



Eating less from bigger packs: Preventing the pack size effect with diet primes



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ABSTRACT

An increase in the package size of food has been shown to lead to an increase in energy intake from this food, the so-called pack size effect. Previous research has shown that providing diet-concerned individuals with a reminder, or prime, of their dieting goal can help them control their consumption. Here, we investigated if providing such a prime is also effective for reducing the magnitude of the pack size effect. We conducted two experiments in which the cover of a dieting magazine (Experiment 1) and diet-related commercials (Experiment 2) served as diet goal primes. Both experiments had a 2 (pack size: small vs. large) × 2 (prime: diet vs. control) × 2 (dietary restraint: high vs. low) between participants design. We measured expected consumption of four snack foods in Experiment 1 (N = 477), and actual consumption of M&M's in Experiment 2 (N = 224). Results showed that the diet prime reduced the pack size effect for both restrained and unrestrained eaters in Experiment 1 and for restrained eaters only in Experiment 2. Although effect sizes were small, these findings suggest that a diet prime motivates restrained eaters to limit their consumption, and as a result the pack size has less influence on the amount consumed. We discuss limitations of this research as well as potential avenues for further research and theoretical and practical implications.

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1. Introduction

An increase in the portion or pack size has been shown to lead to an increase in energy intake (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004; Fisher & Kral, 2008; Levitsky & Youn, 2004; Rolls, Morris, & Roe, 2002; Rolls, Roe, Kral, Meengs, & Wall, 2004; Rolls, Roe, & Meengs, 2007; Stroebele, Ogden, & Hill, 2009; Wansink, 2004) and to weight gain (French et al., 2014). The phenomenon that people eat more when more food is available, is often referred to as the portion or pack size effect.¹ Portion and pack sizes have increased considerably in the past years (Nielsen & Popkin, 2003) and this increase has been identified as one of the main causes of the rise in overweight and obesity (Chandon, 2013; Hill & Peters, 1998; Rozin, Kabnick, Pete, Fischler, & Shields, 2003; Young &

Nestlé, 2012). It thus seems important to develop ways of diminishing the portion and pack size effect.

So far, studies aimed at reducing the magnitude of the portion and pack size effect either had no or only limited success. Different types of mindfulness exercises did not reduce the portion size effect (Cavanagh, Vartanian, Herman, & Polivy, 2014; Marchiori & Papies, 2014), telling participants that portion sizes had been randomly determined did not affect their impact (Marchiori, Papies, & Klein, 2014), and placing a serving size recommendation on the pack somewhat reduced the pack size effect but did not completely remove it either (Spanos, Kenda, & Vartanian, 2015; Versluis, Papies, & Marchiori, 2015). Hence, in the current study, we investigated another method to reduce the magnitude of the pack size effect. More specifically, we tested if exposure to a diet goal prime can help individuals with a dieting goal to keep their consumption under control and as a result, diminish the pack size effect.

Pursuit of goals has been recognized as an important driver of consumer behaviour in general (Kopetz, Kruglanski, Arens, Etkin, & Johnson, 2012; Osselaer & Janiszewski, 2012) and eating behaviour in particular (Stroebe, van Koningsbruggen, Papies, & Aarts, 2013). For many people, eating behaviour is influenced by the goal to stay

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¹ Note that, contrary to some other authors, we define the pack size effect as the difference in amount consumed when a person is provided with a large amount of food in a large pack or with a small amount of food in a small pack.

slim or even lose weight (Andreyeva, Long, Henderson, & Grode, 2010; Bish et al., 2005). One group that has received particular research attention are restrained eaters, or chronic dieters, who chronically try to restrict their food intake in order to control their body weight. While these dieters often overeat when exposed to attractive food cues (Fedoroff, Polivy, & Herman, 1997, 2003; Harris, Bargh, & Bronwell, 2009) they do manage to control their consumption when exposed to reminders of their dieting goal (Anschutz, Van Strien, & Engels, 2008; Buckland, Finlayson, Edge, & Hetherington, 2014; Papies & Hamstra, 2010; Papies, Potjes, Keesman, Schwinghammer, & van Koningsbruggen, 2014; Papies & Veling, 2013; see Papies, 2016; for an overview). Papies and Hamstra (2010), for example, showed that the number of meat snacks consumed by restrained eaters was significantly lower when they were exposed to a poster with health and diet words than when they were not exposed to such a poster. Similarly, Buckland et al. (2014) showed that dieters reduced their intake of a tempting snack when exposed to diet-congruent images instead of control images. These findings are consistent with goal priming research more generally which has shown that priming a goal by external cues can trigger goal-directed behaviour, if the primed goal is instead regarded as desirable (Aarts, Custers, & Veltkamp, 2008; Custers & Aarts, 2005; Papies, 2016).

While this work suggests that a diet prime can reduce consumption of restrained eaters, we do not yet know whether it can also reduce the pack size effect. A prominent explanation for the pack size effect is that the portion or pack size communicates a consumption norm that people use as a guidance for how much is appropriate to eat (Rolls et al., 2002; Wansink, 2010; Wansink & Van Ittersum, 2007; Wansink & Chandon, 2014). More specifically, Herman, Roth, and Polivy (2003) and Herman and Polivy (2005, 2014) argue that portion and pack sizes act as upper limits for intake and define how much can be maximally eaten without being perceived as an excessive eater. As a result, bigger packs thus allow greater consumption. Here, we suggest that if restrained eaters are reminded of their dieting goal, for example through a diet prime, they will be motivated to restrict their intake in order to pursue the dieting goal, instead of relying on the pack size as a reference point for how much to eat. Since pursuing the dieting goal will decrease intake especially from large packs, while having less impact on the already reduced intake from smaller packs, this will weaken the pack size effect. We thus hypothesized that for restrained eaters, a diet prime would reduce consumption from large packs and hence diminish the magnitude of the pack size effect. Since for unrestrained eaters, dieting is not a relevant goal, they should, in contrast, not be affected by the diet prime.

To test these predictions, we conducted one online experiment and one laboratory experiment. In the online experiment, we measured expected consumption and tested if exposure to a diet prime (the cover of a dieting magazine) would lower the pack size effect for restrained but not unrestrained eaters. We chose an online method for our initial study as previous work has shown that the portion and pack size effect is also present when measuring expected consumption instead of actual consumption (Robinson, Te Raa, & Hardman, 2015; Versluis et al., 2015). In the laboratory experiment, we measured actual consumption of candies and again tested if exposure to a diet prime (dieting commercials) would affect the pack size effect for restrained eaters.

2. Experiment 1

In this experiment, we investigated the effect of a diet prime on the expected consumption of four tempting snacks. Participants took part in two ostensibly unrelated studies. In the first study, they were asked to evaluate a magazine cover on a number of

characteristics. As in Van Koningsbruggen, Stroebe, and Aarts (2011), half of the participants were presented with the cover of a dieting magazine, while the other half saw the cover of a travel magazine. In the second study, participants indicated how much they expected to eat from four snacks, which were presented in either large or small packs.

2.1. Methods

2.1.1. Design

The experiment had a 2 (pack size: large vs. small) \times 2 (prime: dieting goal vs. control) \times 2 (dietary restraint: high vs. low) between participants design. Participants were randomly assigned to the one of the four experimental conditions, and dietary restraint was assessed as a continuous individual difference variable.

2.1.2. Participants

The sample consisted of members of the general Dutch population between 18 and 55 years old. Participation was restricted to consumers without a food allergy and who were not on a diet that would prohibit them from eating the snack foods in the study. As participants had to estimate their consumption, we expected that the variance in the data would be relatively high, and that effect sizes would thus be relatively low. Hence, we recruited a large sample size to obtain sufficient power. We aimed to recruit around 500 participants, for a power of 0.99 with an effect size of 0.2, and a power of 0.61 with an effect size of 0.1 (Cohen, 1988; Zhang & Yuan, 2015). A total of 556 participants began participating in the study, and 510 completed it. Of these, 19 participants were excluded from analysis because of poor data quality (completing the survey in less than 5 min, while the mean completion time was 15 min ($SD = 11$); giving the same answer to at least 21 of the 22 *agree/disagree* and *true/false* statements). Another 2 participants were excluded because they correctly guessed the purpose of the study as investigating the impact of the magazine cover on expected consumption. Finally, 12 participants misunderstood the expected consumption question and were therefore excluded.² This led to a final sample of 477 participants, of which 244 were women. The mean age was 40 years ($SD = 11$).

2.1.3. Procedure

Participants were recruited by panel agency GMI, who also provided them with a small monetary compensation for participation. The questionnaire was administered in Dutch. Participants were informed that they would be participating in two separate studies of a Dutch University. After introductory questions about food allergies and age, participants were presented with either the cover of the dieting magazine 'Get in shape' or the cover of the travel magazine 'Time for travel'. After participants answered the questions about the magazine cover, they were directed to the second study. Here, they were presented with snack eating scenarios to assess expected consumption of the four snack foods. For chocolate, participants were presented with a picture of a chocolate bar in its actual size and with 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 180 (75) gram. 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

² Two of these participants indicated in the open-ended answers that they indicated consumption in units (instead of the requested 'hands') and another 10 provided extremely high expected consumption amounts (>80 hands).

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