



Contextual cue exposure effects on food intake in restrained eaters



Eva Kemps^{a,*}, C. Peter Herman^b, Sarah Hollitt^a, Janet Polivy^b, Ivanka Prichard^c, Marika Tiggemann^a

^a School of Psychology, Flinders University, Adelaide, Australia

^b Department of Psychology, University of Toronto, Canada

^c School of Health Sciences, Flinders University, Adelaide, Australia

HIGHLIGHTS

- Examined contextual differences in low calorie food cue exposure in dietary restraint
- Compared exposure to low calorie food cue alone, or together with high calorie one
- Restrained eaters ate less following exposure to grapes cue than grapes + cookies cue.
- Context of low calorie food cue exposure affects self-regulation in dietary restraint.

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ABSTRACT

Food cue exposure has been shown to trigger overeating in restrained eaters. To explore the difficulties experienced by these individuals in regulating their food intake, recent investigations have sought to determine the impact of exposure to a low calorie food cue, but with mixed success. This study tested the possibility that contextual differences moderate the impact of exposure to such a food cue among restrained eaters. To this end, we compared the effect of exposure to a low calorie food cue either on its own or together with a high calorie food cue. Specifically, we exposed 122 undergraduate women to a low calorie food cue (pictures of grapes), or to a high calorie food cue (pictures of cookies), or both, and examined the effect of such food-cue exposure on intake of either grapes or cookies. Restrained eaters were identified by their scores on the Revised Restraint Scale (Herman & Polivy, 1980). In line with predictions regarding dieting goal activation, restrained eaters ate less of the given food, either grapes or cookies, following exposure to the grapes cue alone than after exposure to the grapes + cookies cue. Thus the context in which a low calorie food cue is presented (alone, or in combination with a high calorie food cue) may play an important role in how much restrained eaters eat. The findings have implications for the regulation of food intake in restrained eaters.

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1. Introduction

Our contemporary Western environment is characterised by an abundance of densely calorific food cues. We are continually exposed to foods high in fat and/or sugar, not only in shops, fast-food outlets and vending machines, but also through advertising on television, public transport and on-line. The omnipresence of such palatable food cues is an acknowledged contributor to the increasing rates of overeating and weight gain [17].

Several laboratory studies have shown that exposure to the sight, smell or taste of high calorie food cues increases food intake, particularly among restrained eaters, that is, individuals who chronically restrict

their food intake in order to lose weight or avoid gaining weight [3–6, 11,14]. For example, Jansen and van den Hout [11] showed that restrained eaters ate more high calorie food items (e.g., cake, biscuits, sweets) following exposure to the sight of these foods compared to a no-exposure control condition; cue exposure did not affect unrestrained eaters' intake. Likewise, Fedoroff, Polivy and Herman [6] found that restrained eaters ate more pizza and chocolate-chip cookies (relative to a no-cue condition) following exposure to the smell of these respective food items baking in an oven; again, unrestrained eaters' intake was not affected by exposure to these food cues. This cue-exposure effect is thought to occur because restrained eaters experience increased craving for the food in response to the cue exposure which, in turn, stimulates disinhibited eating [6]. A similar perspective is provided by goal conflict theory [15], which suggests that exposure to high calorie food cues activates the hedonic eating goal in restrained eaters and inhibits their competing dieting goal, resulting in overconsumption.

* Corresponding author at: School of Psychology, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia.

E-mail address: Eva.Kemps@flinders.edu.au (E. Kemps).

If exposure to a high calorie food cue causes overeating in restrained eaters, then perhaps exposure to a low calorie food cue may help them to control their food intake. Researchers have thus recently begun to investigate the impact of exposing restrained eaters to a low calorie food cue, alongside one or more high calorie food cues. Initial endeavours have produced mixed results. For example, in a series of experiments, Wilcox, Vallen, Block and Fitzsimons [18] asked participants to choose a food item from a menu that consisted exclusively of high calorie food choices (e.g., french fries, chicken nuggets, baked potato) or one that also included a low calorie food option (e.g., salad). Surprisingly, individuals with higher levels of food-related self-control (akin to dietary restraint) were more likely to choose the most indulgent food item (i.e., the one with the highest number of calories) when the menu also included a low calorie option than when it did not. Wilcox et al. argued that the mere presence of a low calorie option gave these individuals licence to indulge, because simply having considered the low calorie option served to vicariously fulfil their weight-management goal.

By contrast, Papies and Hamstra [13] showed that the presence of a low calorie food cue reduced restrained eaters' intake of a high calorie food. In their naturalistic study, participants sampled meatball snacks at a butcher's shop. In the experimental condition, a poster for a low-calorie recipe was displayed on the entrance door to the shop; in the control condition there was no such poster. Papies and Hamstra found that restrained eaters (but not unrestrained eaters) ate fewer meatball snacks following exposure to the poster. They argued that the low-calorie recipe poster served to activate the dieting goal in restrained eaters, thereby reducing their meatball intake. Likewise, Buckland and colleagues showed that restrained eaters (but not unrestrained eaters) consumed fewer calories of a selection of snacks in an ad libitum taste test following exposure to a low calorie food [1] or low calorie food images [2] in a bogus rating task. They too reasoned that exposure to low calorie food cues served as a reminder of the dieting goal in restrained eaters, resulting in reduced snack intake.

One possible explanation for the opposing findings in these two sets of studies could be the different context in which the low calorie food cue was presented. In the Wilcox et al. [18] study, the low calorie food option was presented along with the high calorie options; that is, it was another food option that featured on the same menu as the high calorie food options from which participants made a hypothetical choice. Thus participants would have had to consider the low calorie food option while also considering the high calorie options. By contrast, in the Papies and Hamstra [13] study, the low and high calorie food cues were rather different items (a recipe poster versus meatball snacks) appearing in different locations of the butcher's shop (on the entrance door versus on the counter inside the shop). Under these circumstances, participants were able to consider the low calorie food cue on its own without having to also consider the high calorie food cue. This may have afforded restrained eaters an opportunity to cognitively process the low calorie food cue (poster of recipe) and activate their dieting goal, separately from having to decide whether or not, and how much, to sample of the high calorie food (meatball snacks). Similarly, in the Buckland et al. [1,2] studies, the low calorie food cues were presented in an altogether different task than the snacks for consumption in the taste test. Together these findings suggest that the context in which a low calorie food cue is presented (i.e., alone, or in combination with a high calorie food cue) may play an important role in whether it increases or decreases restrained eaters' food intake.

In support of this conjecture, there is some preliminary evidence that contextual differences in the presentation format of a low calorie food cue relative to that of a high calorie food cue can affect food choice. Specifically, Fishbach and Zhang [7] gave participants a choice between a chocolate bar or a bag of carrots from among chocolate bars and carrot bags, either scrambled together in the same pile or put into separate piles. They found that participants' concern with weight watching predicted their choice of carrots over chocolate when these snack options were separated into two piles, but not

when they were in a single pile. The authors reasoned that when the chocolate bars and carrot bags were in different piles, restrained eaters perceived these to be in competition with one another, and therefore exercised self-control, resulting in reduced food intake, whereas when they were together in the same pile, restrained eaters perceived them as complementing each other, and therefore did not experience a self-control problem, resulting in increased food intake. In each condition, however, the low calorie food cue was presented together with the high calorie food cue.

The aim of the present study was to test the "contextual differences" explanation by directly comparing the effect of a context manipulation of exposure to a low calorie food cue on its own versus together with a high calorie food cue on restrained eaters' food intake. To this end, we exposed participants to a low calorie food cue (pictures of grapes), or to a high calorie food cue (pictures of cookies), or both, and examined the effect on their subsequent intake of either a low calorie (grapes) or a high calorie (cookies) food. Because Buckland et al. [1,2] observed differential intake of high versus low calorie snacks following exposure to a low calorie food cue, we investigated contextual cue exposure effects on intake of both a high and a low calorie food. However, to keep the design conceptually clean, each participant was given only one food to taste. Restrained eaters were identified by their scores on the Revised Restraint Scale [9]. On the basis of the literature, we predicted that for restrained eaters: (a) the grapes cue alone would activate the dieting goal (following Papies & Hamstra and Buckland et al. [1,2,13]), (b) the cookies cue alone would stimulate disinhibited eating (i.e., classic cue-exposure effect, e.g., [6]) or activate the hedonic eating goal (goal conflict theory, [15]), and (c) the grapes + cookies cue would give participants licence to indulge due to vicarious fulfilment of the dieting goal (following Wilcox et al. [18]). For unrestrained eaters, we expected no effect of the food-cue-exposure manipulation on food intake. In other words, we predicted an interaction between food cue and dietary restraint, such that for restrained eaters intake would be lowest in the grapes cue condition, followed by the cookies cue condition, and then the grapes + cookies cue condition. In addition to measuring food intake, we also collected ratings of craving before and after exposure to the food cues to determine whether restrained eaters' food intake was driven by a corresponding craving for the cued foods.

2. Method

2.1. Participants

Participants were 122 women recruited from the undergraduate student population at Flinders University for a study investigating market reactions to food. The sample ranged in age from 17 to 31 years ($M = 21.20$, $SD = 3.40$), and had a mean body mass index (BMI) of 23.36 kg/m^2 ($SD = 5.24$). To equalise pre-experimental hunger levels, participants were instructed not to eat or drink anything (except water) for two hours before the testing session. Hunger levels, rated on a 100-mm visual analogue scale, ranging from "not hungry at all" to "extremely hungry", did not differ among conditions ($ps > 0.05$) and were below the mid-point of the scale ($M = 42.55$, $SD = 23.59$). Participants received either course credit or a \$10 honorarium for taking part.

2.2. Design

The experiment used a 3 (food cue: grapes, cookies, grapes + cookies) \times 2 (food tasted: grapes, cookies) \times 2 (restraint: unrestrained eaters, restrained eaters) between-subjects design. Participants were randomly assigned to the food cue \times food tasted conditions. The outcome variables were food intake and cravings for both grapes and cookies.

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