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A disregard for calories during sampling: Exploring the "samples don't count" effect

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ABSTRACT

Product sampling is an important part of food retailing promotion. We explore how food sampling affects individuals' total caloric estimates of a consumption episode. In a field study, at a small self-serve frozen yogurt store, 144 participants were randomly assigned to either a control or samples' condition. Analysis of variance showed that individuals who had no or one sample overestimated the number of calories they were consuming, while those who had two or more samples underestimated their caloric intake.

KEYWORDS

Sampling; Calorie Estimation; Food Intake

1. INTRODUCTION

American society has become "obesogenic", which is characterized by environments promoting increased food intake, lack of exercise and unhealthy eating [1,2]. One of the most important indications of unhealthy eating is overconsumption [3]. Specifically, recent research has suggested that a key factor contributing to overconsumption is the erroneous judgment people make when estimating calories, and more specifically, their underestimation of the calories they consume [4]. Despite the increasing trend of the display of caloric information available to consumers, assessment of caloric intake continues to be a problem [5].

Recent work has identified several stimulus-based effects that can influence people's tendency to erroneously estimate calories. Findings indicate that factors such as portion size, packaging, nutrition labels [6,7] and the relative pairing of food items [8] can influence consumers' perceptions of their caloric intake. For example, consumers believe that a healthy name renders a product healthy [9], that a small amount of a healthy nutrient renders the whole item healthy (e.g., dose insensitivity) [10], and that a healthy quality of one food item can be transferred to nearby items (e.g., group-contagion effect) [11]. Even with the increase in research pointing to the psychophysical elements like these contributing to the erroneous estimations of calories, little is known about the antecedents involved in the process. Furthermore, given recent evidence suggesting individuals' highly flawed methods of grossly underestimating calories [12], understanding the process is imperative for both researchers and policymakers alike.

The objective of this study was to further examine the factors involved in individuals' disregard of caloric inputs into their overall calorie intake, in the context of food sampling. Despite the wide use of food sampling as a successful tool used to increase food sales [13], sampling remains a grossly understudied consumption domain. It was proposed that consumers hold a naïve belief that food samples consumed as part of the food purchase or decision process "don't count", and as such, their estimation of caloric intake for that food event is systematically underestimated. It was further hypothesized that since individuals do not include samples in their caloric estimates, the more samples taken, the greater the underestimation of caloric content. To study the proposed motivational bias that sampling can have on an individuals' judgments, a field study utilizing actual customers in a retail environment was conducted.

2. METHODS

2.1. Study Population

One hundred and forty-four customers were recruited for the present, institutional review board approved study. Participants ranged in age from 18 to over 49 years (mean age group category = 18 - 22 years), and 74% were female. There was a variety of occupations reported, including education, business, music/art, sales, law, administration, information technology, and no occupation (*i.e.*, unemployed). Participants also varied in their frequency of store visits, ranging from the present visit having been participants' first visit, to over twice per week. Table 1 provides further details of participants' characteristics.

2.2. Procedure

The study took place at a small, self-serve frozen yogurt store in New York City. Unlike most typical frozen yogurt venues where the customer orders by size and the server fills the order, in this venue the yogurt is self-served. Customers enter the store, pick up an empty cup, and proceed to filling that cup with yogurt from over 16 possible flavors. After filling their cups to their desired amount of yogurt, customers can then self-serve over 20 toppings of their choice. Payment is made on a standard per ounce charge, according to the total weight of their cups. Since the store normally has a no-sample policy, customers were observed and surveyed during non-peak traffic hours (*i.e.*, between the hours of 12:00 pm and 5:00 pm) on several different days during the week.

Table 1. Participant characteristics (age group, gender, and frequency of store visits).

Participant Characteristics	Count	Percent overall
Age group		
18 - 22 years	62	46.3
23 - 29 years	37	27.6
30 - 39 years	17	12.7
40 - 49 years	9	6.7
Over 49 years	9	6.7
Gender		
Male	37	25.7
Female	107	74.3
Frequency of Store Visits		
Never visited before	41	28.9
Less than once per month	4	2.8
Once per month	5	3.5
Twice per month	5	3.5
One time per week	49	34.5
Two times per week	24	16.9
Three times per week	9	6.3
Four times per week	3	2.1
Five or more times per week	3	1.4

Upon walking into the store, individuals were asked if they wished to participate in a short study assessing their frozen yogurt preferences. In exchange for their participation, they were told that they would be receiving a $1 off coupon good for a future visit to the store. Those who agreed were led towards the back of the store by the yogurt pouring stations. Another researcher met participants there, and explained to them that the study was interested in the processes involved when individuals select their frozen yogurt. As such, the researcher also explained that he would be observing participants as they went through their normal routine of selecting frozen yogurt, and asking some questions along the way. During the control day, participants simply proceeded to filling their cups with the frozen yogurt. On the samples day, the researcher told participants that to facilitate their decision process, they could sample as many flavors of the frozen yogurt as they wished, prior to filling their cups. They were then shown a "Sample Tray" containing empty paper 1 ounce sample cups that participants could take to sample the yogurt, as well as signage indicating that one sample is approximately 25 calories.

Researchers unobtrusively observed the number of samples that participants took (on the samples day), along with how many people were in the participant's party, and how many other people were in the store at the time. When participants were done pouring frozen yogurt into their serving cup, the researcher approached them and asked them to estimate the total amount of frozen yogurt they will have consumed during that particular visit to the store (with samples included, if applicable). To help them get an accurate estimate of the amount of yogurt in their cups, the researchers weighed participants' cups for them. Participants were told they could utilize the nutritional information displayed next to each flavor of frozen yogurt, as well as the signage that was included next to the sampling cups during the samples day. All the flavors were approximately 25 calories per ounce. Finally, participants were also asked their age and familiarity with the store.

2.3. Measures

The main variable of interest in this study was the accuracy of participants' estimate of the calories they would have consumed during that particular store visit. To obtain this estimate, the number of samples and ounces of yogurt in participants' cups was used to calculate the total calories of yogurt. Since all yogurt flavors were approximately 25 calories per ounce, this was multiplied by the weight of the yogurt in the cups, as well as the number of samples participants took, and summed together. Next, participants' estimates were subtracted from this amount in order to assess their accuracy. Positive amounts indicated an overestimation of actual calories, while negative amounts meant underestimation.

2.4. Statistical Analyses

The data were analyzed using SPSS Version 20 for Microsoft Windows. The main dependent variable was based on the calculated measure of participants' caloric estimation accuracy. In addition, participants were classified based on the number of samples they took, which served as the factor in the analysis. An ANOVA was used to determine if differences in accuracy were influenced by the number of samples taken. Results are reported as means. Additionally, a t-test was used to assess whether the accuracy of estimates were statistically significant.

3. RESULTS

Results supported the hypothesis that individuals disregard the calories in samples. Positive values signify that participants overestimated the total amount of calories they would consume, while negative values signify that participants underestimated the total amount of calories they would consume. The more samples participants took, the more they underestimated their total caloric intake ($F(3, 138) = 10.4$, $P < 0.001$). Those who did not take any samples on the control day (N = 49) overestimated the amount of calories of yogurt they were consuming ($M_{\text{No Samples}} = 59.1$). Interestingly, those who took only one sample (N = 57) also overestimated the calories they were consuming ($M_{\text{One Sample}} = 50.1$), though the overestimation was less pronounced than the control group. However, those who took two to three samples (N = 26) and those who took four or more samples (N = 12) significantly underestimated the amount of calories they were consuming ($M_{\text{TwoOrThreeSamples}} = -32.5$, $M_{\text{FourOrMoreSamples}} = -58.9$).

In addition to the main analysis, several ANCOVAs were run to determine the effect of additional factors that may have influenced participants' caloric estimates. More specifically, age, gender, and other individuals in participants' party and the store were used as covariates in the main model testing the effect of amount of samples taken on the accuracy of caloric estimates. Results from this analysis indicate that these factors did not serve as an influence in participants' accuracy (all covariates' P's > 0.06).

To further assess the extent of participants' estimation errors due to sampling, t-test analyses were conducted to test whether these errors were statistically significant. All comparison yielded significant results. Specifically, estimates above zero indicated overestimation ($M_{\text{No Samples}} = 59.1$, $t(47) = 4.0$, $P < 0.05$; $M_{\text{One Sample}} = 50.1$, $t(56) = 3.6$, $P < 0.05$). Estimates below zero indicated underestimation ($M_{\text{TwoOrThreeSamples}} = -32.5$, $t(25) = -2.7$, $P < 0.05$; $M_{\text{FourOrMoreSamples}} = -58.9$, $t(39) = -2.4$, $P < 0.05$). **Figure 1** demonstrates these results.

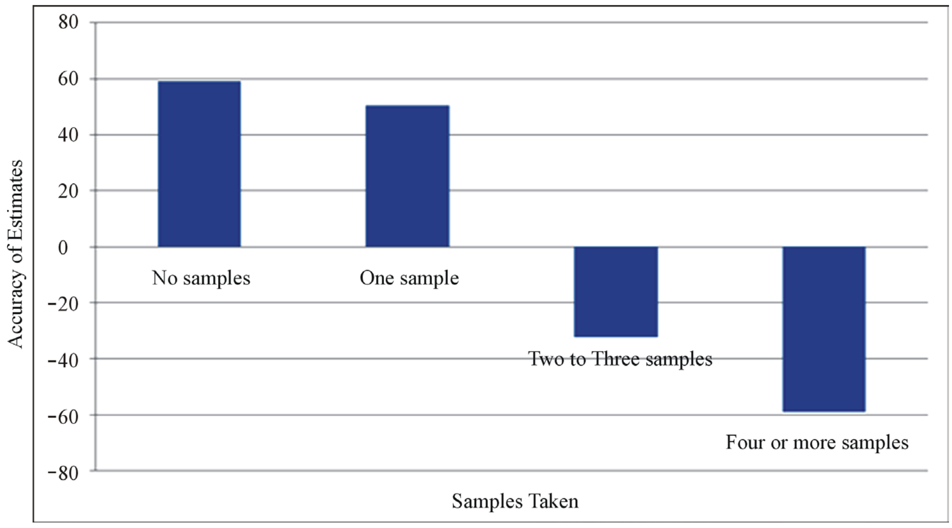

Figure 1. Accuracy of estimates of caloric consumption by categories of samples taken. Note: Estimates above zero indicate overestimation ($M_{\text{No Samples}} = 59.05$, $t(47) = 4.03$, $P < 0.05$; $M_{\text{One Sample}} = 50.50$, $t(56) = 3.64$, $P < 0.05$). Estimates below zero indicate underestimation ($M_{\text{TwoOrThreeSamples}} = -32.45$, $t(25) = -2.70$, $P < 0.05$; $M_{\text{FourOrMoreSamples}} = -58.94$, $t(39) = -2.38$, $P < 0.05$).

4. DISCUSSION

The present study examined the effects of food samples on individuals' estimates of their caloric intake. Specifically, it was hypothesized that samples would be disregarded in such estimates, as individuals would perceive samples as not counting towards their consumption. Findings indicate that individuals generally disregard the calories in samples, and that this effect is more prominent when individuals consume more samples. Interestingly, a disregard for samples was not found to be the case when participants had no samples or only a single sample. It may be that those who had several samples disregarded those calories because they considered the small sample units as trivial, thus causing them to fly under the radar [14] and not counting as much as they should towards the total calorie estimates. On the other hand, those who did not have samples did not experience this bias. While those who took a single sample also overestimated the amount of calories consumed like those who did not have a sample, they did so to a lesser extent. It may be possible that a single sample was not large enough to produce the bias found in the case of multiple samples.

Despite the finding that samples' calories don't count, it is not clear why individuals disregard the calories in samples. In the present study, the caloric information of both the samples and yogurt based on weight was clearly provided for participants. However, it may be that the higher number of samples taken and consumed presented greater cognitive complexity for participants, and they may have simply been unable to accurately calculate the samples' calories. Similarly, it is possible that participants felt guiltier for consuming a greater number of samples. Though frozen yogurt is positioned on claims of health, it is nevertheless a hedonic product and one that participants may have felt guilty for consuming in larger quantities. As a result, their error in calculation may have been defensive in nature.

The present findings lend support to the existing research on factors that influence the way in which individuals perceive the amount of calories in food they consume. Specifically, there is much recent work demonstrating the important role of external cues on such perceptions. Consistent with this body of work, the current findings demonstrate how another factor found in individuals' environments can have an influence on the accuracy of their calorie estimates [15]. Given that sampling continues to be a prevalent form of promotion, it is important to understand its role in individuals' perceptions and consumption.

Though the use of samples continues to be a proven method of increasing sales in the retailing industry, there is little known about some of the unintended, albeit potentially negative consequences of the practice. The current research highlights one potential result of sampling, namely a disregard for the calories included in those samples. Although prior work has demonstrated a host of biases that affect judgments about consumption, little research has explored the influence of samples in this judgment. Given the problems that result from a disregard for calories, it is important to consider the role that samples can have in these issues.

While this research provides evidence to suggest that samples don't count in individuals' calorie estimates, it is only a first step. More research is needed to examine the process that underlies the effect, as well as some of the boundary conditions that exist. It may be interesting to examine whether this effect limited to samples of relatively hedonic food (*i.e.*, dessert-type of food), or to all food. Furthermore, another question that may arise is whether individuals disregard the calories in samples because they are free. Finally, a major limitation of this research that is worth noting is the lack of specific health information, such as BMI, collected from participants, which may have influenced their calorie estimates [16]. These questions raise important issues for individuals' health, making them particularly important for researchers and policymakers to address.

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