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Research report

It takes some effort. How minimal physical effort reduces consumption volume

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ABSTRACT

Plenty of studies have demonstrated that effort influences food choice. However, few have been conducted to analyze the effect of effort on consumption volume. Moreover, the few studies that have measured consumption volume all have strong limitations. The goal of the present paper is to disentangle confounding variables in earlier research and to rule out various alternative explanations. In a tasting setting focusing on snacking behavior, either unwrapping a food product or grabbing it with sugar tongs was enough to significantly reduce consumption, regardless of whether an unhealthy or healthy food item was used. Hardly any cognitive resources seem to be necessary for the effect to occur, as cognitive load did not affect the findings. In light of obesity being a pressing concern, these findings might be valuable for individuals as well as for the food industry.

Introduction

The ease with which we obtain food is considered a crucial factor for food intake (Cutler, Glaeser, & Shapiro, 2003). Wansink (2004) even stated that effort is one of the strongest influences on food intake. As early as the 1970s, researchers began to investigate how additional effort affects food intake. These first studies were conducted in the context of Schachter's externality hypothesis (1971) proposing a differential influence of environmental factors on obese and normal-weight individuals. However, researchers found that not only were obese individuals affected by external factors, but normal-weight persons were affected as well. Over the years, this line of research faded, and if there were studies on effort, they focused on food selection rather than consumption volume. Only recently, researchers rediscovered the effect effort has on consumption volume. The present paper continues this line of research and analyzes effort in a series of carefully conducted lab experiments. The goals of this research project were to isolate the effect of effort and to rule out potential alternative explanations.

Schachter and Friedman (1974) conducted one of the first studies on how effort affects food intake. They had participants fill out some questionnaires on a table with a bag of almonds. In one condition, the almonds had shells on them; in the other, they did not. The share of participants who ate almonds was significantly lower when they had to use a nutcracker than when almonds could be consumed without additional effort. However, this effect emerged only for obese participants; there was no effect for normal-weight participants. Similarly, Levitz (1976) reported a study where the closing of an ice cream cooler had a dramatic effect on dessert selection. In this study, normal-weight and obese persons were equally affected. Since then, other studies have confirmed the effect of effort on *food choice* (Durrant & Garrow, 1982; Lappalainen & Epstein, 1990; Lieux & Manning, 1992; Meiselman, Hedderley, Staddon, Pierson, & Symonds, 1994; Meyers & Stunkard, 1980; Rozin et al., 2011; Smith & Epstein, 1991; Wisdom, Downs, & Loewenstein, 2010), but only a few studies have examined *consumption volume*.

An early exception was a study by Singh and Sikes (1974), which was also conducted according to Schachter's externality hypothesis framework (but see Nisbett, 1968 as well). Participants were offered chocolates and cashews that were either aluminum-foil-wrapped or unwrapped. For the chocolates, neither obesity nor wrapping affected consumption volume. However, obese participants consumed fewer cashews if they were wrapped than if they were unwrapped, while normal-weight participants ate about the same number of nuts. Recently, Honselman et al. (2011) conducted a similar study using pistachio nuts. Their participants self-selected a portion of pistachios that they could eat during a class. One group of students was offered shelled pistachios while a second group was offered pistachios in the shell. Participants who had to shell the pistachios consumed significantly fewer calories than participants who did not have to exert the extra effort. The authors acknowledge that their study did not identify the reasons for decreased consumption since effort was confounded (among others) with the volume of the preselected portion. The

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average portion selected was of similar weight in both conditions, resulting in less volume of eatable pistachios in the shell-on condition. Since participants consumed about the same percentage of calories available from the selected portion, it is unclear whether effort, the selected portion size, or both reduced intake.

Several studies have operationalized effort based on proximity. Engell, Kramer, Malafi, Salomon, and Lesher (1996), for example, found that participants with a water pitcher within reach on the dining table drank more water than participants who had to walk either 6 or 12 m to reach the pitcher. In two field studies in an office setting, Painter, Wansink, and Hieggelke (2002) and Wansink, Painter, and Lee (2006) confirmed these findings with chocolate candies. Participants ate more of the candies when the candies were situated on the desk than when they were 2 m away from the desk. Recently, Musher-Eizenman et al. (2010) confirmed the proximity effect in a sample of preschool and school-age children at a child care center.

Another study that needs to be mentioned, although not measuring consumption volume, was conducted by Cheema and Soman (2008). They instructed participants to take home a box of chocolates: in one condition, unwrapped pieces were inside the box, and in the other condition, there were individually wrapped chocolates in foil. The results showed that participants receiving the unwrapped chocolates took fewer days to eat them than participants with wrapped chocolates. In addition, the effect was stronger for participants who had a greater aversion to overconsumption. Therefore, the authors concluded this was an effect of partitioning since partitions provide more decision-making opportunities for reluctant consumers to control consumption. It remains unclear whether the additional effort to unwrap the chocolates also affected food intake.

To conclude, despite the urgent nature of the topic, very little research has been conducted to investigate the effect of effort on consumption volume. Moreover, the studies that have been done have serious limitations. For instance, Honselman et al.'s (2011) findings were confounded by selected portion size, and Cheema and Soman's (2008) with partitions. Other studies were conducted in the field, which has the advantage of a naturalistic environment, but lacks proper monitoring. For example, it is not possible to control for other people who are in the immediate vicinity; participants might have even shared their candies with other coworkers in Painter et al.'s (2002) and Wansink et al.'s (2006) studies. The water pitcher study by Engell et al. (1996) was a controlled lab study, but like other research that operationalizes effort with proximity, the effort manipulation was confounded with cue prominence. The further away the water pitcher, the less salient and potent the cues were. Besides this confounding factor, Engell et al. let participants walk up to 12 m, which is a considerable amount of extra effort to get a glass of water.

The present paper focuses on minimal physical effort, and it is suggested that the process by which effort results in reduced food intake has to do with eating being an automatic behavior (Brunner, 2010; Brunner, 2012; Brunner & Siegrist, 2012; Cohen & Farley, 2008; Wansink, 2004). Bargh (1994) identified four characteristics of automatic behavior: it occurs without awareness, without intent and without control, and it operates efficiently, i.e., without or with only little effort. Since automatic behavior operates without effort, it seems reasonable to assume that any additional effort somewhat disturbs this automatic process. The present author proposes that in case of food intake, additional effort disturbs the automaticity of food intake, which leads to a reduction of the amount consumed.

The goal of the present research was to conduct a series of controlled lab studies disentangling the confounding variables in earlier studies and ruling out alternative explanations by showing that even a small amount of additional effort causes a reduction of food intake. Since most of the increase in caloric intake during the last few decades stems from calories consumed during snacking (Cutler et al., 2003), the studies focus on snacking behavior. Study 1 draws upon existing research (Singh & Sikes, 1974) and investigates the additional effort of unwrapping chocolates. Study 2 eliminates confounding factors that accompany wrapping. Studies 3 and 4 demonstrate that cognitive resources do not impact the effect of effort.

Study 1

The objective of Study 1 was to confirm that even a small amount of additional effort can lead to reduced food intake. Chocolate candies were used, wrapped in one condition and unwrapped in the other. The wrapped chocolates were very easy to open: as with other candies, participants only had to pull on both sides and the candy would just pop out. This constitutes minimal additional effort compared to already unwrapped chocolates.

Method

Participants and design

A total of 60 female students, recruited from a mailing list, participated in exchange for money. They were invited for an individual chocolate tasting session. The mean age of the sample was 24.8 years (SD = 4.14 years) with a mean BMI of 21.5 (SD = 2.84). They were randomly assigned to one of three conditions: (1) wrapped candies with instructions to keep the wrappers on the table, (2) wrapped candies with instructions to put the wrappers in a small table bin, and (3) unwrapped candies. The second condition with the bin on the table was introduced to eliminate the potential effect of feedback in the first condition. Leaving the wrappers on the table provides feedback regarding how many candies a participant has already eaten, which could also affect food intake (e.g., Stuart & Davis, 1972).

Materials

For the tasting, Mangini Choco Cereals, single candies each weighing approximately 1.3 g, were used. Twenty candies were put in a bowl from which participants could help themselves. The questionnaire to evaluate the chocolate incorporated questions about participants' general enjoyment of the chocolate, purchase probability, and their perceptions of taste, crispiness, texture, and sweetness (all measured on a five-point scale), as well as two open-ended questions about their likes and dislikes. The data stemming from this questionnaire were not analyzed since the questionnaire was only used to support the cover story of the tasting. After the tasting, another questionnaire was handed out including questions about age, height, and weight.

Procedure

Upon arriving at the laboratory, the participants were greeted and led to the experimental room by the female experimenter. On the table was the bowl of chocolates, the evaluation questionnaire, a cup of water for neutralizing, and in the second condition, the table bin. Participants were instructed to evaluate the chocolate using the questionnaire and to try as much chocolate as they wanted during the next 5 min. After 5 min, the experimenter collected the remaining candies and handed out the other small questionnaire on demographics.

Results

A one-factorial ANOVA was conducted on the participants' intakes. This test revealed a significant main effect ($F(2,57) = 4.53, p < .05$). A planned contrast confirmed that when the candies