et al. 1988), so any motivated reasoning should be more pronounced for unhealthy than for healthy food. In addition, one might argue that claiming *just as much* responsibility for healthy eating when one is passively served as when one actively serves the food, is indeed a self-serving attribution.

In a recent review by Wansink and Chandon (2014), the authors argue that three major categories of factors influencing food consumption, namely sensory, emotional, and normative factors, operate chiefly by biasing our consumption monitoring. Further, it has been suggested that attention to amounts consumed is key to exerting self-control in eating (Redden and Haws 2013). Is serving oneself (versus being served) merely another way to enhance or reduce monitoring or attention? While it is possible that being served reduces people's attention to the precise amounts served, there is reason to believe that this is not the primary driver underlying our findings. For instance, in studies 1B and 3, all participants selected their portion size. They all exerted the same decision task in the same fashion and saw a description of the portion in ounces or an image, respectively. Thus, their level of monitoring at this decision stage was likely equivalent—yet one group chose larger portions. Further, if reduced monitoring was the primary driver (rather than motivated reasoning), perceived responsibility and portion sizes should be affected for unhealthy *and* healthy foods. This is not what we find. It is conceivable, however, that being served allows consumers to turn a blind eye and deliberately stop monitoring, ultimately contributing to their ability to reject responsibility. Future research from a cognitive angle could test if attention to portion size as well as to the amount consumed differs by server

*and* healthiness, using techniques such as eye-tracking to quantify any role of visual monitoring.

Relatedly, one limitation of our studies is that we focused on foods *perceived* to be (un)healthy, which is inherently subjective and may in itself be subject to motivated reasoning in certain situations. While we did not find who serves (self versus other) to impact healthiness perceptions in our studies, future research may seek to determine when consumers are more likely to “merely” change their subjective inferences of the food, versus when they are more likely to resort to other types of motivated reasoning (such as reattribution of responsibility or licensing). In the same vein, in our lab studies we used fairly modest portion sizes and it is possible that the sizes that are *perceived* to be “right” might vary more outside of the lab. We believe this makes for a stronger test of our hypothesis, but it is possible that larger portions outside of the lab are influenced by additional factors such as implicit theories linking unhealthy with tasty (Raghunathan et al. 2006) or healthy with less filling (Finkelstein and Fishbach 2011).

Our studies show that serving oneself unhealthy food leads to more negative self-evaluative feelings than being served, even if the food is identical. Further, consumers seem to anticipate this effect and adjust their consumption accordingly. What do these results mean for the consumer’s eating experience? How might this be implicated in the rise in obesity associated with the increase in eating out? First, if being served leads to larger portion sizes, it indirectly contributes to greater consumption, given that portion size is one of best predictors of intake (Diliberti et al. 2004; Rozin et al. 2003). Second, if being served affords individuals the motivated reasoning necessary to protect a positive self-view, then being served a lavish meal allows them to indulge in an eating experience without feeling bad about it. Avoiding negative self-evaluative feelings thanks to being served on one occasion may then afford unhealthy eating at the next consumption opportunity. In the long run, consumption of hedonically appealing but

less healthy foods (e.g., sauces, desserts) may be chronically reinforced more strongly through the being-served-experience than it would be through the serving-oneself-experience. Serving oneself, in contrast, may discourage unhealthy eating even long-term, given that retrospective regret can discourage subsequent purchases (Patrick, Lancellotti, and Hagtvedt 2009). Not least, to the extent that eating or health is an identity-relevant domain for a consumer, more positive self-evaluation in that specific domain may boost her global self-esteem (Crocker et al. 2003).

Therefore, integrating these notions suggests that for “vice” foods, ironically, serving oneself might not be in one’s self-interest in the present (causing negative affective outcomes), but might indeed serve the future self (paying off in health benefits). Of course, this suggests contrasting implications for restaurateurs and policy-makers. Hospitality providers may benefit from enabling consumers to savor consumption experiences more by serving all indulgent “vice” foods to the customers and discouraging self-service in any form. Public entities, however, may help combat over-indulgence and obesity by implementing serve-yourself pay-per-weight setups in unhealthy dining environments. Likewise, consumers may leverage these insights to nudge themselves toward healthier decisions. For example, making it a rule to formally serve oneself even from a so-called single-serve package may help consumers hold themselves accountable for, and in turn curb their portions of, even small snacks they consume during the day. Using family-style bowls so everyone can serve their own portion may aid in reducing portions as well.

Our research suggests many opportunities for future extensions. We focused on only one specific manner in which a consumer can be more or less agentic with respect to food consumption, namely who serves the food. However, another major manifestation of agency in food consumption is food preparation. Studies investigating the effect of preparing one’s own food could span a wide range: from actually cooking a whole dish from raw ingredients to



combining elements of a packaged mix. This important aspect of food consumption should certainly be studied in-depth. Further, our studies suggest that consumers have an intuition how certain consumption situations will make them feel. Lay intuitions can strongly impact consumer decisions, regardless of whether they are correct or rational (Raghunathan et al. 2006). If consumers possess a strong lay theory that being served by someone else will reduce their consumption guilt, they may actively seek out being served for unhealthy foods, or pay up for it.

Future studies may also consider boundary conditions to the “server effect” (self or other). For instance, when other situational factors assert or abdicate responsibility (e.g., social pressures to eat an offered food) the effect may weaken. Future research should explore these possibilities.

Our studies were limited to food consumption, but other research has demonstrated that consumers seek justification for vice-type consumption in many domains. For example, they use having expended effort to obtain a vice (Mukhopadhyay and Johar 2009; Kivetz and Simonson 2002) or having received a special promotion for it (Khan and Dhar 2010) to legitimize vice purchases. Our findings might extend to these and other domains involving vice–virtue conflicts, such as saving versus spending. For instance, consumers may feel equally responsible for automated versus actively authorized deposits into their savings account, but they may feel less responsible for automated versus actively made credit card payments. Future research might conceptualize “serving” more broadly and explore if the “server effect” (self or other) extends to other domains. Lastly, it may be instructive to examine the interplay of satisfaction with the *self* and satisfaction with the *product* in the consumption process. Might dissatisfaction with the self spill over to dissatisfaction with the product? These and other questions await future research.

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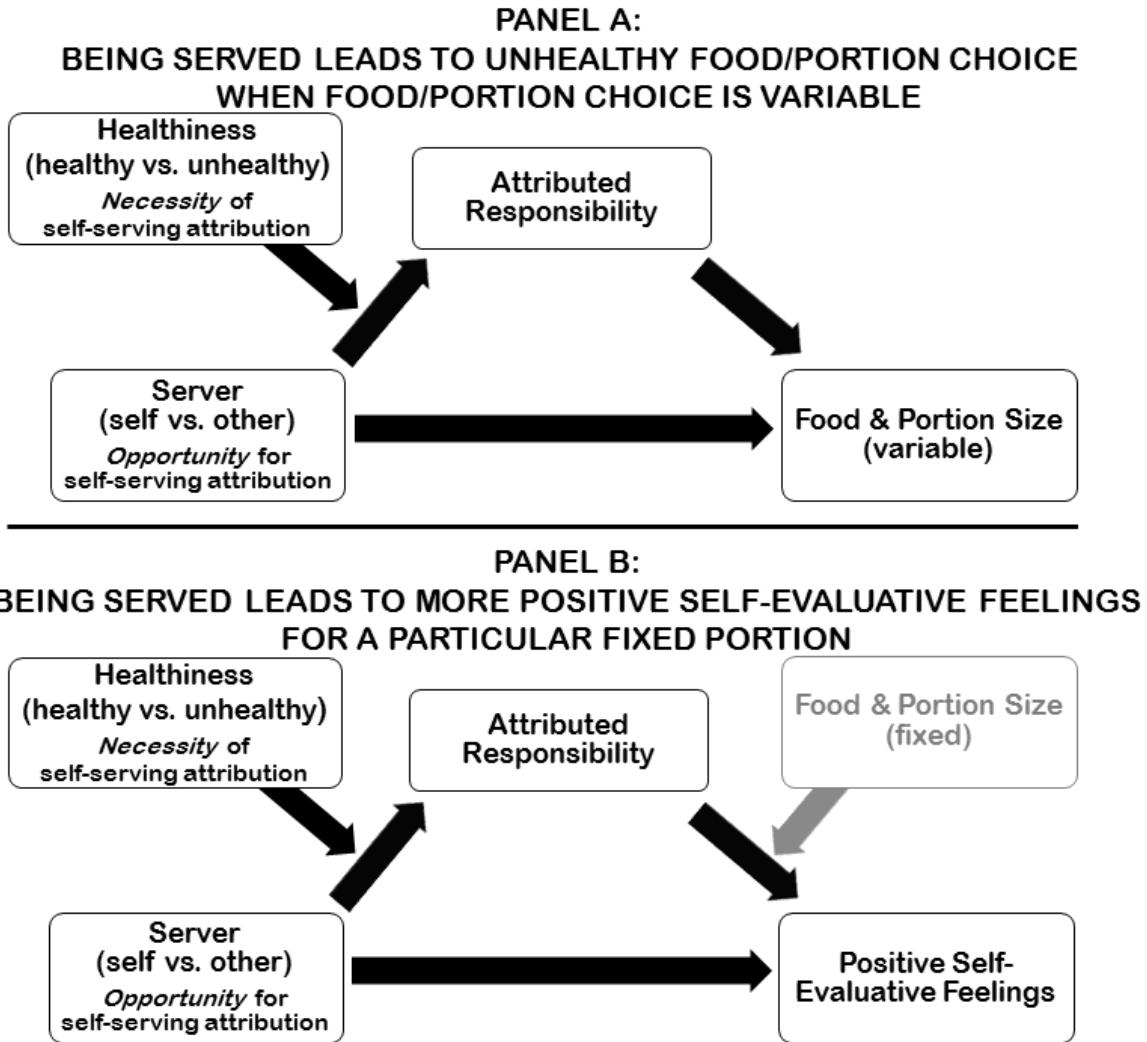
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**FIGURES**

**FIGURE 2:**

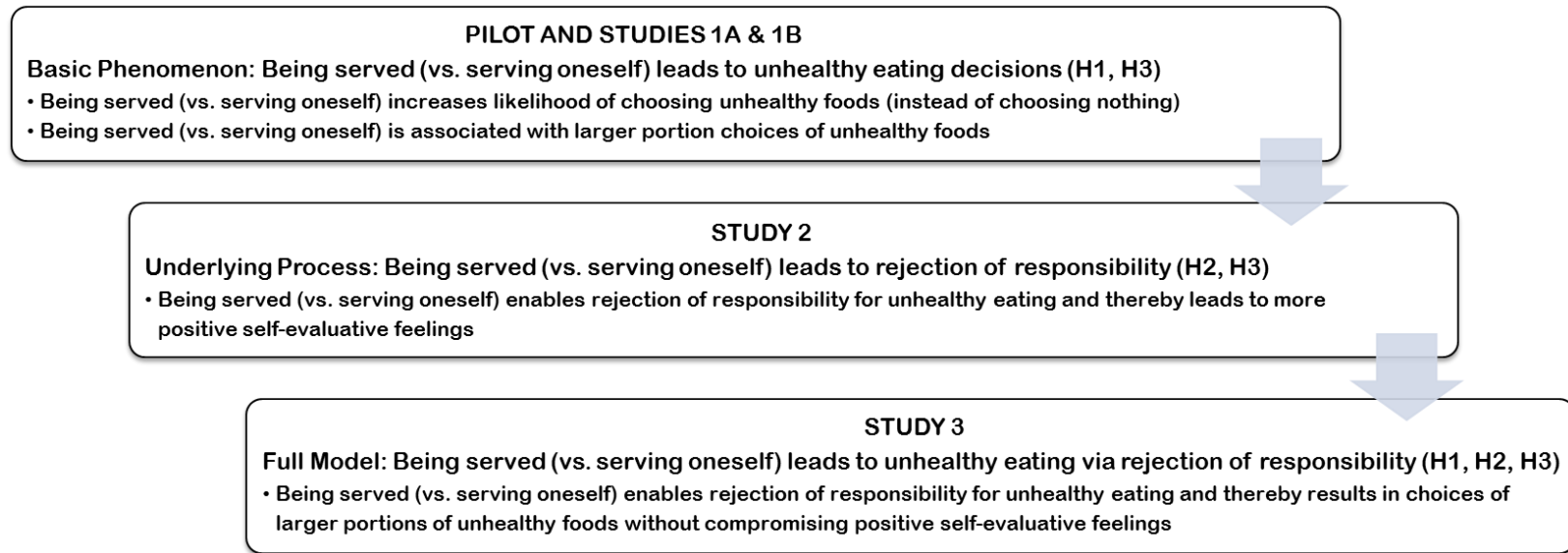
**CONCEPTUAL MODELS OF THE JOINT EFFECTS OF SERVER AND HEALTHINESS**



**Figure 2: Conceptual models of the joint effects of server and healthiness**



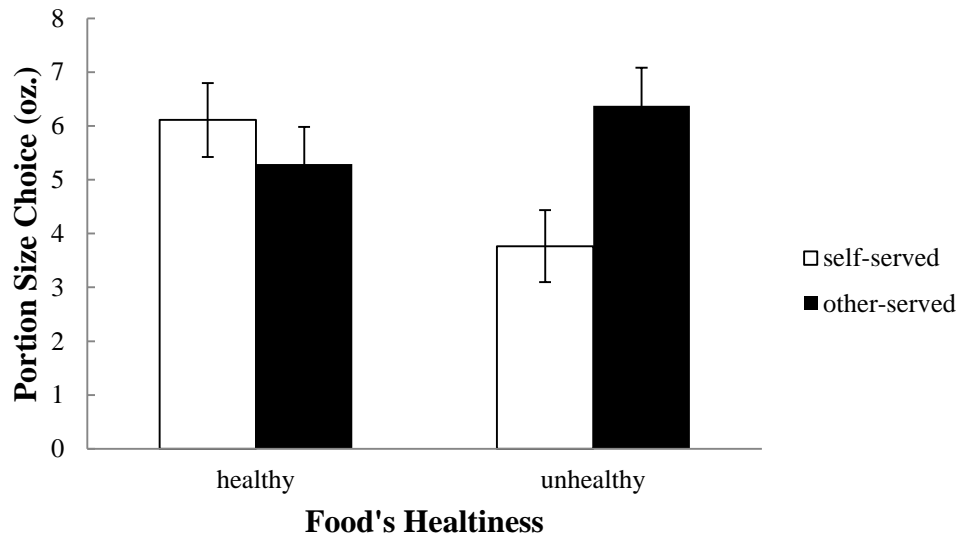
**FIGURE 3:**  
**FLOW CHART OF STUDIES**



**Figure 3: Flow chart of studies**

**FIGURE 4:**

**STUDY 1:  
BEING SERVED UNHEALTHY FOOD LEADS TO  
LARGER PORTION CHOICES**



**Figure 4: Portion choice as a function of both server and food's healthiness in study 1**

**FIGURE 5:  
IMAGES OF MEALS USED IN STUDY 2**



**Figure 5: Images of meals used in Study 2  
Note: Pictured are a plate of healthy (chicken, vegetables, wild rice) on the left;  
unhealthy food (cheeseburger, fries, cookie) on the right**

**FIGURE 6:**

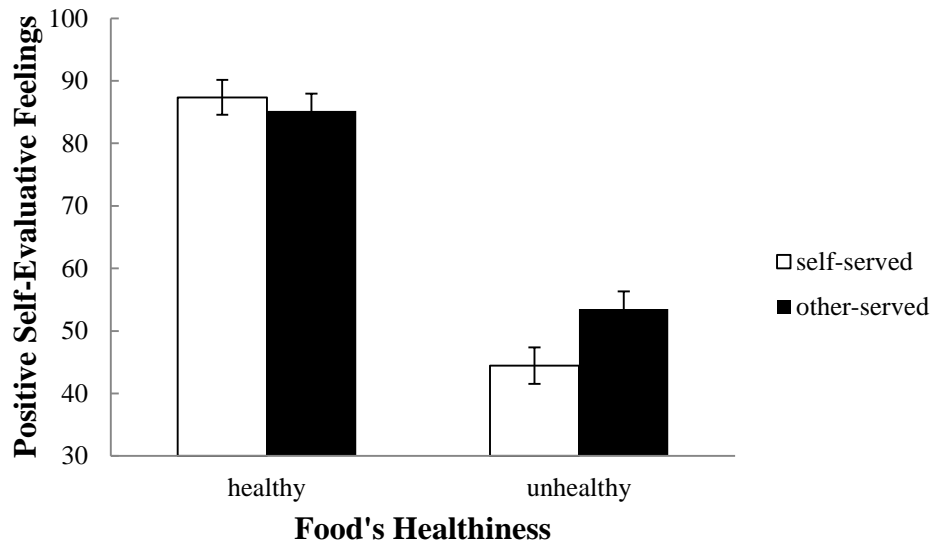
**STUDY 2:  
BEING SERVED UNHEALTHY FOOD CAUSES  
REJECTION OF RESPONSIBILITY**



**Figure 6: Perceived responsibility after eating as a function of both server and food's healthiness in study 2**

**FIGURE 7:**

**STUDY 2:  
SERVING ONESELF UNHEALTHY FOOD LEADS  
TO WORSE SELF-EVALUATIVE FEELINGS**



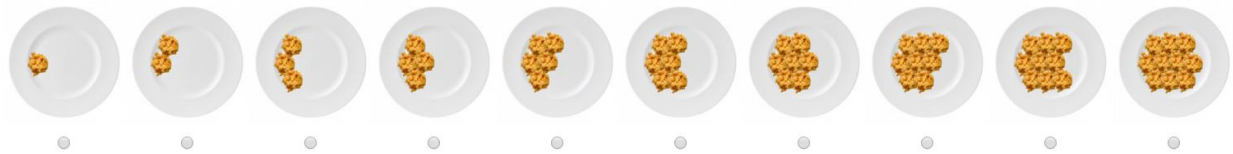
**Figure 7: Positive self-evaluative feelings after eating as a function of both server and food's healthiness in study 2**

**FIGURE 8:**

**FOOD IMAGES USED AS PART OF THE PORTION CHOICE MEASURE IN STUDY 3**

Think about how much macaroni and cheese you would you have the server serve you.

How much macaroni and cheese would you have the server scoop?

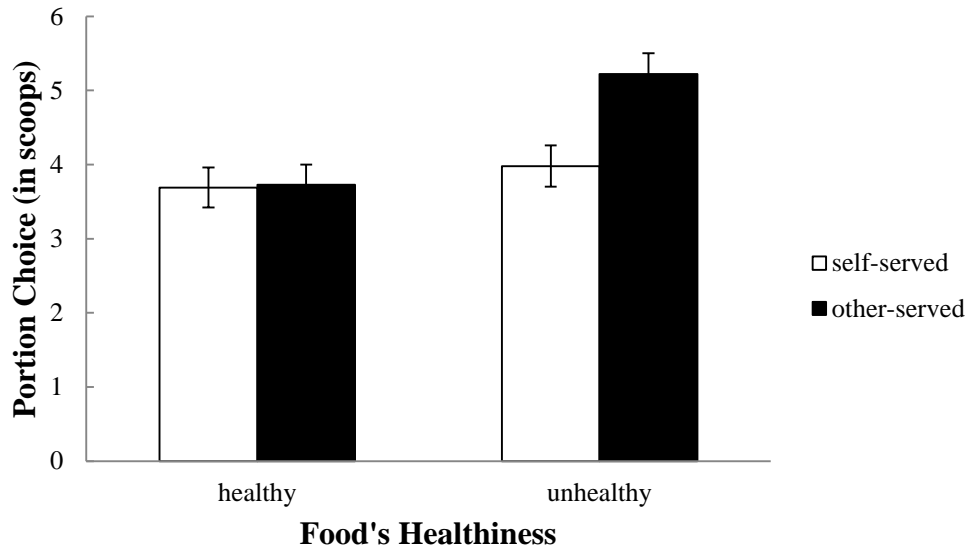


**Figure 8: Food images used as part of the portion choice measure in study 3**

**Note: Pictured is the unhealthy/other-served condition**

**FIGURE 9:**

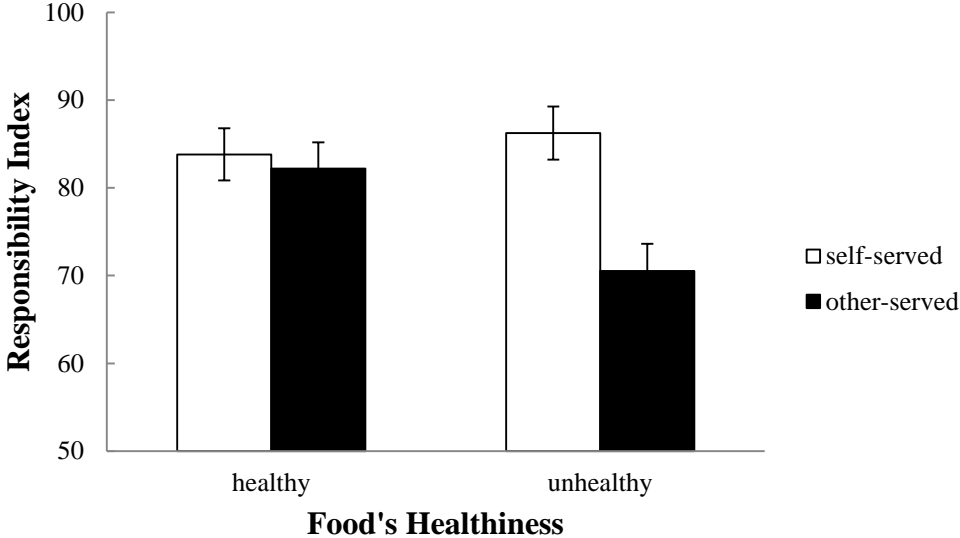
**STUDY 3:  
BEING SERVED UNHEALTHY FOOD LEADS TO  
LARGER PORTION CHOICES**



**Figure 9: Portion size choice as a function of both server and food's healthiness in study 3**

**FIGURE 10:**

**STUDY 3:  
BEING SERVED UNHEALTHY FOOD CAUSES  
REJECTION OF RESPONSIBILITY**



**Figure 10: Perceived responsibility after eating as a function of both server and food's healthiness in study 3**



**CHAPTER III:**  
**OUT OF PROPORTION? THE ROLE OF LEFTOVERS IN EATING-RELATED**  
**AFFECT AND BEHAVIOR<sup>5</sup>**

A slice of pizza, half a chicken wrap, a chunk of lasagna—food leftovers are commonplace, and have become more so. Average portion and package sizes have increased over time (Smiciklas-Wright et al. 2003). For instance, between 1977 and 1996, the average portion size of a cheeseburger grew by 23% (from 5.5oz to 6.8oz) and that of French fries by 35% (from 2.3oz to 3.1oz). Soft drink servings increased by 45% (from 10.8oz to 15.7oz) and salty snack portions by 63% (from .8oz to 1.3oz: Nielsen and Popkin 2003). While these increased portion sizes brought along increased consumption (for a review see Herman et al. 2015), the increase in consumption has not kept up with the increase in portion size: a recent meta-analysis found that when portion sizes are expanded by 100%, people eat only about 35% more (Zlatevska, Dubelaar, and Holden 2014). As such, consumers today tend to have greater proportions of their food left over.

In an environment of larger consumption and even larger leftovers, people leave a lot of food behind (20 pounds per person per month: Buzby and Hyman 2012), but they also gain weight. As of 2015, 63.5% of Americans are either obese or overweight (Center for Disease Control 2015). The proportion of obese individuals in the U.S. population nearly tripled between 1960 and 2006, from about 13% to about 35% (ibid. 2008). Obesity is a burden for individuals

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<sup>5</sup> This chapter is based on a paper in progress by Krishna and Hagen.

and society alike (Ogden et al. 2014), since it increases morbidity and mortality (World Health Organization 2014), reduces emotional and social wellbeing (Puhl and Heuer 2009), and results in direct and indirect economic costs projected to reach about a trillion dollars per year by 2030 (Trogon et al. 2009; Wang et al. 2008).

Accordingly, much research has investigated whether and how increased portion sizes may cause weight gain. Prior work has identified various mechanisms for how larger portion sizes can increase food consumption from a given portion and thereby contribute to obesity. For example, visual biases can lead people to underestimate the increased volume of foods and beverages (Chandon and Ordabayeva 2009): visual size estimations, following an inelastic power function, exhibit decreasing marginal sensitivity (Baird, Romer, and Stein 1970; Stevens 1986). In other words, as object size increases, the impact of size increase on size estimation diminishes. Further, inferences about norms can cause people to assume that whatever portion size is served is appropriate for them (Herman et al. 2015). Both these paths can lead people to eat more when given larger portions.

Clearly, eating more food is an important and intuitive cause of weight gain. But is it possible that having more *leftover* food also contributes to obesity? As mentioned before, when portion size increases, consumption increases to a much smaller degree, effectively leading to more food leftovers. In this paper, we examine whether merely having a large amount of food leftovers changes consumers' perception of how much they ate and consequently impacts subsequent eating and exercising behavior. To our knowledge, the influence of food leftovers on later consumption and compensatory behaviors has not yet been studied.

Theories of perception (Helmholtz 1866; Holland and Lockhead 1968; Braida et al. 1984; for a review see Stewart, Brown, and Chater 2005) and judgment and decision making (Hsee

1996, 1998; Laming 1984; Kahneman and Tversky 1979; Tversky and Kahneman 1991), in one way or another, suggest that people perform relative rather than absolute judgments. When two consumers have eaten the same absolute amount of food, but one has a larger amount of food leftovers, the proportion of food eaten relative to the size of the whole portion is smaller for this latter individual. This, in turn, may lead her to judge their consumption as less. As a result, she may eat more or exercise less afterwards.

In this paper, we address several questions. First, we investigate whether unconsumed food affects consumers' perception of how much they have eaten, independent of how much they have actually eaten. Second, we test whether these consumption perceptions influence consumers' cognitive evaluation of their consumption, but also their affective reactions to their own eating behavior. Third, we measure the motivational influence of these perceptions and affective experiences on subsequent eating and exercise behaviors. Finally, by holding the amount of food eaten constant and only varying the amount of leftovers, we also isolate any effects of leftovers from consumption—two variables that are typically confounded in food consumption studies.

As having leftovers after a meal is growing more common, it is important to understand their impact on consumer experiences and behaviors. Surprisingly, very little research has considered food leftovers at all—and the research that has focuses exclusively on antecedents of food leftovers and waste, such as over-serving (Wansink and van Ittersum 2013) or motivation to signal abundance (Porpino, Parente, and Wansink 2015) rather than their consequences. This paper is the first to assess downstream effects of leaving food on one's plate.

If larger amounts of food leftovers indeed reduce perceived consumption and consumers' motivation to compensate for their eating, this has public health implications. If larger amounts

of leftovers pose an additional mechanism for how growing portion sizes contribute to unhealthy behaviors, policy makers may want to work towards smaller portions sizes. Similarly, managers invested in their patrons' health may support healthy choices by offering their guests the option of having planned leftovers removed and packaged in to-go boxes immediately, to attenuate the underestimation of their own consumption.

In the following sections, we first review relevant prior work on the relationship between portion size and actual and perceived consumption. The pertinent findings in this domain can be grouped into two categories: visual (mis)perception of portion sizes and social-cognitive inference based on portion sizes. Next, we present the theoretical rationale that leads to our predictions. Then we present four experiments showing that, holding actual consumption equal, a greater amount of food leftovers leads people to perceive they ate less, feel better about their consumption, and, as a result, compensate less for their previous eating.

## **THEORETICAL BACKGROUND**

### Effects of Portion Size on Perceptions and Consumption

In light of the rampant spread of obesity, a stream of research has been devoted to the determinants of perceived (versus actual) amounts of food and the resulting perceived (versus actual) consumption. Work in this domain is typically either grounded in the sensation and perception literature or in the social cognition literature.

*Visual (mis)perception of portion sizes.* In many situations, consumers must visually assess a given amount of food or drink, because volume or weight information is not given.

Restaurants and bars, bulk purchases, and family-style dinners are just a few examples. Unfortunately, people systematically misperceive amounts. While estimations of smaller amounts are reasonably accurate, estimations of larger amounts are robustly incorrect—and specifically much smaller than the true amount (Chandon and Wansink 2007). The underlying reason for this underestimation of larger volumes is two-fold. First, perception research has long revealed that people rely primarily on one dimension when judging areas or volumes. This perceptual bias causes the perceived increase in area or volume to be smaller than the actual increase, ultimately leading to a growing underestimation of food amounts (Chandon and Ordabayeva 2009; Krider, Raghubir, and Krishna 2001; but see Cornil et al. 2014). One example of different dimensions receiving different weights in visual perception is the finding that container height impacts perceptions of amounts and consumption more strongly than container width does. Taller, skinnier containers are perceived as more voluminous than shorter, wider containers of objectively equal volume (Raghubir and Krishna 1999). This perception leads people to consume more from shorter, wider containers (Yang and Raghubir 2005), even when they are experienced and incentivized to pour correctly, as evidenced by a study of bartenders who reliably exhibited the bias (Wansink and van Ittersum 2003). To make the impact of this effect more concrete, doubling the actual volume of a product, be it a drinking glass, a medicine container, or a packaging carton, only leads to a 50% to 70% increase in perceived volume (Chandon and Ordabayeva 2009). Second, newer research indicates that people rely on the (incorrect) intuition that changes in dimensions cause changes in volume in an additive fashion, when in fact such changes in a multiplicative manner (Ordabayeva and Chandon 2013).

In addition to these general visual biases, standard optical illusions also distort consumers' size perceptions. For example, by way of generating size-contrast (Delboeuf)

illusions, a large plate size relative to a given food portion reduce the perceived amount and thus leads people to serve themselves a larger amount (van Ittersum and Wansink 2012; Wansink and van Ittersum 2013; Wansink, van Ittersum, and Painter 2006). A thin rim around the plate achieves the same effect (McClain et al. 2014). Clinical trials attest to the noteworthy success of plate size interventions, finding weight-loss in diabetics (Pedersen, Kang, and Kline 2007) and a reduction in self-served portions by up to one-third among obese children and adults (Robinson and Matheson 2015) after several weeks of using smaller and rimmed plates.

In sum, visual biases cause consumers to misperceive—and specifically underestimate—substantially the amount of food they are faced with, and this misperception only escalates as portions grow bigger. However, even if visual perception were accurate, visual cues emanating from the size of a portion of food would have the power to lead consumers astray. People do not simply take the portion size they see at face value; instead, they make inferences about their prospective, current, and past consumption based on the portion sizes at hand to help navigate their eating decisions.

*Social-cognitive inferences based on portion sizes.* Social cognition research has found that consumers use the food amounts presented to them to guide their consumption. Larger portions increase consumption primarily through changing inferences of appropriateness (for an excellent review see Herman et al. 2015). First, mere exposure to enlarged portion sizes increases the portion size consumers consider “normal” in general (Kerameas et al. 2015) as well as “ideal” for themselves (Robinson et al. 2016). Overall, once consumers face an actual enlarged portion in front of them, they are quick to accept them as the right size. For instance, studies show that when a restaurant serves portions enlarged by 50%, patrons rate them as

equally appropriate as the former smaller portions and simply eat more (Diliberti et al. 2004). Accordingly, when offered a set of ordinal portion sizes, diners persistently choose the same relative size (e.g., the medium option) even after the entire set has been shifted up drastically in size (Zuraikat et al. 2016).

As consumers begin to eat, enlarged portion sizes significantly increase consumption compared to smaller portions across adult and child populations (Fisher and Kral 2008; Kral and Rolls 2004; Rolls, Morris, and Roe 2002; Wansink, Painter, and North 2005; Wansink and van Ittersum 2013). In the same vein, a sub-stream of research has identified a “unit bias” (Geier, Rozin, and Doros 2006)—enlarged units of food within portions also increase consumption. Consumers tend to finish off any unit of food (such as a candy bar or a cookie) that they started to eat from. Thus, if each unit is larger, they end up eating more (Geier et al. 2006; van Kleef, Kavvouris, and van Trijp 2014).

Importantly, these effects of enlarged portion sizes on food intake are sustained over multiple days (Rolls, Roe, and Meengs 2006, 2007). Moreover, they remain robust even for foods that are not particularly delectable (Wansink and Kim 2005), when people cannot see the portion due to blindfolding (Burger, Fisher, and Johnson 2011), and after portion size education (Cavanagh et al. 2013) or mindfulness exercises (Marchiori and Papies 2014). Finally, after having consumed an enlarged portion, consumers do not report greater satiation (Wansink et al. 2005) and do not eat less later (Schusdziarra et al. 2011), which further highlights that enlarged portions are perceived as equally appropriate as smaller portions.

Although some have attributed these effects to the increase in bite size that is associated with larger portions (Burger et al. 2011; Fisher, Rolls, and Birch 2003), research converges that portion size effects operate chiefly through setting consumption norms. Consumers infer that the

portion presented to them is appropriate and they anchor on this assumed-to-be normative size. Adjustments away from this anchor may be made (for example, based on hunger), but still, the higher the anchor, the greater the intake (Marchiori, Papiés, and Klein 2014; see also McFerran et al. 2010).

In the same vein, larger package or container sizes lead to larger prospective consumption estimates (Hieke et al. 2016) and larger actual consumption (Rolls et al. 2004; Wansink and Cheney 2005). Note that some work has found that small packages may increase consumption. However, these studies focused on particularly small packages (“snack packs”) that are believed to aid in portion control (do Vale, Pieters, and Zeelenberg 2008), or found this reverse effect only for dieters who believed the small packs served as portion control (Scott et al. 2008).

While portion and package or container size effects emerge analogously and likely share similar roots, it is important to keep in mind that they occur independent of each other. Larger containers lead to increased consumption even when the amount of food inside the container is held constant (Marchiori, Waroquier, and Klein 2011), and conversely, larger portions lead to greater consumption even when the size of the container size is held constant (Marchiori, Corneille, and Klein 2012).

On the whole, social-cognitive inferences about appropriateness cause consumers to rely heavily on the portion size offered to guide their consumption. This inference effect is robust to even gross enlargements in portion sizes, and in today’s environment of growing portion size (Nielsen and Popkin 2003) it reliably leads consumers to overeat.

In sum, research overwhelmingly shows that consumers do not simply comprehend the “true” portion of food in front of them by the absolute amount present. Be it because of visual biases that lead to portion size misperception or by way of inferences that alter assumptions



about portion size appropriateness, consumers' sense of food portions is distorted in multiple ways, impacting their eating decisions every step of the way.

### The Dynamic Interplay of Portion Perceptions and Consumption

What has curiously been unstudied is the dynamic interplay of food portions and eating, namely, food leftovers. In the process of consuming food, naturally, the more a person eats from the original portion, the less is leftover. Is it possible that both how much a person has consumed and how much she has leftover impact her perception of her food consumption and downstream behaviors? This previously unacknowledged question is an important one to answer. As mentioned before, portion sizes keep growing (Nestle 2002; Nielsen and Popkin 2003; Smiciklas-Wright et al. 2003). Although people eat more from larger portions (see Herman et al. 2015), the fact that portion-size-induced increases in consumption have been found to be but a fraction of the portion-size-increases themselves (Zlatevska et al. 2014) means that consumers are often confronted with food leftovers. Critically, for any given amount of actual consumption it is the case that the larger the original portion size was, the larger the amount of food leftovers will be. To illustrate, when a diner presented with a two-scoop ice cream sundae eats one scoop, she has half of the dessert left. In contrast, when another diner, who is presented with a three-scoop sundae, eats one scoop, she has two thirds left. Might these two diners feel different? And if they do, how will it impact their subsequent eating-related decisions and behavior?

Examining this unexplored aspect of food consumption provides timely insights, given that serving sizes and food leftovers are growing, as are people's waistlines. Understanding the role of food leftovers in the processes that contribute to obesity—that is, overeating and under-

compensating—is critical to developing interventions. Therefore, in this research, we propose and test a novel framework for the affective, motivational, and behavioral consequences of having larger amounts of food leftover, given equal actual consumption. Specifically, we investigate whether, after equal actual food consumption, having a greater amount of food leftovers from one’s portion reduces consumers’ perceived consumption, enhances their eating-related self-evaluation, and in turn allows them to slack off on healthy behaviors later on (see figure 11).

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Insert figure 11 about here

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In the following sections, we first detail the theoretical rationale for our prediction that larger amounts of food leftovers may reduce perceived consumption. Then we elucidate in what ways such reduced consumption may boost consumers’ self-evaluative feelings and argue why this may eventually dampen their future efforts to compensate for their food consumption. Lastly, we give a brief overview of the empirical test of our hypotheses before presenting four experiments in support of the proposed framework.

### Relativity of “Absolute” Judgments

The reason to predict that a larger proportion of leftovers cause people to perceive they consumed less lies in their general propensity to make relative, rather than absolute judgments. Ever since Helmholtz (1866) posited that visual perceptions are generated from current sensory input compared to knowledge from the past, researchers studying perceptions and judgments agree that evaluations of stimuli of all kinds are fundamentally relative. Early findings indicated that evaluations of stimuli as ‘heavy’ or ‘light’ weights (Wever and Zener 1928) or ‘high’ or

‘low’ auditory pitch (Truman and Wever 1928) are shifted depending on the range of stimuli. Similarly, in sequential estimations of loudness, perceptions are affected by immediately (Garner 1953) and distantly preceding stimuli (Holland and Lockhead 1968). Add to that the influence of context and memory (Lockhead 2004) and it is clear that absolute judgments are by no means absolute. Tying together many of these findings on a broader level, much theoretical work has argued that wholistic judgments—that is, evaluations that integrate across attributes, subcomponents, and context—come first in human judgment, before any analytical judgments of distinct elements. Thus, many agree that perceptions are integrative in nature and fundamentally influenced by surrounding stimuli (for a review see Kimchi 1992).

Not only in the sensory domain are evaluations of target stimuli dependent on surrounding stimuli from that category, but also across various other judgment domains. Gains and losses are evaluated relative to a salient reference point. Such relative judgments occur when the target is substantial, for instance, monetary gains and losses are evaluated against the current financial status (Kahneman and Tversky 1979; Tversky and Kahneman 1991). Prices are judged in comparison to both external reference prices (i.e., prices available in the vicinity) and internal reference prices (i.e., prices available in memory, Bolton, Warlop, and Alba 2003; Mayhew and Winer 1992), and price promotions are gauged by the percentage reduction from the original price (Heath, Chatterjee, and France 1995). However, relative evaluations are also made when the target is conceptual. Attribute levels, for instance, are endowed with meaning primarily by comparison to the other available levels (Hardie, Johnson, and Fader 1993; Prelec, Wernerfelt, and Zettelmeyer 1997), and quality judgments are heavily influenced by how realized quality compares to expected quality (Gneezy, Gneezy, and Lauga 2014). Not least, consumers’ judgments of their own skills as they pertain to product usage, rely on intuitions of their relative

standing compared to other consumers (Burson 2007; Moorman et al. 2004).

Goal progress, too, is judged in relative terms. That is, the proportion of the start-to-goal distance that has been completed shapes people's evaluation of improvement more than the absolute change that has been achieved (Fishbach and Dhar 2005). Such a heightened sense of (relative) progress has been shown to significantly increase consumers' motivation, as manifested in performance and purchase acceleration as they near performance or purchase goals (Kivetz, Urminsky, and Zheng 2006).

Given that sensations, perceptions, and judgments are so inherently relative, it is likely that people judge their food consumption in relative terms. One salient standard to gauge how much one has eaten may be one's whole portion. That is, people may evaluate their consumption in terms of the proportion of a given portion they have eaten. If that is the case, they may perceive the same amount of actual consumption as less—relative to the whole portion—when they face a larger (versus smaller) amount of food leftovers. Thus, we first predict that:

**H1:** Holding absolute consumption constant, a larger amount of food leftovers from the whole portion leads to lower perceived consumption.

However, there is reason to believe that the impact of having a larger (versus smaller) amount of food leftovers goes far beyond this cognitive evaluation of how much one has consumed. Rather, perceiving they consumed less likely influences consumers' affective reaction to their consumption and, as a result, their motivational responses.

### Affective and Motivational Consequences of Eating

“We must have pie. Stress cannot exist in the presence of a pie,” writes David Mamet (1999, print 2003) in his play *Boston Marriage*. Charming as it sounds, for most people foods

like pie do not do any good with respect to solving problems. Quite the contrary, many consumers find themselves emotionally conflicted about their eating decisions. The tradeoff between pleasure from delicious taste and distress stemming from health- or weight-concerns is inherent in many eating decision, especially those regarding quintessentially unhealthy indulgences. Much research has found that people react affectively to their own food consumption, and there is reason to believe that these affective responses in turn have the power to impact consumers' downstream motivation and effort regarding eating-related goals.

*Eating and affect.* For many people eating is an emotion- and conflict-laden domain. The majority of consumers hold healthy eating goals (Bublitz, Peracchio, and Block 2010), and many feel ambivalent (Rozin, Bauer, and Catanese 2003) or guilty for unhealthy eating (Ramanathan and Williams 2007). Indeed, when faced with tempting food options, many consumers actively try to resist the urge to consume (Vohs and Heatherton 2000). Joint presentation of healthy and unhealthy options may especially heighten the anticipated guilt for choosing an unhealthy item, which decreases consumers' likelihood of choosing it (Okada 2005).

Conversely, when consumers do over-indulge they often reason away their over- or unhealthy consumption in order to feel better about themselves. For example, consumers are inclined to believe portion size labels that suggest that a portion is smaller (Aydinoğlu and Krishna 2011) and accept food labels that suggest that a food is healthier (e.g., pasta salad versus pasta special: Irmak, Vallen, and Robinson 2011). People also use being served by someone else as an opportunity to deny responsibility for unhealthy eating, which helps them preserve positive self-evaluative feelings (Hagen, Krishna, and McFerran, conditionally accepted). In a similar vein, consumers are more likely to indulge in a chocolate cake when they have a license to do so, such as having expended effort (Kivetz and Zheng 2006) or having exerted restraint previously

(Mukhopadhyay and Johar 2009), presumably because such licenses avert feeling guilty. Remarkably, people even mentally exaggerate the gravity of forgone transgressions (Effron, Monin, and Miller 2013). Indeed, focusing on downward counterfactuals and considering how much worse things could have gone boosts people's positive feelings about themselves (White and Lehmann 2005) and can reduce their motivation (McMullen and Markman 2000).

Taken together, many consumers strive to eat healthy, experience negative affect when they eat unhealthy, and employ motivated reasoning strategies to prevent negative affect associated with unhealthy eating. Here, we propose that when consumers perceive that they left a larger (versus smaller) amount of food uneaten and feel they consumed less, they may perceive that they successfully abided by their healthy eating goal (or, successfully avoided overeating). Correspondingly, they should experience less negative affect, especially less negative self-evaluative feelings. In addition, by way of making salient how much more a consumer could have eaten (but did not), larger (versus smaller) amounts of leftovers may also foster downward counterfactuals and lead to less negative self-evaluative feelings. Accordingly, we predict that:

**H2:** Holding absolute consumption constant, for unhealthy foods, a larger (versus smaller) amount of food leftovers bolsters self-evaluative feelings.

In one sense, then, larger portions and the associated larger leftovers could be viewed as advantageous to consumers. However, while more positive self-evaluative feelings may be desirable in the short-term, research indicates that they can cause people to slack off on beneficial behaviors, such a goal pursuit activities, which may hurt them in the long-term.

*Achievements, affect, and motivation.* By definition, people want to achieve progress towards their goals, such as eating healthy or losing weight. Doing so typically makes them feel

good. On the one hand, some work has found that goal progress can increase motivation and effort towards said goal. For example, customers who receive a restaurant shop loyalty card with eight stamps left to go until a complimentary purchase complete those remaining eight purchases faster when they have been endowed with two stamps (in addition to the eight left to go) than when they have not received any prior stamps and merely have eight stamps left to go (Nunes and Drèze 2006; Kivetz et al. 2006). This positive effect of goal progress on effort has been attributed to higher inferred goal commitment (Zhang and Huang 2010).

On the other hand, it has been argued that progress, and specifically feeling good about one's current progress or standing in a given domain, may lead to "coasting"—feeling that everything is going well and thus reducing effort towards it (Carver 2003; Fröber and Dreisbach 2014). In line with this idea is the finding that high positive affect at work reduces proactive behaviors, such as suggesting routes to improvement or attempting to address potential problems before they arise (Lam, Spreitzer, and Fritz 2014). Having made progress towards a goal, such as winning a sports competition, may also dampen people's subsequent effort by way of reducing the exigence to achieve during future success (Mizuchi 1991). In fact, even observing someone else make goal progress can undermine people's own goal efforts (Tobin et al. 2015).

In turn, feeling bad about not meeting a goal in a given domain can spur motivation. Guilt predicts motivation to repair one's shortcoming; shame predicts motivation to change the self overall (Lickel 2014). For example, feeling guilty for having acted in prejudiced ways leads people to strive harder for unprejudiced responses later (Amodio, Devine, and Harmon-Jones 2007), and people who feel guilty after failing to cooperate in social bargaining games are more likely to cooperate in subsequent games (Ketelaar and Au 2003). New research indicates that this remedy drive of guilt can even spill over into other domains, too, causing consumers to seek out

products for self-improvement in unrelated areas (Allard and White 2015).

At first glance, the findings cited above appear inconclusive at best, contradictory at worst. However, taking a closer look at the type of tasks utilized in these different studies may resolve the contradictory findings of these two streams of research. Notably, studies that found goal progress to increase effort typically used contexts in which the effort required to achieve the goal is intrinsically desirable, because each step towards the goal is in fact an instantiation of the goal itself. Case in point: people working towards the goal of earning one additional free coffee (Kivetz et al. 2006), car wash (Nunes and Drèze 2006), falafel sandwich, or music purchase (Zhang and Huang 2010) based on their previous purchases of these products presumably enjoy drinking coffee, having their car cleaned, eating falafel, and rating music. While perhaps at a different rate, they would likely make these additional purchases anyway. As such, in these types of studies, goal effort can hardly be understood as burdensome.

In contrast, studies that found goal progress to decrease motivation and effort typically looked at domains where goal effort is less intrinsically desirable. For instance, exerting physical energy to win a basketball game is exhausting (Mizuchi 1991), completing discrimination tasks for a reward is boring (Fröber and Dreisbach 2014), and helping unknown others on a meaningless task to fulfill one's goal of being a prosocial individual is at least costly in terms of time (Amodio et al. 2007). In other words, in these contexts, goal effort is more burdensome. As a result, goal progress may elicit the sense that some degree of relief from the burdensome goal effort is necessary and has been earned, leading to coasting.

Focal to this paper, in the domain of food consumption goal effort is likely viewed as burdensome. Healthy eating often means forgoing some particularly tasty options (Raghunathan et al. 2006), and exercising is not exactly fun for many consumers. For that reason, we expect



that perceived achievements in the eating domain and resulting positive self-evaluative feelings will decrease motivation and effort (rather than increase them). Specifically, we predict that:

**H3:** Holding absolute consumption constant, a larger (versus smaller) amount of food leftovers reduces subsequent compensation behavior by way of reducing perceived consumption and bolstering self-evaluative feelings (H3).

## Overview of Studies

In summary, given that much of people's perception is relative rather than absolute, we propose that, merely having a larger (versus smaller) amount of food leftovers will cause people to feel they ate less. What is more, we predict that this lower perceived consumption causes them to feel better about themselves, which in turn reduces their motivation to compensate for their consumption. Four experiments provide evidence supporting these predictions. First, study 1 establishes the basic premise that larger (versus smaller) amounts of food leftovers cause people to feel they ate less despite equal actual consumption. Next, studies 2A and 2B replicate this effect of leftovers on perceived consumption and demonstrate that larger (versus smaller) leftovers impact people's compensatory behaviors: larger (versus smaller) leftovers lead to a greater consumption later on (study 2A) as well as less exercise effort in a subsequent task (study 2B). Lastly, study 3 reveals that this negative effect of larger (versus smaller) leftovers on consumers' effort to compensate is mediated by a sequence of lower perceived consumption and resulting enhanced self-evaluative feelings.

## **STUDY 1: CHOCOLATE LEFTOVERS AND PERCEIVED CONSUMPTION**

Study 1 tests whether having left a larger (versus smaller) amount of food leftovers leads consumers to feel they ate less (H1).

## Method and Procedure

Forty-six community members recruited at a large Midwestern university (47.3% women) volunteered to participate in the study. The average age in the sample was 20.65 years (range: 18 to 30 years). Participants were approached on campus and were randomly assigned to a one-factor 2-cell (amount of leftovers: smaller vs. larger) between-subjects design.

Under the cover of a study on health and energy all participants were presented with a whole bar of chocolate and told that they would “have a chance to taste some of this chocolate and rate a few questions about [their] consumption experience.” The whole chocolate bar was presented to them on its foil wrapper; the paper cover was removed beforehand to disguise the chocolate’s brand name and prevent any impact of prior experiences or associations with the brand on the current reaction. Once an individual agreed to participate in the study, the research assistant cut off a part of the whole chocolate bar and instructed the participant to eat this amount of chocolate for the purpose of the study.

In order to hold the actual amount of chocolate consumed constant, all participants were asked to eat six (6) squares of chocolate. However, we manipulated leftovers by using a chocolate bar that is produced in two different sizes, varying only in the number of squares per bar (Chocolove regular versus mini bars). Thus, while everyone ate six (6) squares, people in the small leftovers condition ate from an eight-square bar and thus had two (2) squares leftover, whereas people in the large leftovers condition ate from an 18-square bar and had 12 squares leftover (see figure 12).

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Insert figure 12 about here

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The remainder of the chocolate bar was left in front of each participant as he or she ate the designated six squares of chocolate. Subsequently, participants indicated their perceived consumption by rating on a 1–9 scale “How much chocolate do you feel you consumed? Please rate the absolute amount you feel you consumed” (1 = *very little* to 9 = *very much*).

## Results and Discussion

We conducted a one-way ANOVA on our dependent variable, perceived consumption, with proportion left as the independent variable. The analysis revealed a significant effect of the amount of leftovers on perceived consumption ( $F(1, 44) = 5.63, p < .05$ ), such that people who ate six squares but had a larger amount leftover ( $M = 5.83, SD = 1.00$ ) perceived they had consumed less than those who ate six squares but had a smaller amount leftover ( $M = 6.77, SD = 1.63$ ). This result supports the hypothesis that a larger (versus smaller) amount of food leftovers cause people to feel they ate less (H1).

### **STUDY 2A: COOKIE LEFTOVERS AND SUBSEQUENT EATING**

Study 2A replicates study 1’s finding that having a larger (versus smaller) amount of food leftovers leads consumers to feel they ate less (H1), and also examines whether a larger (versus smaller) amount of leftovers reduces their eating-related compensatory behaviors (H3). Specifically, we test whether having a larger (versus smaller) amount of food leftovers leads to greater consumption at the next eating occasion.

## Method and Procedure

One hundred and six participants were recruited from the paid subject pool at a large Midwestern university (69.8% women) for payment of \$4. The average age in the sample was 25.9 years (range: 18 to 47 years). Participants completed the study in private computer cubicles and were randomly assigned to a one-factor 2-cell (amount of leftovers: smaller vs. larger) between-subjects design.

Under the guise of a taste test, all participants were presented with a chocolate chip cookie and asked to eat a designated section of this cookie that was cut out and marked by an arrow. The cookie was presented on a white paper plate that had been placed in each participant's cubicle before the beginning of the session and covered with another paper plate as a lid. All packaging was removed beforehand to disguise the cookie's brand name and prevent any impact of prior experiences or associations with the brand on the current reaction.

Critically, we manipulated cookie size so that the section to be eaten was approximately equal across groups, but the amount of cookie leftovers was different between groups. To achieve this difference in leftovers we used two differently sized cookies: a smaller cookie for the smaller leftovers condition and a larger cookie for the larger leftovers condition. Critically, the two cookie sizes were matched in such a way that asking people to eat 75% of the smaller cookie or 25% of a larger cookie for tasting would result in the same amount of actual consumption, but at the same time naturally would cause people who ate this amount from the smaller cookie to have a smaller amount leftover (only 25%) and people who ate from the larger cookie to have a larger amount leftover (75% of their cookie, see figure 13). While we could have chosen any two proportions of the two different cookies matched in size, we specifically

selected 25% and 75% in order to keep the angles of the cuts and the shapes of the wedges identical across conditions.

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Insert figure 13 about here

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Note that the cookie diameters were selected to account for the decreasing marginal sensitivity in size perception mentioned previously (Stevens 1986) to ensure visual equality of the 75% and 25% wedges. We corrected for this bias using the widely established rule that  $\text{Perceived Size} = \text{Actual Size}^e$ , with  $e$  being .8 (for a discussion see Krider et al. 2001). That is, the actual size of the larger cookie had to be somewhat increased in order to make up for the fact that the human eye perceives increases in size at a slightly smaller-than-actual rate. Note also that this adjustment helps us achieve visual equality of the wedges, but causes a slight difference in their actual areas. Specifically, the actual area consumed was slightly smaller in the smaller leftovers condition (area eaten:  $2.99\text{in}^2$ ) compared to the larger leftover condition (area eaten:  $3.98\text{in}^2$ ). Recall that we predict that people in the smaller leftovers condition will perceive *greater* consumption and therefore eat *less* at a subsequent occasion, so this adjustment works against our prediction and makes for a more conservative hypothesis test. (That said, in an earlier version of this manipulation we did not make this adjustment for decreasing marginal sensitivity in size perception and the results are robust. The data from this study are available from the authors upon request.)

Participants learned that they were receiving the whole cookie to accurately judge its appearance, but that they should only eat the designated section. They read:

Please go ahead and eat the part of the cookie marked with an arrow. Please take enough time to experience the taste, scent, and texture as you eat the cookie. When you are done, proceed to the next page to complete the product evaluation questions.

The instructions also highlighted that they would have to leave any remaining food in the

laboratory after the session and could not take any part of the cookie with them.

## Measures

*Perceived consumption.* After eating the designated section of the chocolate chip cookie, participants completed mock taste questions. Embedded in these questions was the first variable of interest: perceived consumption. As in study 1, participants indicated perceived consumption by rating on a 1–9 scale “How much cookie do you feel you consumed? Please rate the absolute amount you feel you consumed” (1 = *very little* to 9 = *very much*). At the end of this set of questions, people received the message that the first study had concluded, but if they wanted, they could participate in another short, entirely optional cookie evaluation to measure the second variable of interest: consumption at the next eating occasion.

*Subsequent consumption.* For the optional alleged second study, people were instructed to open a wax paper bag filled with mini cookies and asked to sample as many or as few as they liked and rate them on various dimensions. All bags initially contained 10 cookies and we derived subsequent consumption from the number of cookies remaining in each bag after the session.

## Results and Discussion

Sixteen participants did not follow instructions and ate either more or less than the marked section of the cookie. One person with a disability participated with the help of an aide, and one person indicated she never received the instructions regarding the second optional study.

These individuals were dropped from the analysis, leaving 88 data points for the hypothesis tests.

*Perceived consumption.* The analysis revealed a significant effect of the amount of leftovers on perceived consumption ( $F(1, 86) = 5.28, p < .05$ ), such that people who had larger leftovers ( $M = 4.00, SD = 1.89$ ) rated their consumption as lower than people who had smaller leftovers ( $M = 5.00, SD = 2.17$ ). Again, this supports H1.

*Subsequent consumption.* A Kolmogorov-Smirnov test for normality indicated that the distribution of cookies eaten in the second task was highly skewed in both conditions ( $D_{\text{large}} = .16, p < .01$ ;  $D_{\text{small}} = .20, p < .001$ ), violating the assumptions of standard parametric tests. We thus present a variety of statistical analyses appropriate for this type of data pattern.

First, we conducted a log-linear (or Poisson) regression, the standard analytical approach for count data, which cannot be expected to be normally distributed, and especially for data with a high proportion of zeros, such as ours (Greene 2011). Smaller leftovers were coded as 0 and larger leftovers as 1. This analysis revealed that the amount of leftovers had a significant effect on the number of cookies eaten during the second study ( $b = .36, \text{Wald-}\chi^2 = 8.64, p < .01$ ). Specifically, people with larger leftovers ate more cookies during the alleged second study ( $M = 3.74, SD = 3.06$ ) than people with smaller leftovers ( $M = 2.62, SD = 2.75$ ).

Next, an analysis of the raw data using the Mann-Whitney U test—another non-parametric test examining whether two distributions are different from each other—also revealed a significant effect of the amount of leftovers on subsequent consumption ( $U = 736.00, Z = -1.95; p = .051$ ). Specifically, people with larger leftovers ate more cookies during the alleged second study ( $M = 3.74, SD = 3.06$ ) than people with smaller leftovers ( $M = 2.62, SD = 2.75$ ).

Lastly, after transforming the data to better approximate a normal distribution and conform to the assumptions of parametric tests, a oneway ANOVA once more revealed a significant effect of the amount of leftovers on subsequent consumption (log-transformed DV:  $F(1, 86) = 4.11, p < .05$ ; square root-transformed DV:  $F(1, 86) = 4.17, p < .05$ ). These robust results across three types of analyses strongly support H3.

*Test for mediation.* We tested a mediation model with an indirect effect of the amount of leftovers on subsequent consumption through perceived consumption. A bootstrap analysis using Hayes' (2013) process macro (model 4) indicated that the amount of leftovers did not exert a significant indirect effect on subsequent consumption through perceived consumption ( $B = -.01, SE = .04$ ), as the confidence interval for the effect included zero (95% CI =  $-.12 - .06$ ).

At first glance, this result does not seem to directly support H3. However, firstly, we theorize that a positive (versus negative) affective reaction to low perceived (versus high perceived) consumption is critical to motivating compensatory behaviors. That is, we propose a serial mediation model. In such serial mediation models, it is statistically possible (and in our case theoretically predicted) that one or both of the specific indirect effects (i.e.,  $X \rightarrow M_1 \rightarrow Y$  or  $X \rightarrow M_2 \rightarrow Y$ ) *alone* are not significant, but only the *serial* indirect effect (i.e.,  $X \rightarrow M_1 \rightarrow M_2 \rightarrow Y$ ) is significant (see Hayes 2013, chapter 5). As such, based on our theory, we do not necessarily predict perceived consumption alone to mediate the effect of leftovers on subsequent consumption. Instead, we predict that negative self-evaluative feelings are a necessary intermediate step responsible for motivating behavior.

Secondly, as noted earlier, our dependent variable, cookie count, was heavily skewed (even the transformations do not achieve perfect normality) and exhibited a large variance



(around or above the mean), whereas the mediator was normally distributed and exhibited a much smaller variance. This may make it more difficult to detect a mediation relationship.

In sum, these data show that having a larger (versus smaller) amount of food leftovers causes people to feel they consumed less food (despite having eaten a slightly larger objective amount), and also causes them to eat more at a subsequent eating opportunity. In other words, larger (versus smaller) leftovers reduce consumers' compensatory eating behavior.

## **STUDY 2B: COOKIE LEFTOVERS AND SUBSEQUENT EXERCISE**

Study 2B replicates study 2A but focuses on a different type of compensatory behavior, testing whether having a larger (versus smaller) amount of food leftovers leads to decreased exercising effort.

### Method and Procedure

One hundred and thirty-three participants were recruited from the subject pool at a large Midwestern university (58.6% women) participated for partial course credit. The average age in the sample was 20.4 years (range: 19 to 31 years). Participants were run individually and were randomly assigned to a one-factor 2-cell (amount of leftovers: smaller vs. larger). We used exactly the same leftovers manipulation as in study 2A.

### Measures

*Perceived consumption.* Again, embedded in mock taste test questions was the question

“How much do you feel you consumed?” (1 = *very little* to 9 = *very much*). At the end of this set of questions, participants learned that we were also “interested how people evaluate certain nutritional aspects of what they ate” after the fact, and that they would now engage in some light exercise on a stepper.

*Subsequent exercise.* A research assistant familiarized each participant with the stepper equipment. Then people completed the exercise task on their own. Participants read:

[W]e would like you to step on the stepper and walk on it as long as you think is necessary to balance out the amount of cookie that you ate. The display mounted between the two pedals will help you keep track of the number of steps you’ve taken.

They exercised privately; time spent and speed were at their discretion. We measured steps taken and calories burned with a small onboard computer attached to the stepper.

## Results and Discussion

Twenty-four participants ate more or less than the marked section of the cookie or skipped entire sections of the study. Two participants could not eat the cookie due to allergies. Six participants’ step counts were outliers ( $>2SD$  above the mean, the standard cut-off for skewed data, such as reaction time etc., see Cowles and Davis 1982). These individuals were dropped from the analysis, leaving 101 data points for the hypothesis tests.

*Perceived consumption.* The analysis revealed a significant effect of amount of food leftovers on perceived consumption ( $F(1, 99) = 13.50, p < .001$ ), such that people with larger leftovers ( $M = 3.65, SD = 1.59$ ) rated their consumption as lower than people with smaller leftovers ( $M = 5.04, SD = 2.14$ ). Once more, this result corroborates H1.

*Subsequent exercise.* Once more, a Kolmogorov-Smirnov test for normality indicated that the distribution of steps taken in the second task was highly skewed in at least one of the two conditions ( $D_{\text{large}} = .11, p = .16$ ;  $D_{\text{small}} = .16, p < .01$ ).

Again, we conducted a log-linear (or Poisson) regression. Smaller leftovers were coded as 0 and larger leftover as 1. This analysis revealed that the amount of leftovers had a significant effect on the number of steps taken during the second task ( $b = -.38, \text{Wald-}\chi^2 = 568.96, p < .001$ ), such that people with larger leftovers walked fewer steps to balance out the cookie ( $M = 133.76, SD = 89.27$ ) than people with smaller leftovers ( $M = 195.19, SD = 143.08$ ).

Next, an analysis of the raw data using the Mann-Whitney U test also revealed a significant effect of the amount of leftovers on subsequent consumption ( $U = 990.50, Z = -1.93, p = .054$ ). Specifically, people with larger leftovers walked fewer steps to balance out the cookie ( $M = 133.76, SD = 89.27$ ) than people with smaller leftovers ( $M = 195.19, SD = 143.08$ ).

Lastly, after transforming the data to better approximate a normal distribution and conform to the assumptions of parametric tests, a oneway ANOVA once more revealed a significant effect of the amount of leftovers on subsequent consumption (log-transformed DV:  $F(1, 99) = 4.55, p < .05$ ; square root-transformed DV:  $F(1, 99) = 5.53, p < .05$ ).

*Test for mediation.* We tested a mediation model with an indirect effect of the amount of leftovers on subsequent consumption through perceived consumption. A bootstrap analysis using Hayes' (2013) process macro (model 4) indicated that the amount of leftovers did not exert a significant indirect effect on subsequent consumption through perceived consumption ( $B = .12, SE = .08$ ), as the confidence interval for the effect included zero (95% CI =  $-.14 - .33$ ).

As in study 2A, on the surface, this result does not directly support H3. Again, however, our theory predicts that perceived consumption and negative feelings, *in series*, mediate the effect of the amount of leftovers on subsequent exercise effort. We hypothesize that negative feelings are key for motivating behavior, and as noted before, there is no reason to assume either mediator alone would mediate the effect on its own. Secondly, our dependent variable, step count, was skewed (even after transformation) and exhibited a large variance, whereas the mediator was normally distributed and exhibited a much smaller variance, possibly making it more difficult to detect mediation. Overall, this conceptual replication of study 2A further corroborates the hypotheses that a larger (versus smaller) amount of leftovers cause people to feel they consumed less (despite having eaten an equal objective amount) and that they also lead them to compensate less for their consumption.

Thus far, all three studies have involved actual food consumption, and studies 2A and 2B additionally measured real subsequent behavior—eating and exercising. On the one hand, it is of course very desirable to demonstrate food-related evaluations and their downstream effects in actual eating situations; it is arguably how most of consumer’s interactions with food products occur. On the other hand, consumers’ reactions may differ between real and imagined food stimuli. For example, it may be more difficult to imagine the full breadth of the multisensory experience (Krishna, Morrin, and Sayin 2014). It is crucial to understand whether a given food consumption-related effect generalizes from real to imagined consumption (and vice versa), because the degree of generalization has critical ramifications for two other important ways consumers interact with food: advertisements and memories of their own consumption. For instance, if the effect of larger (versus smaller) amounts of food leftovers on perceived consumption holds even for imagined consumption, then advertising images that depict larger

(versus smaller) leftovers may give a consumer the sense that this food product will leave her feeling light and not stuffed. To establish the generalization to (or boundaries set by) merely imagined consumption, study 3 moves on to imagined eating.

Further, while we uncovered important downstream effects on real behavior, the nature of these behavioral measures (highly skewed, large variance, and non-normally distributed even after transformation) compared to the nature of the self-reported proposed mediator variable (small variance and normally distributed) makes it much harder to detect mediation. To better test our mediation hypothesis, study 3 employs a multi-item self-report measure of behavioral intentions to quantify motivation to compensate. Beyond, study 3 also introduces the construct of negative self-evaluative feelings, which we hypothesize are the critical link between perceived consumption and subsequent motivation. This allows for a comprehensive, serial mediation test of our proposed model (see figure 11).

### **STUDY 3: CHOCOLATE LEFTOVERS, NEGATIVE SELF-EVALUATIVE FEELINGS, AND MOTIVATION TO COMPENSATE**

Study 3 tests all hypotheses together, that is, that having a larger (versus smaller) amount of food leftovers leads consumers to feel they ate less (H1), makes them feel better about themselves (H2), and thereby lowers their motivation to engage in compensatory behaviors (H3), as measured by intentions to eat less and exercise more.

#### **Method and Procedure**

One hundred and sixty-two U.S.-based participants were recruited through Amazon's

Mechanical Turk platform (46.3% women) for nominal payment. The average age in the sample was 34.54 years (range: 18 to 75 years). Participants completed the study on their personal computer and were randomly assigned to a one-factor 4-cell (amount of leftovers: 33% vs. 50% vs. 70% vs. 79%) between-subjects design.

Participants saw the remainder of a chocolate bar resting on its wrapper. The depiction was generic and, once again, no brand name was visible, to prevent brand associations from impacting participants' inferences. From the image, it was evident that six (6) squares had been eaten from the whole bar. Critically, we manipulated the amount of leftovers by manipulating the size of the whole chocolate bar. People saw either a 9-square bar with three (3) squares left (33.3%), a 12-square bar with six (6) squares left (50% left), a 20-square bar with 14 squares left (70% left), or a 28-square bar with 22 squares left (79% left, see figure 14).

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Insert figure 14 about here

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Along with the image, participants read:

Imagine that this is your chocolate bar, that you have just eaten it, and that you left only the part in front of you. Try to imagine vividly what it was like to eat that chocolate bar from when it was whole to what you left of it.

Then they rated how they would feel about themselves after eating the chocolate, how much they would try to engage in behaviors to compensate for their unhealthy eating, and how much they felt they had eaten.

Measures

*Negative self-evaluative feelings.* Subsequently, participants rated on 1–9 scales “To what extent would you feel the following: guilty/regretful/shameful?” (1 = *not at all* to 9 = *very*

*much*). These items were combined into a “Negative Self-Evaluative Feelings Index” ( $\alpha = .94$ ).

*Motivation to compensate.* We measured motivation to compensate for their chocolate eating via three items on 1–9 scales: “How likely would you try to eat less at the next meal?” (1 = *would definitely not try to eat less* to 9 = *would definitely try to eat less*), “How much would you try to work out later that day?” (1 = *would not try at all* to 9 = *would try very hard*), and “How likely would you be to work out longer the next time you work out?” (1 = *would definitely not work out longer* to 9 = *would definitely work out longer*). These items were combined into a “Motivation to Compensate Index” ( $\alpha = .76$ ).

*Perceived consumption.* Participants rated on 1–9 scales “How much would you feel you consumed? Please rate the absolute amount you’d feel you consumed.” (1 = *very little* to 9 = *very much*) and “How full do you think you would you feel after eating this amount of chocolate?” (1 = *not at all full* to 9 = *very full*; “Perceived Consumption Index,”  $\alpha = .66$ ).

## Results and Discussion

We conducted linear regressions, with the amount of leftovers as the predictor variable and the indices for perceived consumption, negative self-evaluative feelings, and motivation to compensate as dependent variables.

*Perceived consumption.* For perceived consumption, regression analysis revealed a significant effect of the amount of leftovers on perceived consumption ( $b = -.37$ ,  $t(161) = -4.99$ ,  $p < .001$ ): the larger the amount of leftovers, the lower was people’s perceived consumption (see

figure 15, panel A; see table 1 for group means).

*Negative self-evaluative feelings.* For negative self-evaluative feelings, the analysis revealed a marginal effect of the amount of leftovers on negative self-evaluative feelings ( $b = -.13$ ,  $t(161) = -1.68$ ,  $p < .1$ ): the larger the amount of leftovers, the lower were people's negative self-evaluative feelings (see figure 15, panel B; see table 1 for group means).

*Motivation to compensate.* For motivation to compensate, the analysis revealed a significant effect of the amount of leftovers on motivation to engage in counteractive behavior ( $b = -.15$ ,  $t(161) = -1.97$ ,  $p = .05$ ): the larger the amount of leftovers, the lower was people's motivation to compensate (see figure 15, panel C; see table 1 for group means).

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Insert figure 15 about here

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*Test for mediation.* To test for statistical mediation, we examined several conceivable models for comparison. First, we conducted two separate bootstrap analyses (Hayes 2013) testing each mediator in a simple mediation model by themselves (model 4). These two analyses revealed that while the amount of leftovers did not exert a significant indirect through negative self-evaluative feelings alone ( $B = .005$ ,  $SE = .004$ ; 95%  $CI = -.014 - .0006$ ), it did exert a significant indirect effect through perceived consumption alone ( $B = -.012$ ,  $SE = .00$ ; 95%  $CI = -.021 - -.005$ ).

Then we tested both mediators jointly in a parallel mediation model (model 4). Similar to the two independent simple mediations, in such a parallel mediation model, the amount of leftovers did not exert a significant indirect effect through negative self-evaluative feelings alone



( $B = -.005$ ,  $SE = .003$ ; 95%  $CI = -.13 - .0004$ ), but it did exert a significant indirect effect through perceived consumption alone ( $B = -.009$ ,  $SE = .003$ ; 95%  $CI = -.018 - -.003$ ).

Next, we tested the proposed serial mediation (model 6, see figure 1) and found that, as predicted, the amount of leftovers exerted a significant indirect effect on motivation to compensate through the sequence of perceived consumption and negative self-evaluative feelings ( $B = -.003$ ,  $SE = .002$ ; 95%  $CI = -.007 - -.006$ ). Again, as in the simple mediation models, in this model, the indirect path through negative self-evaluative feelings alone was not significant (95%  $CI = -.0097 - .003$ ), but the indirect path through perceived consumption was significant (95%  $CI = -.018 - -.003$ ).

We also tested a serial mediation with the opposite order of mediators. This analysis showed that a sequence of negative self-evaluative feelings and perceived consumption was not significant ( $B = -.006$ ,  $SE = .005$ ; 95%  $CI = -.002 - 0.00$ ).

Critically, to determine the explanatory value of including both mediators in the predicted serial fashion and order, we compared the model  $R^2$ s. As predicted, the serial model in which the sequence of perceived consumption and negative self-evaluative feelings mediates the effect of the amount of leftovers on motivation to compensate achieved much greater explanatory power ( $R^2 = .22$ ) than the simple model in which only perceived consumption mediates ( $R^2 = .10$ ).

Overall, these results indicate that larger (versus smaller) amounts of food leftovers reduce perceived consumption, which causes people to feel better about themselves, and this feeling better in turn reduces their motivation to compensate for their eating.

## **GENERAL DISCUSSION**

The curious coincidence of growth in average portion sizes (Nielsen and Popkin 2003; Smiciklas-Wright et al. 2003) and propagation of obesity (Ogden et al. 2014; Trust for America's Health 2015) over time has attracted much study. Indeed, research implicates growing portions as a direct cause of expanding waistlines. To date, work has revolved around the finding that the larger a portion of food, the more people eat from this portion (Herman et al. 2015; Young and Nestle 2002). This finding has been attributed either to visuoperceptual biases that cause people to underestimate larger portions (Chandon and Ordabayeva 2009; Krider et al. 2001) or to social-cognitive inferences that a presented portion is the appropriate size (Diliberti et al. 2004, Herman et al. 2015).

In this paper, we suggest a novel, additional pathway by which enlarged portions may contribute to the obesity epidemic: generating larger (versus smaller) amounts of food leftovers. While larger portions lead to greater consumption, this increase in consumption is typically just a fraction of the increase in consumption (Zlatevska et al. 2014)—thus, on average, consumer today have more food left on their plates. Drawing on perception and judgment research, we predicted that, holding actual consumption constant, having a larger (versus smaller) amount of food leftovers may lead people to underestimate their consumption. Based on research in the domains of affect and motivation, we predicted that in food consumption contexts, lower perceived consumption would ultimately reduce people's subsequent motivation to compensate for their eating accordingly.

Four studies provided evidence for this framework. In study 1, after eating exactly the same amount of chocolate, people with a larger (versus smaller) amount of chocolate leftovers perceived they had eaten less. In studies 2A and 2B, after eating the same amount of a cookie, people with a larger (versus smaller) amount of cookie leftovers not only felt they had eaten less

but also exhibited less compensatory behavior in a subsequent task. Specifically, in study 2A, people with larger (versus smaller) cookie leftovers failed to curb their subsequent calorie intake and ate more additional cookies later on. In study 2B, people with a larger (versus smaller) amount of cookie leftovers failed to increase their calorie output and walked fewer steps on a stepper. Lastly, in study 3, after imagining eating the same amount of chocolate, people who saw a larger (versus smaller) amount of chocolate leftovers perceived they ate less, felt less negatively about their chocolate consumption, and were less motivated to compensate for their chocolate eating (e.g., by eating less at the next meal or working out). Indeed, the diminishing effect of larger (versus smaller) amounts of leftovers on motivation to compensate was mediated by reduced perceived consumption and ameliorated negative self-evaluative feelings.

In sum, across real and imagined consumption, we find that larger (versus smaller) amounts of food leftovers lead people to feel they consumed less. Importantly, this reduces real, consequential downstream compensatory behaviors. Larger (versus smaller) amounts of leftovers lead people to eat more and exercise less, because perceiving less consumption bolsters their self-evaluative feelings, which in turn undermines their motivation to compensate.

This research reveals that unconsumed food can exert meaningful influence on consumers' perceptions, affect, motivation, and important health-related behavior. Our findings contribute to the food consumption literature, and particularly the body of work that has been devoted to portion size effects. The results showcase a previously unknown mechanism through which growing portion sizes may contribute to obesity. Thus far, research has focused only on the fact that larger portions increase people's consumption *from these portions*. Our work, however, demonstrates that enlarged portions can also impact consumption *subsequently*, expanding the scope of portion size research and highlighting the complex ways in which

enlarged portions can influence consumption behaviors.

First and foremost, these insights should serve to further urge policy makers and government agencies to work towards curbing portion oversizing. Dietary recommendations as well as requirements on portion sizes within nutritional programs are areas where smaller portions may contribute to healthier eating in a two distinct ways: by reducing immediate consumption and also by reducing the leftovers that would otherwise lead consumers to underestimate their eating.

Moreover, our findings have important implications for consumers' health behaviors. Most prominently, our results suggest that some dieting strategies may come back to haunt consumers. One common piece of advice to reduce calorie intake is portion control. "Eat only half of whatever portion the restaurant serves!" implore many dieting columns. At first glance, this may sound like a good idea—half a pizza definitely contains less fat, sodium, and calories than a whole pizza. However, to the extent that a consumer feels she ate less because she left leftovers, she may make up a good amount of the "saved" calories later on, by eating more at the next opportunity and exercising less. That is, rather counterintuitively, proudly foregoing half one's meal may backfire later and subtly undermine subsequent healthy behaviors.

In this regard, future research may examine effective interventions to mitigate the subversive impact of leftovers. For instance, researcher may test whether removing food leftovers from sight attenuates the underestimation of one's consumption. If so, consumers who plan to eat only part of their portion may benefit from asking for a to-go box right away and packing up their planned leftovers immediately. Moreover, the presentation of factual size descriptors of food portion, such as weight or volume, could possibly counteract the impact of leftovers. Future research may want to identify the circumstance under which such information

can help consumers judge their consumption more accurately, despite leftovers.

To expand this line of research, it will also be worthwhile to examine individual moderators of this effect that are related to visual imagery. For instance, when facing real food the effect may be stronger (weaker) for people who score higher on the visual (verbal) processing subscale of the Style of Processing Scale (Childers, Houston, and Heckler 1985), as those individuals process more deeply what they visually see (verbally read or hear). Similarly, when merely recalling one's leftovers, the effect may be stronger for people scoring higher in Vividness of Visual Imagery (Marks 1973), as they recall more details of visual images.

One limitation of the present research is that we only examined consumers' reactions to leftovers of unhealthy food, but not healthy food. On the one hand, it stands to reason that consumers' eating-related motivations, intentions, and behaviors are more impacted by their perception of how much unhealthy food they ate (or did not eat) compared to how much healthy food they ate (or did not eat). Conventional wisdom suggests that to avoid weight gain or weight-related diseases such as type-2 diabetes, one must primarily cut down one's consumption of unhealthy foods. On the other hand, however, it is possible that consumers' reactions to larger (versus smaller) leftovers of healthy foods are either congeneric and simply weaker (e.g., perceiving that they ate less kale soup may cause them to feel mildly better and thus to be slightly less motivated to compensate), or rather opposite (e.g., perceiving they ate less kale soup may cause them to feel worse, for omitting valuable nutrients, and thus to be more motivated to engage in healthy behaviors later). Dissecting these possibilities and pinning down the effect of leftovers of healthy food will be a worthwhile question for future research.

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**TABLE**

**SUMMARY TABLE OF MEANS ACROSS VARIABLES AND STUDIES**

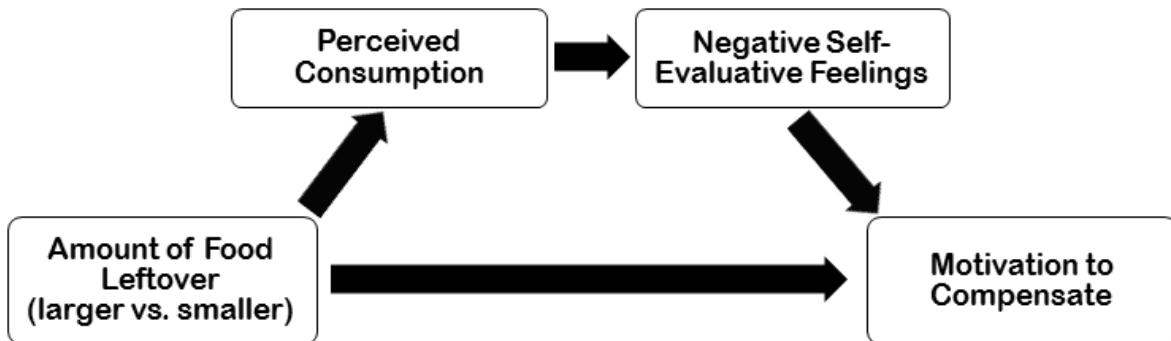
<b>Study (Food)</b>	<b>Perceived Consumption</b>	<b>Negative Self-Evaluative Feelings</b>	<b>Measure of Compensatory Behavior</b>
<b>1 (Chocolate)</b>			
large leftovers	5.83 (1.00)	---	---
small leftovers	6.77 (1.63)		
<b>2A (Cookie)</b>			Cookies eaten
large leftovers	4.00 (1.89)	---	3.74 (3.06)
small leftovers	5.00 (2.17)		2.62 (2.75)
<b>2B (Cookie)</b>			Steps walked
large leftovers	3.65 (1.59)	---	133.76 (89.27)
small leftovers	5.04 (2.14)		195.19 (143.08)
<b>3 (Chocolate)</b>			Intention Ratings
79% leftover	3.66 (1.33)	2.63 (1.68)	5.11 (1.82)
70% leftover	3.89 (1.61)	2.81 (1.82)	4.73 (1.82)
50% leftover	4.91 (1.75)	3.53 (2.37)	5.35 (1.94)
33% leftover	5.18 (1.77)	3.24 (2.49)	5.68 (2.00)

**FIGURES**

**FIGURE 11:**

**CONCEPTUAL FRAMEWORK OF THE EFFECTS OF FOOD LEFTOVERS**

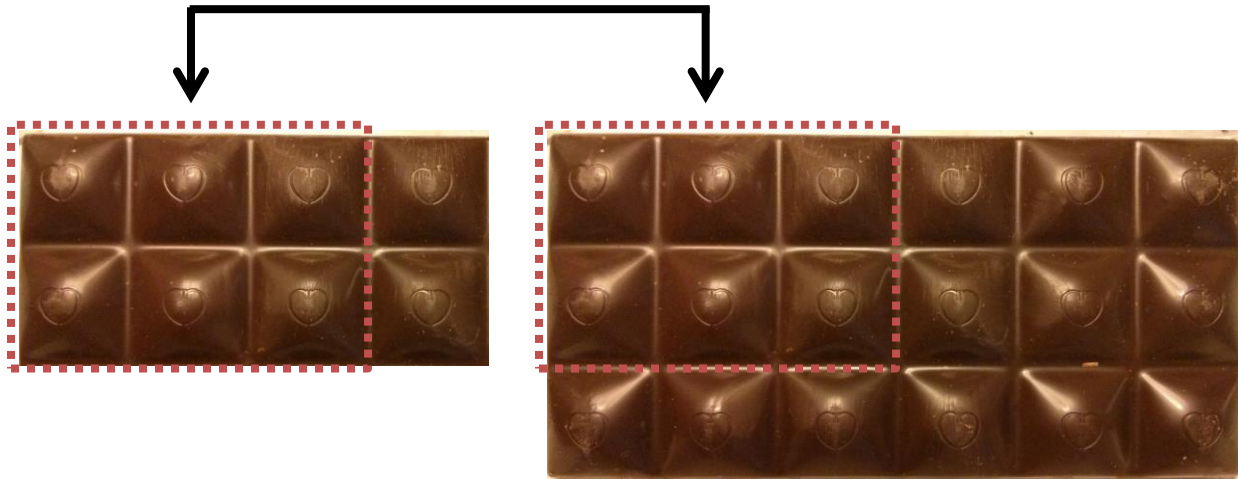
**LARGER (VERSUS SMALLER) LEFTOVERS REDUCE MOTIVATION TO COMPENSATE THROUGH LOWERING PERCEIVED CONSUMPTION AND BOLSTERING SELF-EVALUATIVE FEELINGS**



**Figure 11: Conceptual framework of the effects of food leftovers**

**FIGURE 12:**

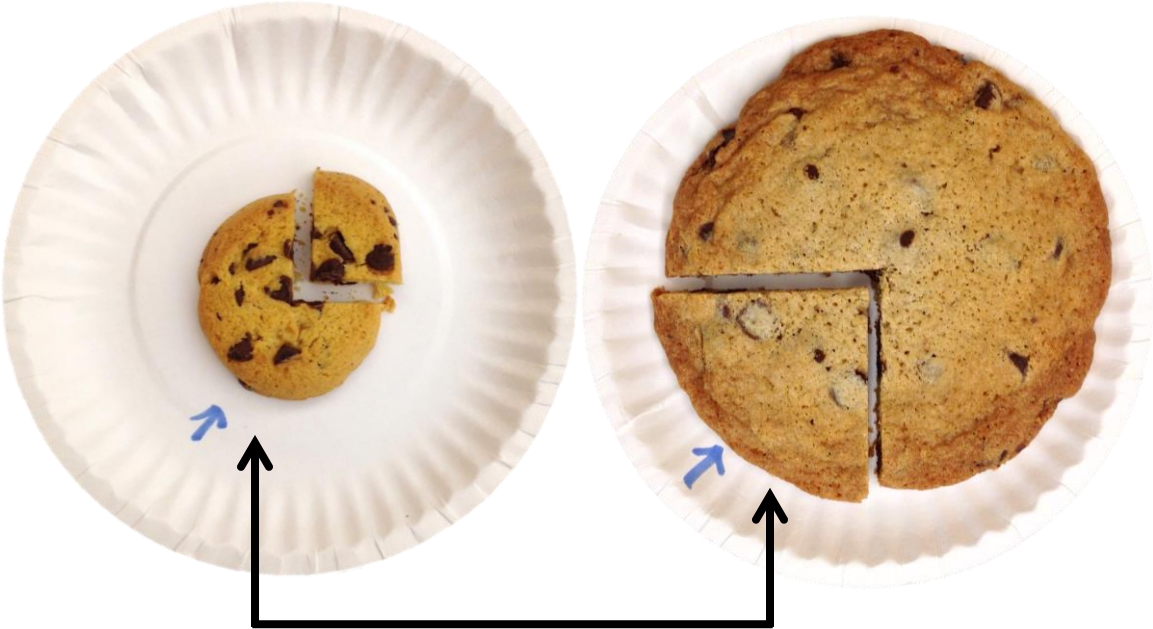
**IMAGE OF THE REAL CHOCOLOVE CHOCOLATE BARS USED IN STUDY 1**



**Figure 12: Image of the real Chocolove chocolate bars used in study 1.  
Note: All participants ate six (6) squares of equal size, but had either small leftovers (two [2] squares left, pictured on the left) or large leftovers (12 squares left, pictured on the right)**

**FIGURE 13:**

**IMAGES OF THE REAL COOKIES USED IN STUDIES 2A AND 2B**



**Figure 13: Image of the real cookies used in studies 2A and 2B**

**Note: Cut out and marked areas are equally sized (adjusted for decreasing marginal sensitivity in size perception [Krider et al. 2001, Stevens 1986]), but had either small leftovers (25% left) or large leftovers (75% left)**



**FIGURE 14:**  
**CHOCOLATE IMAGES USED IN STUDY 3**

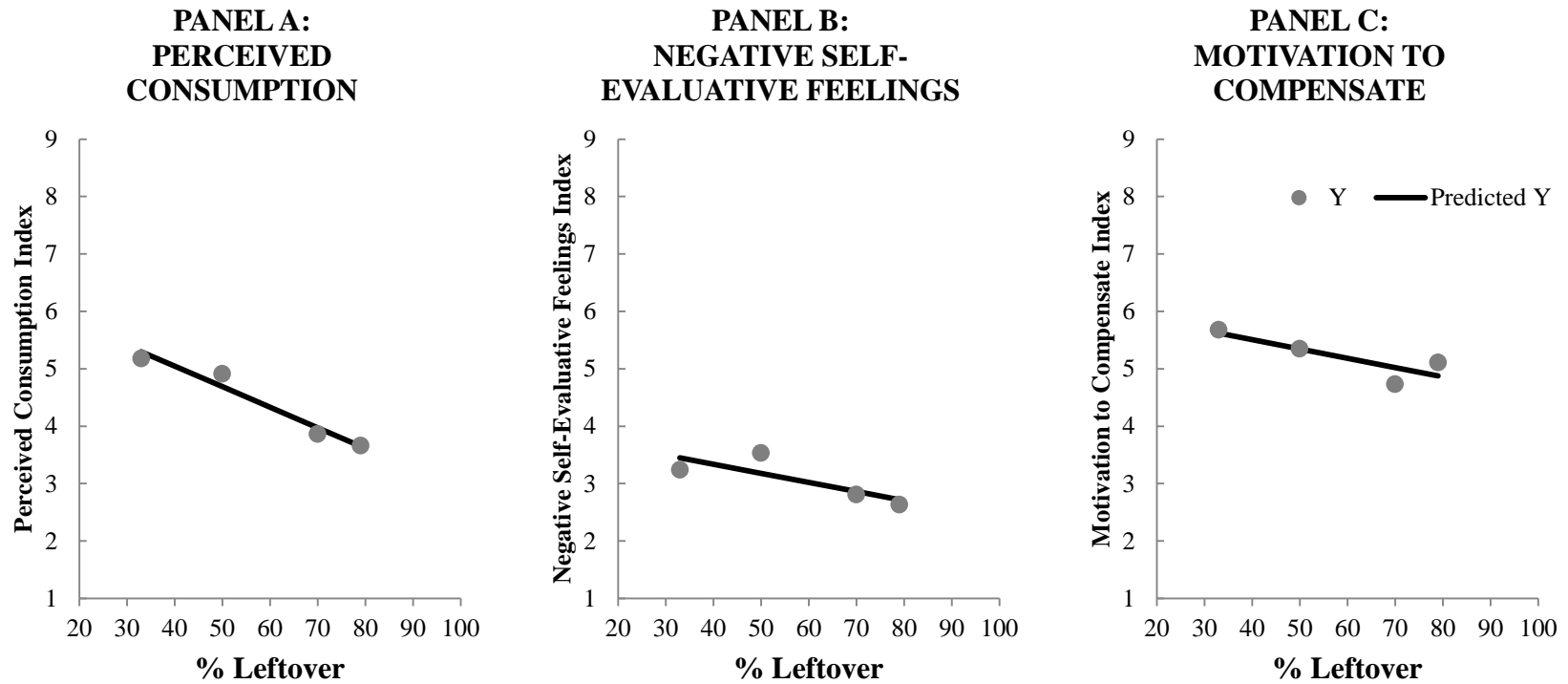


**Figure 4: Chocolate images used in study 3**  
**Note: All participants imagined having eaten six (6) squares of chocolate, but had different amounts of leftovers (three [3] squares, six [6] squares, 14 squares, or 24 squares)**

**FIGURE 15:**

**STUDY 3:**

**DEPENDENT VARIABLES AS A FUNCTION OF AMOUNT OF FOOD LEFTOVERS**



**Figure 15: Perceived consumption (panel A), negative self-evaluative feelings index (panel B), and motivation to compensate index (panel C) as a function of chocolate leftovers in study 3**

## **CHAPTER IV:**

### **CONCLUSION**

Based on a review of the current food consumption literature, this dissertation first suggested that food consumption research would benefit from considering the consumer as motivated to maximize food consumption pleasure while minimizing consumption-related negative affect. Given the prominent vice-virtue conflict inherent in many food consumption situations, motivated reasoning may be more prominent and more versatile than what current work shows. To facilitate systematic research into motivated reasoning in food consumption, I introduced a general framework and nomenclature to structure different types of motivated reasoning along the progression of processes involved in food consumption.

Specifically, I highlighted how consumers' visual impression of foods may be distorted by a motivation to downplay indulgences, such that unhealthy food in particular may be seen as smaller (motivated perception), and how the combination of different healthiness cues may be biased in order to arrive at a more favorable overall healthiness judgment (motivated integration). Beyond mentally engineering a more favorable healthiness judgment, I suggested, consumers may also draw upon circumstances that excuse their indulging and thereby render it more acceptable (motivated vindication). Lastly, post-indulgence, consumers may seek to remedy their unhealthy eating—directly via healthier behavior or indirectly via symbolic gestures that attenuate negative consumption-related feelings (motivated compensation).

For each of these potential leverage points for motivated reasoning, I argued, existing

research does not clarify whether or not consumers react in such biased ways. However, motivated distortions seem plausible at all points. Most importantly, whether or not motivated reasoning is at play qualifies the practical implications marketers should derive. For instance, if a certain underestimation of food portion sizes is driven by the motivation to mentally minimize one's unhealthy consumption, then marketers and policy makers will likely not be able to leverage the same process to encourage greater consumption of healthy foods.

As such, a better appreciation of where and when consumers employ motivated reasoning tactics is critical to understanding the generalizability of effects across healthy, unhealthy, and ambiguous foods, choices for self and other, or different consumer groups. Only with knowledge about these qualifications can researchers provide accurate, comprehensive advice for managers and policy makers. Developing targeted interventions that reliably reduce unhealthy and increase healthy consumption requires more precise knowledge of the underlying processes.

Subsequently, in the empirical portion of this dissertation, I targeted two previously unstudied marketing-related variables that had the potential to impact consumers' perceptions of their consumption in ways that enhance self-evaluative feelings and thereby encourage consumption. Specifically, chapter II revealed that when people are served food (compared to when they serve themselves), they are more inclined to consume unhealthy foods, and to select larger portions of unhealthy foods. This behavior occurs because being served allows people to reject responsibility for unhealthy eating and thus to feel better about themselves following indulgent consumption. In terms of theoretical insights, first, these findings expand our understanding of the boundaries of self-serving attributions. Being less physically involved in the act of serving food offers people the toehold they need to deny responsibility, but being more physically involved disentitles them from such a motivated inference. Critically, not actively

serving oneself allows people to reject responsibility even in situations when they made the food choice themselves. This finding challenges the notion that choosing is the primary determinant of people's sense of agency. While much research attests that choosing can give people a sense of agency (e.g., Botti and McGill 2011; Inesi et al. 2011), the results across our studies strongly suggest that consumers' physical involvement in obtaining a product may exert an important independent effect on their perceptions of agency and responsibility.

Second, this examination also shows that consumers clearly engage in biased reattribution of responsibility as a motivated reasoning tactic to relieve themselves of negative consumption-related affect. As described in chapter I, prior research had found that consumers engage in self-licensing to justify their indulgences, but other ways in which consumers may sanctify their unhealthy eating had not been considered yet. Thus, chapter II begins to fill the gaps with respect to motivated vindication that current research has not yet examined. It also indicates that consumers may use other tactics of vindication, such as focusing on downward counterfactuals or denying the consequences of unhealthy eating. Future research should examine under which conditions these other tactics are most likely to be used.

Practically, the insights gained in chapter II also point to interventions to nudge consumers towards healthier choices. Specifically, the findings suggest that making available unhealthy food options only by way of serving oneself may reduce both the incidence of unhealthy food choice as well as the amount of unhealthy consumption. For example, a school or workplace cafeteria seeking to discourage unhealthy eating may succeed by doing away with the pre-served plates of sliced cake that customers merely have to pick up, and instead may set up a dessert station where customers have to pick up tongs, reach out their arm to grasp a slice of cake, lift it up, and set it onto their plate. At the same time, the cafeteria operator may not have to

worry about how to make available healthy options; based on the findings of chapter II, a serve-yourself set-up is not expected to deduct from healthy consumption.

On the one hand, a note of caution is warranted with respect to the use of buffets. There is reason to believe that the effects of serving oneself food on consumption may weaken or disappear if implemented in combination with a flat rate pricing schemes, also known as “all-you-can-eat buffets.” Such flat rate pricing schemes can instigate consumers to aim to maximize their transaction utility—that is, “get their money’s worth”—and thereby increase consumption (Thaler 2004). This effect may ultimately countervail the reduction in consumption that would be achieved by serving oneself. On the other hand, if used under consumption-based pricing, serve-yourself stations may be a viable and virtually costless intervention to reduce unhealthy eating.

Chapter III uncovered that when consumers have a larger (versus smaller) amount of food leftovers they feel that they have eaten less. This reduction in perceived consumption causes them to feel better about themselves in relation to their consumption. As a result, they are less motivated and make less of an effort to compensate for their consumption. Indeed, it appears that how good or bad people feel about their consumption is a critical driver of their motivation to compensate. Theoretically, these findings suggest that food leftovers provide an important visual cue that impacts people’s judgment of their own consumption. As mentioned before, vision appears to exert much more impact on people’s eating than, for example, taste or satiation. Thus, in line with related research, the size of the food leftovers that people see in front of them shapes their perceived consumption. These results also indicate that consumers do not only use visual cues, such as plate size or glass width, prospectively to gauge amounts prior to eating. Instead, they also look to their unconsumed food to evaluate their eating retrospectively.

Even more importantly, the findings also highlight the importance of negative

consumption-related feelings in motivating compensatory behavior. As mentioned in chapter I, prior work suggests that guilt can motivate people to make amends for problematic past actions. The results of chapter II suggest that negative self-evaluative feelings with respect to prior eating significantly improved the prediction of people's motivation to compensate, above and beyond perceived consumption alone. This insight contributes to our understanding of what drives motivated compensation. Merely improving consumers' cognitive judgments of the overall healthiness of the food they eat or their consumption level may not be enough to maximize their subsequent motivation to engage in counteractive healthy behaviors. Instead, it appears to be critical whether or not consumers can draw upon mitigating circumstances that justify their unhealthy eating and thereby reduce negative self-evaluative feelings. While in this study, greater perceived consumption and stronger negative self-evaluative feelings encouraged direct compensatory behavior (i.e., eating less, exercising more), future research may want to dissect which circumstances encourage direct compensation and which encourage indirect or symbolic compensation (i.e., purchasing organic products, displaying brands associated with exercising).

Practically speaking, these findings show that oversized portions may contribute to obesity in multiple ways. First, prior research has found that larger portions suggest that such large amounts are indeed appropriate, and thus they increase consumption during the *initial* consumption period. Second, this research shows that, to the extent that larger portions generate larger amounts of food leftover (Zlatevska, Dubelaar, and Holden 2014), larger portions may also reduce perceived consumption and thereby increase consumption in the *subsequent* period. In light of this doubly problematic effect of enlarged portions on consumption, policy makers may want to intensify their petitions to limit portion oversizing. Policies that restrict oversizing seem especially warranted because the typical advice for how to avoid overeating when faced

with large portions is to decide a priori to only eat half of a restaurant portion and keep the rest as leftovers. The results of chapter III suggest that such strategies may actually not help reduce consumption but may rather backfire and increase consumption later on. Simply reacting to large portions with this type of damage control will likely remain ineffectual, so the case for cutting out oversized portions in the first place is even stronger.

In conclusion, in this dissertation I have highlighted in what ways food consumption research may be augmented by studying food consumption through a lens of motivated reasoning and have laid out a framework for future research on these topics. Through two empirical papers I have begun to identify specific marketing-related variables that facilitate motivated reasoning and thereby encourage unhealthy eating behavior. In addition to the specific variables examined here, I believe there are many more distinct factors in consumption contexts that warrant study from a motivated reasoning perspective. Understanding the impact of each of them will give marketers and policy makers the tools to encourage healthier eating decisions and thereby contribute to greater individual and societal wellbeing.

Ultimately, however, with the framework proposed here, I seek to highlight a broader, overarching question that remains largely obscure despite the existing research on motivated reasoning: What determines where in the consumption process the distortions occur that facilitate indulgence? That is, which individual or situational factors favor, for instance, distorted perception as opposed to distorted cognition? Can we think of these processes as activated on a “first-available” basis, such that the first suitable ambiguity that offers potential for motivated distortions gives rise to them? To what extent can motivated distortions work in an additive fashion, and how might they co-operate? Answering these higher-level questions will be a complex effort, and I look forward to contributing to it in the future.



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