



The effect of heightened awareness of observation on consumption of a multi-item laboratory test meal in females



Eric Robinson ^{*}, Michael Proctor, Melissa Oldham, Una Masic

University of Liverpool, UK

HIGHLIGHTS

- We examined the effect of heightened awareness of observation on food intake.
- This caused female participants to eat less of an energy dense snack food.
- This effect was moderated by weight status and trait eating behaviour measures.
- Heightened awareness of observation had little effect on intake of other foods.

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ABSTRACT

Human eating behaviour is often studied in the laboratory, but whether the extent to which a participant believes that their food intake is being measured influences consumption of different meal items is unclear. Our main objective was to examine whether heightened awareness of observation of food intake affects consumption of different food items during a lunchtime meal. One hundred and fourteen female participants were randomly assigned to an experimental condition designed to heighten participant awareness of observation or a condition in which awareness of observation was lower, before consuming an *ad libitum* multi-item lunchtime meal in a single session study. Under conditions of heightened awareness, participants tended to eat less of an energy dense snack food (cookies) in comparison to the less aware condition. Consumption of other meal items and total energy intake were similar in the heightened awareness vs. less aware condition. Exploratory secondary analyses suggested that the effect heightened awareness had on reduced cookie consumption was dependent on weight status, as well as trait measures of dietary restraint and disinhibition, whereby only participants with overweight/obesity, high disinhibition or low restraint reduced their cookie consumption. Heightened awareness of observation may cause females to reduce their consumption of an energy dense snack food during a test meal in the laboratory and this effect may be moderated by participant individual differences.

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1. Introduction

Human eating behaviour is often studied in the laboratory [1–3]. A potential methodological issue of such research is social desirability on the part of the participant [4]. Because people form impressions and stereotypes based on how much or what a person eats [5–8], if a participant were to believe that their food consumption was being measured in a study, this may cause them to alter their eating behaviour [4,9]. In line with this notion, a recent meta-analysis has shown that when females feel as though their behaviour is being observed in the laboratory they significantly reduce their energy intake [10]. However, a limitation of this meta-analysis was that most studies had only measured intake of

energy dense snack foods, such as cookies. There is reason to believe that consumption of other food types may be affected by heightened awareness of observation. For example, when people self-report their food intake a wide variety of different food types are under-reported, including snack foods and meal foods high in fat [11,12]. Under-reporting of food intake is likely to be in part caused by self-presentation concerns [13]. Likewise, in a recent study, Stubbs et al. [14] found that, when female participants were led to believe that their food intake was being closely measured, they reduced their energy intake and this was apparent for energy derived from fat, protein and carbohydrates. However, in a different study, Thomas et al. [15] told female participants that there was a hidden set of scales weighing their plate during a meal and found little evidence that this experimental manipulation influenced consumption of two different test foods (pasta followed by cookies).

Given that a large number of laboratory eating behaviour studies involve consumption of multi-item test meals [3,16–19],

^{*} Corresponding author at: Psychological Sciences, Eleanor Rathbone Building, University of Liverpool, Liverpool L69 7ZA, UK.
E-mail address: eric.robinson@liv.ac.uk (E. Robinson).

in the present study our aim was to examine whether heightened awareness of observation affects consumption of different food items (e.g. savoury and sweet, high and low fat) during a lunchtime test meal. This was to assess whether awareness of observation may influence intake of the high fat ‘unhealthy’ foods offered differently to the low fat foods, on account of self-presentation concerns. A novel secondary aim of the present work was to explore whether individual differences moderated the influence that heightened awareness of observation has on food intake. In the aforementioned recent meta-analysis, whether participant weight status or eating traits [20] (e.g. restrained, disinhibited or emotional eating), moderated the influence of heightened awareness of observation on food intake was not examined due to a lack of data. However, there has been some suggestion that overweight individuals are particularly self-conscious of their weight and eating behaviour [21,22], so could be more likely to eat minimally when awareness of observation is heightened. Likewise, it has been suggested that restrained eaters are particularly conscious of how their eating behaviour is perceived by others [10,23], as indicated by dietary restraint predicting greater under-reporting of energy intake [24]. Moreover, disinhibition and emotional eating have been shown to predict food intake in the laboratory [25–27] and it is conceivable that they may be moderators of the influence that heightened awareness of observation has on food consumption.

We hypothesised that heightened awareness of observation would affect participant food intake. More specifically, in line with recent work from our laboratory [4], we predicted that heightened awareness would reduce consumption of cookies (a high fat, ‘unhealthy’ food item) and we tentatively hypothesised that the consumption of other high fat meal items may also be reduced. With regard to individual differences, we hypothesised that heightened awareness may reduce food intake among participants who would be likely to have raised self-presentation concerns, e.g. overweight and obese participants and restrained eaters. We did not have strong a-priori hypotheses concerning the moderating effects trait disinhibition or emotional eating may have on the influence of heightened awareness.

2. Method

2.1. Sample

To be consistent with existing research on heightened awareness of observation of food intake [10] and to be able to recruit a homogenous sample of participants, we recruited females only. We powered the study based on a comparable study that had been recently conducted in our laboratory [4]. In that study, heightened awareness of observation had a statistically large effect on food consumption. A power calculation with 95% power, $d = 0.8$, $p < 0.05$ indicated that we would require 84 participants to detect significant differences in food intake between the two conditions in the present study. However, we were mindful that the size of any meaningful effects observed in the present study (e.g. secondary moderation analyses) may be smaller in size. Thus, because of practical constraints we made a pragmatic a-priori decision to recruit a minimum of 84 participants, but to collect data for up to nine months from study start and recruit as many eligible participants as was feasible in this time frame.

2.2. Participants

One hundred and twenty two participants were recruited from 1st year psychology students at a UK university campus, university staff or the surrounding community. To disguise the aims of the research, the study was advertised as examining ‘mood, cognition and satiety’. Participants were reimbursed a small cash sum or could instead receive course credit (1st year psychology students only). Participants who registered interest in the study were only eligible for participation if

they were female, aged 18 years or older, had no known history of food allergies and were not vegetarians. All procedures were approved by the University of Liverpool Research Ethics Committee. Written informed consent was obtained from all participants.

2.3. Cover story

Participants were led to believe that the study assessed the influence of meal consumption on mood and cognitive ability. To corroborate the cover story, participants were asked to complete mood measures before and after being served the lunch meal. Shortly after the meal participants were also asked to complete a short cognitive task which involved line tracing the outline of two shapes as accurately as possible using their non-dominant hand.

2.4. Design

Participants were randomly assigned to one of the two conditions in a between-subjects design; ‘heightened awareness’ or ‘less aware’. Either a male or female researcher aged between 18 and 24 years old oversaw laboratory sessions (5 researchers in total ran individual study sessions). We examined whether the researcher running the session, or their gender, affected any of our reported results (when controlled for and when included as a factor in analyses) and found no evidence that they did, so did not include this as a factor in our main analyses (see online supplemental materials).

2.5. Manipulation

In the ‘heightened awareness’ condition, prior to consuming their lunchtime meal participants were given a set of written instructions which stated; ‘*In this study we want to examine your eating behaviour and food intake (i.e. how much you eat of each food). Because of this, in this section of the study you will be served some lunch foods. You can eat as little or as much of each food as you like and after you have finished eating we will later weigh each plate to work out how much you have eaten. Also, after you have finished eating you will be asked to complete a simple pen and paper cognitive task.*’ In the ‘less aware’ condition the instructions read; ‘*In this study we want to examine cognitive performance and mood at different times of the day (e.g. mid-morning, after eating lunch, in the evening etc.). Because of this, in this section of the study you will be served some lunch foods. You can eat as little or as much of each food as you like. After you have finished eating you will be asked to complete a simple pen and paper cognitive task.*’ In both conditions the researcher verbally checked that the participant understood the instructions.

2.6. Test foods

Participants were served a multi-item lunch meal on a tray which consisted of commonly consumed UK lunch items on well stocked individual plates (see Table 1) and a large glass of water. We selected the lunch meal food items in order to have a balance of food items which were high and low in fat and which most participants would perceived as being ‘healthy’ and ‘less healthy’. Data collected during the session supported this with participants rating the high fat options (cookies, crisps and sausage rolls) as more unhealthy and the low fat options (sandwich, rice cakes and grapes) as more healthy on 100 mm VAS scales (see procedure).

2.7. Procedure

Participants attended a session that took place between 12:00 pm–2.30 pm and were asked to abstain from eating in the two hours prior to the session. Sessions took place in a cubicle in the Kissileff eating behaviour laboratory. On arrival the researcher described the cover story to the participant and explained what would happen during

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