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Research report

Influence of nutrition labelling on food portion size consumption

Mary T. McCann [a], Julie M.W. Wallace [a], Paula J. Robson [b], Kirsten L. Rennie [a,c], Tracy A. McCaffrey [a], Robert W. Welch [a], M. Barbara E. Livingstone [a,*]

[a] Northern Ireland Centre for Food and Health (NICHE), University of Ulster, Cromore Road, Coleraine BT52 1SA, UK
[b] School of Public Health, University of Alberta, Canada
[c] School of Health and Emergency Professions, University of Hertfordshire, Hatfield, Hertfordshire AL10 9AB, UK[1]

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ABSTRACT

Nutrition labelling is an important strategic approach for encouraging consumers to make healthier food choices. The availability of highly palatable foods labelled as 'low fat or reduced calorie' may encourage the over-consumption of these products. This study aimed to determine whether the manipulation of nutrition labelling information can influence food portion size consumption. Normal and overweight men ($n = 24$) and women ($n = 23$) were served an identical lunch meal on three separate days, but the information they received prior to consuming the lunch meal was manipulated as follows: "baseline", "high fat/energy" and "low fat/energy". Food and energy intake was significantly increased in the low fat/energy condition compared with both baseline and the high fat/energy condition. An additional 3% (162 kJ) energy was consumed by subjects under the low fat/energy condition compared to baseline. No differences were observed between the baseline and high fat/energy condition. Subjects who consumed most in the low fat/energy condition were found to be mostly men, to have a higher BMI and to be overweight. Low fat/energy information can positively influence food and energy intake, suggesting that foods labelled as 'low fat' or 'low calorie' may be one factor promoting the consumption of large food portions.

Introduction

Increased food portion size has been shown to facilitate excess energy intake (EI) and adiposity among adults (Kelly et al., 2009; Rolls, Roe, & Meengs, 2006; Rolls, Roe, & Meengs, 2007) and children (Fisher & Kral, 2008; Fisher, Rolls, & Birch, 2003; Rolls, Engell, & Birch, 2000). Servings size, container/plate size (Wansink & Cheney, 2005), inaccuracy in portion size estimation (Blake, Guthrie, & Smiciklas-Wright, 1989), social norms (Bevelander, Anschütz, & Engels, 2012) and expected satiety and familiarity (Irvine, Brunstrom, Gee, & Rogers, 2013) have all been suggested as potential stimuli to increasing food portion size selection. It has been suggested that as well as physiological and environmental food cues, sensory influences (e.g. visual cues, and olfactory cues) and cognitive cues (beliefs or pre-conceptions about a food) may influence the amount of food that is consumed in response to large food portions. There is an obvious and urgent need to educate consumers of the importance of portion control, not only as a guide for weight loss but also, crucially, for weight maintenance. It is therefore important to better understand the drivers of large food portion selection and consumption.

Nutrition labelling is now at the forefront of public health policies aimed at the promotion of healthy eating and consumer awareness of food choice. Given that consumers are now routinely exposed to food labels detailing nutrition information, it is conceivable that this information may influence their perceptions or beliefs about a food and consequently, the amount consumed. Consumers pay most attention to the nutrients they wish to avoid (Shine, O'Reilly, & O'Sullivan, 1997), particularly fat and energy (Kreuter, Brennan, Scharff, & Lukwago, 1997; Kristal, Levy, Patterson, Li, & White, 1998). There are a limited number of studies that examine the effect of nutrition labelling on the amount of food consumed and these studies have provided contradictory findings. Some studies (Aron, Evans, & Mela, 1995; Harnack et al., 2008) have suggested that nutrition information may have little effect on the amount eaten by females but increase intake by males, while others (Girz, Polivy, Herman, & Lee, 2012; Roberto, Larsen, Agnew, Baik, & Brownell, 2010) indicate that nutrition information can reduce intake in both males and females. The abundance of lower fat/energy products currently available may have helped to generate the misperception that when reduced fat products are consumed, the quantity eaten is unimportant. Thus, perversely, the availability of highly palatable foods now labelled as 'reduced

* Corresponding author.
E-mail address: mbe.livingstone@ulster.ac.uk (M.B.E. Livingstone).
[1] Present address.

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fat or reduced calorie' could actually be promoting the over-consumption of these products in some consumers. Cognitive cues may therefore play an important complementary role in determining food portion size consumption. Consumers have reported difficulty in interpreting the information contained in nutrition labels (Cowburn & Stockley, 2005), thus, it is important to assess the motivational drivers of increased food consumption when presented with different nutrition labels.

Consequently, the aim of the current study was to determine the extent to which the information on fat and energy content of foods influence food portion size consumption in normal weight and overweight adults.

Methods

Experimental design

This research was carried out in the Human Intervention Studies Unit (HISU) in the Northern Ireland Centre for Food and Health at the University of Ulster. The study used a repeated measures design where each subject served as their own control. Each subject attended the HISU on three separate study days, with a 2-week interval between each study day. On each study day, subjects were given a standard breakfast (approximately 25% of each subject's daily estimated energy requirement calculated as 1.5 × Basal Metabolic Rate) in order to standardise study conditions. Lunch consisted of chicken curry (600 g) and rice (300 g) which was prepared according to a standardised recipe. Subjects were served exactly the same lunch meal (in terms of food, food weight (g) energy density and macronutrient content) on each study day, but prior to consuming the lunch meal, the information presented to the subjects about the fat and energy content was manipulated as follows: "standard" day – this session served as a baseline (BL) in which the subjects were informed that the lunch meal contained a standard amount of fat and energy; "low fat/low energy" (LFLE) information day – subjects were informed that the meal was a LFLE version of the BL meal and "high fat/high energy" (HFHE) information day – subjects were informed that the meal was a HFHE version of the BL meal. A fixed sequence of treatment was used in this study and treatments were presented to subjects in the following order; BL–LFLE–HFHE. Before subjects were served the lunch meal, they were presented with information sheets containing the fat and energy content of the meals, which were adapted from the 'traffic light' system of food labelling promoted by the UK Food Standards Agency (FSA), combined with information on guideline daily amounts (GDAs). The 'traffic light labelling' concept rates the content of the food in relation to energy (kcal), total fat (g), saturated fat (g) and salt (g), on the front of the food packet as high (red), medium (amber) or low (green). For the purposes of this study the BL information was highlighted in amber, LFLE information was highlighted in green and the HFHE information was highlighted in red (Fig. 1). After lunch, each subject was issued with a set of dietary scales, a food diary, detailed instructions on how to complete a food diary, and were asked to complete a weighed record of all foods and beverages consumed for the remainder of each study day.

Ethical approval for this study was granted by the Office for Research Ethics Committee for Northern Ireland (05/NIR02/63) and subjects gave written informed consent before commencement of the study. To ensure that subjects remained blind as to the true nature of the study, the consent form stated that the purpose of the study was to assess the effects of fat intake on sensory perception. Subjects were advised that this study would assess the acceptability of foods varying in fat content. Subjects travel expenses were reimbursed if applicable; no other incentive to participate was offered.

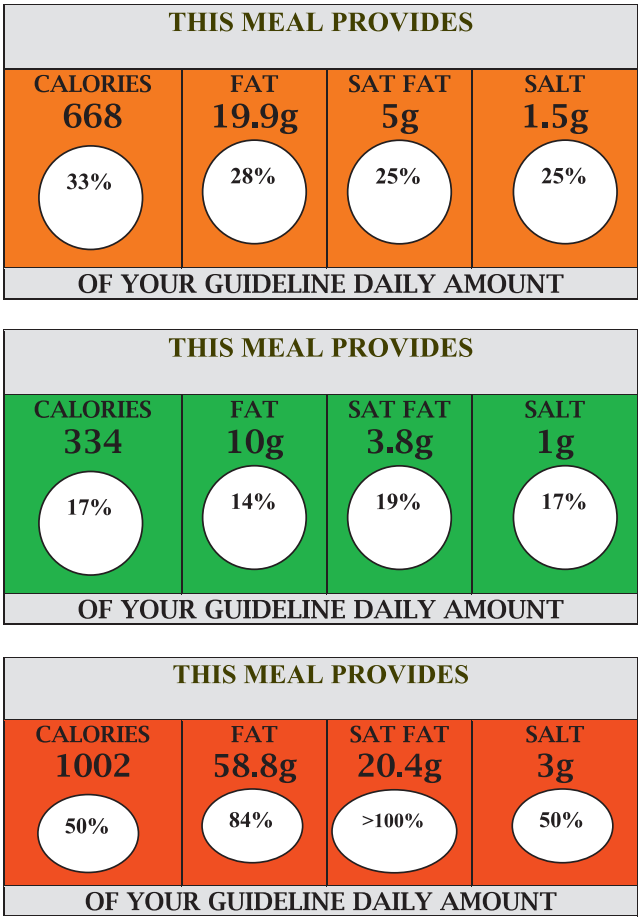

Fig. 1. Nutrition label information presented to subjects on each study day. Study day 1 – standard information (amber); study day 2 – Low fat/low energy information (green); study day 3 – High fat/high energy information (red). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Subject recruitment

Subjects were recruited by advertisements throughout the University. Individuals aged 18–65 years, who expressed interest in the study, were interviewed to ensure their eligibility for participation. Exclusion criteria were: smokers; vegetarians; those taking prescription medications or any drugs that might interfere with normal food intake; food allergies or dietary restrictions; chronic disease; Body Mass Index (BMI) <18.5 or >30 kg/m^2. Data from a previous study (Rolls, Morris, & Roe, 2002) showed that the within-subject SD for EI in studies of this nature is 500 kJ. It was therefore calculated that if 18 subjects completed the study, this would ensure a power of 80% to detect a difference between treatments. Given the possibility that men and women, or those who exhibit restrained or disinhibited eating styles, respond differently to cognitive cues regarding food, it was anticipated that 50 subjects (25 of each gender) would be recruited.

Before commencement of the study, a menu was presented to eligible subjects to ensure the acceptability of the breakfast and lunch choices on offer. At the outset of the study each subject completed the Dutch Eating Behaviour Questionnaire (DEBQ) (van Strien, Frijters, Bergers, & Defares, 1986) to assess eating behaviour styles.

Protocol

Subjects were asked to refrain from eating and drinking from 9 pm on the evening prior to each study day, and presented at