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Research report

Preventing the pack size effect: Exploring the effectiveness of pictorial and non-pictorial serving size recommendations

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ABSTRACT

People eat more from large than from small packs, which is known as the pack size effect. We hypothesized that providing a serving size recommendation would reduce the influence of the pack size on consumption and would thus diminish the pack size effect. Moreover, we hypothesized that a pictorial serving size recommendation, displaying food amounts visually, would be more effective than a non-pictorial recommendation that communicates the recommended amount in grams only. We tested these hypotheses in two online experiments (N = 317 and N = 324) and in one lab experiment (N = 89). In the online experiments, participants were shown a small or a large pack of unhealthy snacks, with or without a serving size recommendation. The main outcome measure was expected consumption. Replicating the pack size effect in an online setting, we found that participants expected to consume more food from large than from small packs. Furthermore, the pack size effect was considerably stronger for men than for women. Importantly, when including portion size preferences as a covariate, the pictorial serving size recommendation significantly reduced expected consumption, especially when placed on a large pack, as hypothesized. The non-pictorial serving size recommendation had no effect. In the lab experiment, students received a large bag of M&M's which did or did not contain the pictorial serving size recommendation. We again included general portion size preferences as a covariate. The serving size recommendation significantly lowered the amount of M&M's that participants served themselves, but only when participants reported to have noticed the serving size recommendation. We conclude that providing a pictorial serving size recommendation can be an effective intervention strategy to reduce the pack size effect, if it attracts sufficient attention.

Introduction

An increase in the portion or pack size typically leads to an increase in food consumption (see for example Chandon & Wansink, 2011; Steenhuis & Vermeer, 2009; Wansink, 2004; Zlatevska, Dubelaar, & Holden, 2014 for reviews). This effect is often referred to as the portion size effect or pack size effect. Whether it concerns pasta (Burger, Fisher, & Johnson, 2011; Diliberti, Bordi, Conklin, Roe, & Rolls, 2004), sandwiches (Rolls, Roe, Meengs, & Wall, 2004), snacks (Rolls, Morris, & Roe, 2002; Rolls, Roe, Kral, Meeng, & Wall, 2004; Stroebele, Ogden, & Hill, 2009), stale popcorn (Wansink & Kim, 2005), or vegetables (Mathias et al., 2012; Rolls, Roe, & Meengs, 2010), the bigger the portion or pack from which people eat, the higher their consumption. Similar effects have been found for non-food products (Wansink, 1996). Portion sizes and pack sizes have increased in the past years (Nielsen & Popkin, 2003), making supersized portions and packs an important contributor to the rise in overweight and obesity (Chandon, 2013; Hill & Peters, 1998; Rozin, Kabnick, Pete, Fischler, & Shields, 2003; Young & Nestlé, 2012). It is thus important to find ways to prevent the occurrence of the portion and pack size effect.

Previous research on intervention strategies has mainly focused on finding general ways to reduce the consumption of unhealthy foods, for example by partitioning foods (Cheema & Soman, 2008; Geier, Wansink, & Rozin, 2012) or by activating a health goal (Papies & Hamstra, 2010; Van Koningsbruggen, Stroebe, Papies, & Aarts, 2011). However, no research so far has identified effective ways to prevent people from eating more from large than from small packs. In the present paper, we propose a strategy to prevent the pack size effect that is based on the perspective that consumers are uncertain about how much they should eat and as a result rely on the portion or pack size to determine their consumption quantity (Marchiori, Papies, & Klein, 2014; Wansink & Chandon, 2014). We hypothesized that a clear serving size recommendation will provide consumers with a more suitable quantity to base their

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consumption on, so that they will rely less on the pack size, and the pack size effect will be reduced.

The portion and pack size effect

People rely strongly on external cues in their environment when they determine how much they should eat (Cohen & Farley, 2008; Herman & Polivy, 2005; Robinson, Thomas, Aveyard, & Higgs, 2014; Wansink, 2010). One of the most easy and accessible cues to rely on is the size of the portion or pack from which one is eating. As a result, consumers eat more when provided with a large portion or pack of food than when provided with a more modest serving (Fisher & Kral, 2008; Raynor & Wing, 2007; Rolls et al., 2002; Rolls, Roe, & Meengs, 2007; Wansink, 1996). Recent studies, which have tried to prevent this effect by drawing attention to internal signals to stop consumption, have mainly confirmed the strength of this portion size effect (Cavanagh, Vartanian, Herman, & Polivy, 2014; Marchiori & Papies, 2014).

A possible explanation for this effect is that the size of the portion or pack signals to the consumer how much is appropriate to eat (Rolls et al., 2002; Wansink & Chandon, 2014). In other words, portion and pack sizes act as consumption norms. Marchiori et al. (2014) suggested that portion and pack sizes are used as anchor quantities, such that consumers take the size of the portion or pack as a reference amount. Although they may then adjust their consumption somewhat from this reference amount, this adjustment is typically insufficient (Epley & Gilovich, 2001; Tversky & Kahneman, 1974), so that the larger the pack becomes, the larger the consumption amount will be. To prevent this reliance on the pack size, we propose to provide consumers with a more suitable quantity on which they can base their consumption. More specifically, we suggest providing consumers with a serving size recommendation that clearly visualizes how much they are advised to eat. We reason that if this serving size recommendation is available, consumers may use this as a reference amount to base their consumption on, and rely less on the size of the pack. As a result the pack size effect will be smaller, or even absent. We thus predict that a serving size recommendation that is smaller than the pack will reduce consumption, and that it will be particularly effective on large packs, as these typically lead to high consumption.

We furthermore suggest that a serving size recommendation will most likely be used in the consumption decision if it is presented with a picture. Earlier research has suggested that people typically represent the portions they eat visually (Wilkinson et al., 2012) or in easily countable units (Geier, Rozin, & Doros, 2006; Marchiori, Waroquier, & Klein, 2011). Similarly, people often have difficulty understanding serving size recommendations in grams (Faulkner et al., 2012). In other words, a serving size recommendation might be most effective if it is presented in the way in which food portions are typically and easily processed, which is why a pictorial serving size recommendation might be more effective than numerical information.

The current research

We investigated to what extent a serving size recommendation on a snack package can diminish the pack size effect. We conducted two experiments in an online setting and one experiment in a lab setting.

In the online experiments participants indicated how much of a snack food they would consume. Snack foods were presented either in large or small packs, and the packs did or did not include a serving size recommendation. In Experiment 1, we varied the pack size of a chocolate bar (either small or large) and the presence or absence of a pictorial serving size recommendation. In Experiment 2, we extended this design to include other snack foods (i.e., M&M's, savory crackers, cocktail nuts). We furthermore compared the effectiveness of the pictorial serving size recommendation to a non-pictorial serving size recommendation that only presented the recommended amount in grams.

Finally, in Experiment 3, students served themselves from a large bag of M&M's that either did or did not contain the serving size recommendation, and we measured both the amount served and the amount consumed.

Experiment 1

Methods

Design

The experiment had a 2 (pack size: large vs. small) × 2 (pictorial serving size recommendation: present vs. absent) between-participants design, and participants were randomly assigned to conditions.

Participants

The sample consisted of members of the general Dutch population between 18 and 65 years old. Participants who indicated that they never eat milk chocolate or indicated that they would eat zero pieces of the presented chocolate bar, were told that they did not belong to the target group of the study and hence could not continue. This led to an initial sample of 362 participants. We removed 27 participants because they did not finish the survey and another 17 because of poor data quality. Data quality was defined to be poor when participants answered the survey in less than 4 minutes (the average time needed to fill in the questionnaire was 12 minutes ($SD = 8$)), or when they gave the same answer to at least 21 of the 22 *agree*/*disagree* and *true*/*false* statements. Finally, 1 participant was removed because she indicated to strongly dislike both milk chocolate and the brand of chocolate used in this study. This led to a final sample of 317 participants, of which 159 were female. Their mean age was 44 ($SD = 12$) years.

Procedure

Participants were recruited by panel agency GMI, who also provided them with a small monetary compensation for participation. During recruitment, the study was announced as a consumer market research study. The questionnaire was administered in Dutch. After some introductory questions about age, gender and consumption frequency of milk chocolate, participants were presented with the chocolate eating scenario that we used for our experimental manipulation and to assess expected consumption. Participants were presented with the picture of the chocolate bar and the following scenario: "Imagine that it is afternoon and you feel like eating something tasty. You decide to unwrap the chocolate bar shown below. The total weight of the bar is 75 gr (180 gr). How many pieces of chocolate do you think you will eat?" Participants then typed the number of chocolate pieces in an input box to indicate their expected consumption. To clarify what we meant by a piece of chocolate, we displayed a picture of one chocolate piece next to the input box (see Web appendix A for a screenshot). Participants then completed a number of additional questionnaires. Finally, participants were debriefed by means of a short text, and had the opportunity to write down any comments they might have.

Materials

In the critical scenario, we presented participants with a picture of the chocolate bar. The screen showed either a small (75 gr, 14 pieces) or a large (180 gr, 30 pieces) plain milk chocolate bar of the Dutch brand Verkade. The bars were shown in their actual size, and a standard pen was shown below the package as a size reference. In the serving size recommendation condition, the serving size