



Research report

Sex differences in young adults' snack food intake after food commercial exposure[☆]Doeschka J. Anschutz^{a,*}, Rutger C.M.E. Engels^a, Carmen S. van der Zwaluw^a, Tatjana Van Strien^{a,b}^a Behavioural Science Institute, Radboud University Nijmegen, P.O. Box 9104, 6500 HE, Nijmegen, The Netherlands^b Institute for Gender Studies, Radboud University Nijmegen, The Netherlands

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ABSTRACT

Exposure to food commercials on television is considered to be related to elevated snack food intake in front of the television. However, this assumed relation has as yet not been fully established. The present study, therefore examined the direct effects of watching television food commercials on concurrent non-advertised snack food intake in young adults. In addition, possible sex differences were investigated. Participants ($N = 82$, 50% male) watched a movie interrupted by two commercial breaks that contained either food commercials or neutral commercials. While watching, they could freely eat crisps and chocolate coated peanuts. Afterwards, participants filled out questionnaires and were weighed and measured. Regression analyses showed that men and women were differently affected by the food commercials. Food intake in women was higher when they watched the food commercials than when they watched the neutral commercials, whereas food intake in men was lower when they watched the food commercials than when they watched the neutral commercials. The results suggest that especially women are vulnerable for eating more snack food when exposed to food commercials.

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Introduction

Television watching has often been linked to obesity because of decreased physical activity (Robinson, 2001; Salmon, Bauman, Crawford, Timperio, & Owen, 2000; Thomson, Spence, Raine, & Laing, 2008) and increased snacking behavior (Thomson et al., 2008; Snoek, Van Strien, Janssens, & Engels, 2006). Though food advertising is generally believed to be an important causal factor in increased intake of energy dense foods (French, Story, & Jeffery, 2001; Hill & Peters, 1998), only a few studies tested the relationship between food advertising exposure and adults' snack food intake in front of the television. So far, most studies have focused on young children and the general finding was that exposure to food commercials indeed is related to higher snack food intake (e.g., Buijzen, Schuurman, & Bomhof, 2008; Coon & Tucker, 2002; Halford, Gillespie, Brown, Pontin, & Dovey, 2004). Although especially children may be susceptible to the persuasive messages in commercials (Rozendaal, Buijzen, & Valkenburg, 2008), there is no reason to believe that exposure to food commercials would not also affect food intake in adults. One correlational study found a relation between general television

advertising exposure and increased fast-food consumption in adults (Scully, Dixon, & Wakefield, 2009), but a further study found no effect of food commercials on actual food intake while watching television (Martin, Coulon, Markward, Greenway, & Anton, 2009). The aim of the present study was to experimentally assess the direct causal effects of exposure to commercials that promote food (in comparison with neutral commercials) on adults' snack food intake in front of the television.

Food cues (i.e., sight of food) in food advertising can incite increased craving for food (Cornell, Rodin, & Weingarten, 1989; Mattes, 1997; Nederkoorn, Smulders, & Jansen, 2000) and subsequent snacking. In food commercials, the act of eating is often presented as being highly rewarding, which might lead to motivation to eat (Ariely & Norton, 2008; Kopalle & Lehmann, 2006) through activation of dopamine systems in the brain eliciting wanting and craving of the food (Berridge, 1996; Schur et al., 2009). Previous studies showed that increased cue reactivity indeed predicted increased likelihood of food intake after exposure to food cues (Coelho, Jansen, Roefs, & Nederkoorn, 2009; Jansen & Van den Hout, 1991; Jansen, 1998; Rogers & Hill, 1989).

Advertising specific as well as individual factors may determine the processes through which people are affected by food advertising. In food advertisements, the reinforcing value of food is often strongly emphasized in food advertising and previous studies showed that increased reinforcing value of food was related to higher intake of energy dense foods (Epstein, Leddy, Temple, & Faith, 2007). Furthermore, models appealing to the

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target group are used, to increase the possibility that people are influenced because they identify with the models (see also Austin, Chen, & Grube, 2006; Moyer-Guse & Nabi, 2010). In addition, not everyone might be equally affected by exposure to food commercials. For example, a greater attentional bias towards food cues may relate to increased craving for food after exposure to food commercials (see also Franken, Rosso, & Van Honk, 2003). Previous studies showed that individuals with higher BMI scores (Nijs, Muris, Euser, & Franken, 2010) or restrained eating tendencies (e.g., Hollit, Kemps, Tiggemann, Smeets, & Mills, 2010; Overduin, Jansen, & Louwerse, 1995) displayed a greater attentional bias towards food cues. This attentional bias might make these individuals more vulnerable for the effects of food advertising on energy dense food intake. So, food advertisements are designed to influence consumption – in the broad sense – and individual characteristics may further elicit the effects of food advertising on food intake.

In a recent between-subject experiment among adults, support was found for the generally assumed relation between exposure to food advertising and intake of snack food (Harris, Bargh, & Brownell, 2009). Food intake was tested during a taste-test afterwards. Participants – especially men – that had been exposed to energy dense food commercials ate more and their eating persisted longer during the taste test compared with the participants that had been exposed to commercials that contained a health message (by promoting foods with nutritional benefits; e.g., high in dietary fiber) or the participants that had been exposed to neutral commercials. A drawback of using a taste-test design is that it decreases ecological validity as (1) a taste-test does not resemble a daily life situation, (2) participants can not eat *while* watching television, and (3) participants are obliged to eat at least something in the taste-test and this oral sensory experience might facilitate an increased subsequent food intake (e.g., Drenowski, 1997).

The present study investigated the direct effects of exposure to food commercials, taking into account the above-mentioned limitations. Recently, in a similar experimental study in young children, it was found that boys were more vulnerable for the effects of exposure to food commercials on increased snack food intake than girls (Anschutz, Engels, & Van Strien, 2009). Furthermore, adult men were found to eat more than women after exposure to food commercials (Harris et al., 2009). This could be explained by the fact that boys tend to be more responsive to external cues (e.g., Snoek, Van Strien, Janssens, & Engels, 2007; Van Strien & Bazelier, 2007) and have lower self-control than girls (Turner & Piquero, 2002). This suggests that they show higher cue reactivity and reward sensitivity when exposed to food cues, which may explain their increased intake after exposure to food commercials. Furthermore, males are in general less influenced by sociocultural pressure to be thin than females (e.g., Gardner, Sorter, & Friedman, 1997; Murnen, Smolak, Mills, & Good, 2003; Sands, Tricker, Sherman, Armatas, & Maschette, 1997), which makes them less likely to feel the urge to inhibit their snack food intake. Therefore, it was expected that especially men would eat more after exposure to food commercials than after exposure to neutral commercials.

Methods

Participants

The sample consisted of 82 non-overweight university students (50% male). They participated in exchange for money or course credits. The mean age of the male students was 20.9 ($SD = 2.5$) and the mean age of the female students was 20.4 ($SD = 1.5$). Male students had a mean body mass index ($BMI = \text{weight}/\text{height}^2$) of 22.1 ($SD = 1.6$) and female students had a mean BMI of 21.7

($SD = 2.1$). Statistical outliers on food intake (>800 kcal) were removed from the dataset ($n = 7$). None of the participants was aware of the true purpose of the study, which was assessed directly after watching television.

Procedure

The present study was approved by the ethical board of the Faculty of Social Sciences of the Radboud University Nijmegen. Data was collected in 2008 and analyzed in 2009. To increase ecological validity, the setting in which participants were tested was designed to resemble a living room with a comfortable couch, side table, a large television screen and decorating plants and paintings (see Anschutz, Engels, Becker, & Van Strien, 2008; Anschutz, Van Strien, & Engels, 2008). When participants entered the lab, they had to fill out a short questionnaire about their travel preferences (e.g., favorite country and favorite way of transportation). This was done to let the participants think the study was about traveling, hereby covering the true purpose of the study. Subsequently, they were invited to sit down on the couch and make themselves comfortable. Participants were told they were going to watch television for 30 min and did not have to pay attention to anything in particular, but just had to act like they were at home. On the side table in front of the participants stood a glass of water, a bowl of crisps and a bowl of M&M's. They were invited to drink or eat whatever they liked during watching television.

Participants were exposed to a 30-min clip taken from a nature movie that was considered neutral in content (Traveling Birds; see Anschutz, Van Strien et al., 2008). The television clip was interrupted by two commercial breaks (after 5 and 18 min) of 3 min each. Half of the participants (random assignment) were exposed to commercial breaks that consisted of 3 commercials promoting energy dense foods and 5 neutral filler commercials each. The other half of the participants was exposed to commercial breaks that consisted solely of 8 neutral commercials each. The neutral commercials comprised a relatively large percentage of commercials related to traveling in both conditions to strengthen the cover story of the study. Since we were not interested in testing brand effects, the food offered to the participants differed from the food promoted in the commercials (see Anschutz et al., 2009). Food intake during watching the television clip was measured by pre- and post weighing the bowls with crisps and M&M's every session.

After watching the television clip, attitudes towards the movie, commercial recall and liking of the commercials were investigated to provide information about how participants perceived the movie and the commercials and to check for possible differences between the two commercial conditions (randomization check). Finally, participants' height and weight was measured (without shoes).

Measures

Satiation

Individual differences in deprivation might influence food intake (e.g., Polivy, Coleman, & Herman, 2005; Urbszat, Herman, & Polivy, 2002). After they had watched the movie clip, participants filled out a 14-cm Visual Analogue Scale (VAS) to establish the extent to which they had felt hungry or satisfied before they entered the experiment ranging from 'very hungry' to 'totally satisfied' (cf. Anschutz et al., 2009; Anschutz, Engels et al., 2008; Anschutz, Van Strien et al., 2008). So, higher scores represented more satiation and less hunger.

Attitudes towards the movie

Participants were asked to indicate on a 5-point Likert-scale (ranging from 1 'totally not agree' to 5 'totally agree') to what extent they considered the movie interesting, boring, bad and nice.

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