



Expected satiation alone does not predict actual intake of desserts

Etienne Guillocheau, Olga Davidenko^{*}, Agnès Marsset-Baglieri, Nicolas Darcel, Claire Gaudichon, Daniel Tomé, Gilles Fromentin

UMR Physiologie de la Nutrition et du Comportement Alimentaire, AgroParisTech, INRA, Université Paris-Saclay, 75005, Paris, France

ARTICLE INFO

Article history:

Received 6 October 2017
Received in revised form
1 December 2017
Accepted 20 December 2017
Available online 24 December 2017

Keywords:

Expected satiation
Food intake
Palatability

ABSTRACT

The degree to which consumers expect foods to satisfy hunger, referred to as expected satiation, has been reported to predict food intake. Yet this relationship has not been established precisely, at a quantitative level. We sought to explore this relationship in detail by determining whether expected satiation predicts the actual intake of semi-solid desserts. Two separate experiments were performed: the first used variations of a given food (eight apple purées), while the second involved a panel of different foods within a given category (eight desserts). Both experiments studied the consumption of two products assigned to volunteers based on their individual liking and expected satiation ratings, given *ad libitum* at the end of a standardised meal. A linear model was used to find predictors of food intake and included expected satiation scores, palatability scores, BMI, age, sex, TFEQ-R, TFEQ-D, water consumption during the meal, reported frequency of eating desserts, and reported frequency of consuming tested products as explanatory variables. Expected satiation was a significant predictor of actual food intake in both experiments (apple purée: $F(1,97) = 18.60$, $P < .001$; desserts: $F(1,106) = 9.05$, $P < .01$), along with other parameters such as product palatability and the volunteers' age, sex and food restriction (variation explained by the model/expected satiation in the experiments: 57%/23% and 36%/17%, respectively). However, we found a significant gap between expected and actual consumption of desserts, on group and on individual level. Our results confirm the importance of expected satiation as a predictor of subsequent food intake, but highlight the need to study individual consumption behaviour and preferences in order to fully understand the role of expected satiation.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

It has been shown that most people are able to plan their meals in terms of portion size (Fay et al., 2011; Hinton et al., 2013). Consumers can predict the degree to which foods are expected to satisfy hunger when compared on a calorie-for-calorie basis, which is referred to as expected satiation (Brunstrom & Rogers, 2009). What is less studied today is whether expected satiation is quantitatively related to actual food intake. It was reported that the “perceived fullness” score was the best predictor of actual food intake among military personnel, since it could explain half of the variance associated with food intake (Pilgrim & Kamen, 1963). In addition, expected satiation was found to be significantly correlated with the ideal portion size estimated by subjects (Brunstrom &

Rogers, 2009; Brunstrom & Shakeshaft, 2009). Despite this, very little work has been done to connect expected satiation with real food intake: only one study by Wilkinson et al. (2012) suggested that among factors such as liking, appetite, food reward, body mass index (BMI) and food restriction and disinhibition scores, expected satiation might be a good predictor of food intake. However, this study was performed using only one food (pasta with sauce), and it would be difficult to generalize such findings to other commonly consumed foods. Expected satiation is also dependent on context. Indeed, expected satiation is more important when people are hungry than when sated (Brogden & Almiron-Roig, 2010). Given this, desserts present several interests to study expected satiation: first, they constitute a particular food group which is well-understood by the general public yet offers a variability of sensory and nutritional characteristics; second, because desserts are consumed at the end of a meal when people are already starting to experience satiation, a situation that allows to control the nutritional state of volunteers in ecological conditions. Despite this, little work has yet been done on desserts (Forde, Almiron-Roig, &

^{*} Corresponding author. Physiologie de la Nutrition et du Comportement Alimentaire, AgroParisTech, INRA, Université Paris-Saclay, 16 rue Claude Bernard, F-75005 Paris, France.

E-mail address: olga.davidenko@agroparistech.fr (O. Davidenko).

Brunstrom, 2015). The objective of this study was therefore to expand our knowledge by studying the correlation between expected satiation and actual food intake using a range of desserts in the context of a meal.

This study had two objectives: (1) to confirm whether expected satiation could predict the actual food intake of desserts, and whether the accuracy of this predictor depends on the satiating power of the dessert or on its sensory characteristics; (2) to study the degree to which expected satiation can be considered as a measure of the amounts of food actually consumed, at both the group and individual levels.

2. Materials and methods

We present here the data resulting from two independent experiments which shared the same experimental design but featured different sets of products. The first study used eight apple purées only varying in texture (“apple purée” experiment), while the second used eight desserts commonly found on the French market (“dessert” experiment), which were more dissimilar. The objective of this second experiment was to verify whether the results obtained in the first experiment are generalisable to a larger group of foods. According to French law, the experimental protocols were approved by the French National Agency for Medicines and Health Products Safety (ANSM) and the Ethics Committee for Research Ile de France VII (“apple purée” experiment: #2013-A00339-36; “dessert” experiment: #2015-A00089-40). All participants received financial compensation for their participation.

2.1. Participants

Two different panels of volunteers were recruited for the experiments in Paris (France) and its surrounding area. All subjects were healthy non-smokers, aged from 18 to 60 years, with a normal weight (BMI ranging from 18 to 25 kg/m²) and not on a diet. They did not display any food allergies or dislikes regarding the foods proposed, and were not taking any medications known to affect appetite. Pregnant or breast-feeding women, athletes in training, people with a score ≥ 9 on the restraint subscale (TFEQ-R) or ≥ 8 on the disinhibition subscale (TFEQ-D) of the Three-Factor Eating Questionnaire (Lesdéma et al., 2012; Stunkard & Messick, 1985) were excluded from the study. Moreover, since both experiments involved foods usually consumed as desserts, we only recruited volunteers who stated that they were generally used to eating a dessert at the end of their meals. The power calculation estimated that 54 subjects were necessary for each experiment to show a 33-g difference in food intake (1/3 of a standard portion) between the least and most satiating products with a power of 0.80. In order to ensure spontaneous and natural behaviour during the sessions, the true purpose of the study was not disclosed to the participants; instead they were told that the aim was to adjust the recipes of the products (apple purées or desserts).

Fifty-four participants (14 M, 40 F) were recruited for the “apple purée” experiment between January and June 2014, according to the recruitment criteria described above. Their mean (SEM) ages and BMI values were 25.0 (0.6) years and 20.9 (0.3) kg/m², respectively, and their mean (SEM) restriction and disinhibition scores were 4.6 (0.2) and 4.9 (0.3), respectively.

Fifty-seven participants (13 M, 44 F) were recruited for the “dessert” experiment between February and June 2015, according to the recruitment criteria described above. Their mean (SEM) ages and BMI values were 24.1 (0.5) years and 21.1 (0.2) kg/m², respectively, and their mean (SEM) restriction and disinhibition scores were 5.2 (0.3) and 5.1 (0.3), respectively.

2.2. Study products

For each experiment, a set of eight products was designed so that products within the set would match two criteria: (1) similar energy content (maximum difference of 20 kcal/100 g among products), and (2) possibility to visually discriminate the products. The “apple purée” experiment used eight apple purées obtained from one initial preparation (chunky apple purée with no added sugar from Andros®). The purées were adjusted in a way similar to that used during a previous study by our team (Parizel et al., 2016) and varied in terms of particle size, pulp content and the addition of apple fragments (see Table 1 for details), which resulted in perceived visual and texture differences. The “dessert” study used a set consisting of eight desserts selected from those commonly available in France and described during the same previous study (Parizel et al., 2016). This assortment was based on a free sorting test carried out by 32 untrained subjects (who were not the same as the participants in the present study) that allowed us to choose the most dissimilar desserts among a set of 16 products. These desserts included fruit purees, dairy products, custards and puddings; these differed with respect to several sensory modalities (colour, texture, flavour) but had similar nutritional contents (see Table 2 for details).

2.3. Evaluation of expected satiation

Expected satiation was evaluated using a variation of the method developed by (Wilkinson et al., 2012). For each test food, 16 photographs were taken using a high-resolution digital camera. The lighting conditions and viewing angles were identical for all photographs. The test foods were arranged in identical transparent bowls (Duralux®, 135 mm diameter). The portion size displayed on the photographs increased linearly in 25 kcal steps, from 25 kcal in photograph 1 to 400 kcal in photograph 16. Photograph 4 corresponded to a standard (100 kcal) portion. Each photograph was identified by a random three-figure number, and the 16 photographs of each test food were gathered in a single picture displayed on a tablet (Samsung® Galaxy Tab 2 10.1, Android 4.1.2). During the evaluation of expected satiation, the participants were asked to look simultaneously at the 16 pictures, and then to “select the picture corresponding to the portion which they thought they needed to eat in order to feel full at the end of lunch”. In addition, the volunteers were given the bowl that had been used for the pictures of each test food, thus enabling them to estimate the real quantity associated with each picture.

2.4. Experimental procedure

Each experiment consisted in four sessions that took place at lunch time. The participants were asked to attend at the same time for all sessions, between 11.30 a.m. and 1.30 p.m., with a one-week minimum gap between each session. They were instructed to eat the same evening meal the day before each test day and the same breakfast on each test day, and were asked to consume no food or drinks, except for plain water, between their breakfast and the session. During the sessions, the volunteers were served lunch in a quiet room free of any food references or other sources of distraction. Each participant was seated alone at a table, and visual contact between the volunteers was not possible. At the start of each session, the participants were first asked to indicate, on a 100-mm unmarked visual analogue scale (VAS), how they were feeling at the time they completed the following questions: How hungry do you feel now? (VAS anchors: not hungry at all—extremely hungry); How full do you feel now? (not full at all—extremely full); How strong is your desire to eat now? (very weak—very strong); How

Download English Version:

<https://daneshyari.com/en/article/7306089>

Download Persian Version:

<https://daneshyari.com/article/7306089>

[Daneshyari.com](https://daneshyari.com)