



## Short communication

## Effects of food-cue exposure on dieting-related goals: A limitation to counteractive-control theory

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## ABSTRACT

The present study investigated the effects of exposure to a food cue on the self-reported importance of dieting in those with low, medium, and high levels of dietary restraint. The results indicated that exposure to a food cue bolstered dieting-related goals in those who were low in dietary restraint but had no effect on the importance of dieting-related goals for those with medium or high levels of dietary restraint. The results demonstrate that exposure to temptations may differentially affect self-control processes depending on an individuals' level of dietary restraint.

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Weighing the benefits of short-term costs versus long-term benefits requires a fine balance. For the chronic dieter who is trying to lose weight, avoiding indulgence in tasty treats is an immediate cost, but exerting such self-control in the presence of tempting foods makes the long-term goal of weight loss more likely. Trope and Fishbach (2000) developed counteractive-control theory to explain self-control processes that operate during exposure to temptations. According to this theory, exposure to temptation can bolster the value of a long-term goal and lead one to behave so as to achieve this long-term goal. For example, students who had an upcoming exam and were primed with a temptation (social motives, which are incompatible with studying) reported valuing studying more than did students who were not exposed to a social prime (Trope & Fishbach, 2000).

Fishbach, Friedman, and Kruglanski (2003) found further support for counteractive-control theory, specifically with respect to eating behavior, demonstrating that exposure to food-related cues (i.e., a basket of chocolates and a gourmet food magazine) led to more intentions to avoid fattening foods and made participants more likely to choose a healthy food (versus a fattening food) relative to participants who were not exposed to a food cue. Fishbach et al. excluded “nonrestrained eaters” on the grounds that their previous research indicated that counteractive-control

processes were active only when the subjective importance of the long-term goal was high (see Fishbach et al., 2003, p. 303). In order to identify such eaters, these researchers inquired whether participants “ever restricted what they ate” or were “ever health conscious about what they ate” (p. 304) and excluded any participants who said no to either of these questions. However, this assessment technique does not provide a clear indication of the strength of dietary restraint and does not capture chronic concerns with weight and shape. Therefore, in the current study, we aimed to study the effects of food-cue exposure on the value of dieting using a validated measure of dieting-related concerns.

The Restraint Scale (Polivy, Herman, & Howard, 1988) can serve as a useful tool for identifying the presence of chronic weight and shape concerns and classifying individuals' level of dietary restraint. Traditionally a median split has been used to classify individuals as either “restrained” eaters (i.e., scores at or above the median) or “unrestrained” (i.e., scores below the median) when studying eating behaviors. However, in the present study we anticipated that the bolstering of the value of dieting might represent a special case in which a tertile split is justified and predicted that food-cue exposure would affect those with medium (but not low or high) levels of dietary restraint. We predicted that food-cue exposure would not influence the value of dieting for either individuals who were classified as highly restrained (due to potential ceiling effects) or those low in dietary restraint (due to low subjective importance of dieting-related goals, according to the justification provided by Fishbach et al. (2003) for excluding “nonrestrained” eaters). In contrast, we expected those with medium levels of restraint to value dieting more after food-cue

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exposure given their fit with the criteria set out by Fishbach et al. (i.e., these individuals exhibit weight- and shape-related concerns, and therefore subjectively value dieting, yet do not exhibit such extreme weight- and shape-concerns to render their value of dieting at ceiling levels).

## Methods

### Participants

A total of 103 female undergraduates at the University of Toronto at Mississauga took part in this study and received either one credit towards their grade in an Introductory Psychology course or a payment of \$10 CAD as compensation for their participation.

### Measures

In order to assess the importance of dieting, participants completed a questionnaire adapted from the Values Questionnaire used by Trope and Fishbach (2000). Participants rated the extent to which they valued: losing weight, dieting, devoting efforts to eating less, maintaining a diet when others around them are eating unhealthy food, being thin, and overcoming urges to eat unhealthy food. Participants' ratings on each of the items were summed in order to create a total score for this measure. The possible range of scores was between 6 and 66, with higher scores representing a higher value of dieting. Participants also completed the Restraint Scale (Polivy et al., 1988), to assess individuals' concern with dieting and weight fluctuations, and a Visual Analogue Scale to assess initial levels of hunger and satiety.

### Procedure

A cover story was employed to prevent participants from detecting the true purpose of the study. Participants were informed that the study involved an investigation of the relationship between personality and cognitive/perceptual performance. Participants in the study were randomly assigned to one of two experimental conditions, either the olfactory food-cue condition (in which the smell of chocolate-chip cookies baking was presented), or a control condition (in which there was no food cue presented). Participants were unaware of the different experimental conditions and were not informed of the experimental condition to which they had been assigned.

Participants rated their levels of hunger and satiety using a Visual Analogue Scale upon arriving for the experimental session. Upon completing this questionnaire, participants were given 10 min to complete two cognitive tasks (a word-rating task, in which participants rated a list of 46 words on how positive or negative they found the words to be, and a word-association task in which they wrote the first word that came to mind after viewing each of 40 neutral words) included in order to conform with the cognitive-performance cover story, and, importantly, to allow time for the presentation of the food cue. For participants in the cue condition, chocolate-chip cookies were baked in a toaster-oven in the room immediately adjacent to the testing room during these 10 min. The door of the testing room was left slightly ajar during the food-cue presentation to allow the smell of the baking cookies to waft into the testing room. The door was shut for the remainder of the study, and for the entirety of the no-cue condition. This exposure manipulation was adapted from the procedure used by Fedoroff, Polivy, and Herman (1997).

After participants had completed both tasks, the presentation of the olfactory food cue ceased, and participants completed a series

of measures,<sup>1</sup> including the adapted Values Questionnaire and the Restraint Scale. Participants were also asked to write down what they thought the main purpose of the study was, in order to probe for suspicions about the true purpose of the experiment. Finally, the experimenter measured participants' height and weight, and debriefed them before they left the laboratory.

## Results

A total of 103 participants completed this study; however, data were dropped from eight participants who indicated that they were suspicious that the study concerned the effects of exposure to the smell of cookies. The design of this study was  $3$  (restraint status: low, medium, high)  $\times$   $2$  (food-cue condition: olfactory food cue present or absent).

### Participant characteristics

A tertile split based on participants' scores on the Restraint Scale was used to classify individuals as low, medium or high in dietary restraint. The cut-points were defined as 10 and 16. Ten participants scored exactly at one of the cut-points, and were not included in any of the groups. Therefore, scores of 9 or lower were classified as low restraint ( $n = 26$ ), scores of 11 through 15 were classified as medium restraint ( $n = 28$ ), and scores of 17 or higher were classified as high restraint ( $n = 31$ ).<sup>2</sup>

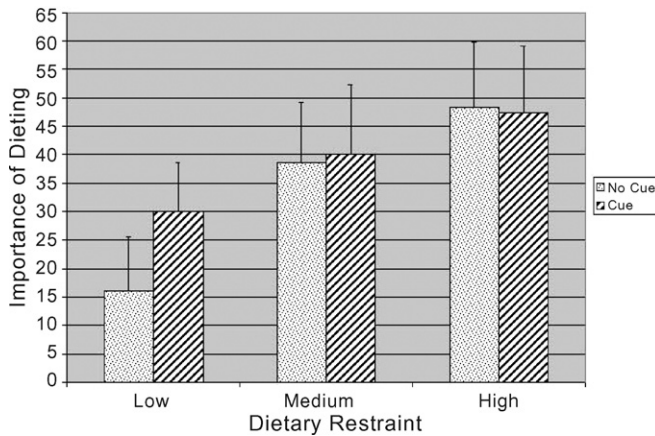
Participants' restraint status had a significant association with their body mass index (BMI) [ $F_{(2,78)} = 9.12$ ,  $p < .001$ ]. Pairwise comparisons (with a Bonferroni correction) indicated that individuals with low restraint had a significantly lower BMI ( $M = 20.6$ ,  $S.D. = 2.3$ ) than did individuals with either medium restraint ( $M = 24.3$ ,  $S.D. = 5.2$ ) or high restraint ( $M = 25.0$ ,  $S.D. = 4.0$ ),  $p < .005$ , who did not differ from one another. There were no significant group differences for ratings of hunger or satiety (all  $p$ 's  $> .1$ ).

### Values Questionnaire

An ANOVA was performed on the rated importance of dieting, using restraint status and food-cue condition as independent variables. This analysis demonstrated that there was a significant main effect of condition on the rated importance of dieting [ $F_{(1,79)} = 4.12$ ,  $p < .05$ ], with individuals in the cue condition reporting a higher importance of dieting ( $M = 39.2$ ,  $S.D. = 12.8$ ) than those in the no-cue condition ( $M = 34.3$ ,  $S.D. = 17.2$ ). There was also a significant main effect of restraint [ $F_{(2,79)} = 36.88$ ,  $p < .005$ ], with individuals who were high in restraint reporting a greater importance of dieting ( $M = 47.8$ ,  $S.D. = 11.5$ ) than those who had medium levels of restraint ( $M = 39.4$ ,  $S.D. = 11.4$ ), who in turn reported a higher importance of dieting than those who were low in restraint ( $M = 23.0$ ,  $S.D. = 11.4$ ; pairwise comparisons with a Bonferroni correction indicated that all means significantly differed from one another,  $p < .02$ ). These main effects were qualified by an interaction between restraint status and food-cue condition [ $F_{(2,79)} = 3.72$ ,  $p < .03$ ; see Fig. 1]. Neuman-Keuls post-hoc analyses indicated that low-restraint individuals who were exposed to a food cue had significantly higher ratings of the importance of dieting compared to low-restraint individuals who

<sup>1</sup> These measures were included as part of an additional research question investigating the effects of food-cue exposure on cognitions and expectations of eating, and are not detailed here for the sake of brevity.

<sup>2</sup> The mean restraint score of participants was 14.3 ( $S.D. = 6.4$ ), which is in line with previous research (e.g., Ruderman, 1983). The mean scores for each of the groups were as follows: low-restraint  $M = 6.6$  ( $S.D. = 2.1$ ), medium-restraint  $M = 13.8$  ( $S.D. = 1.2$ ), and high-restraint  $M = 21.2$  ( $S.D. = 3.1$ ).



**Fig. 1.** Self-reported importance of dieting (mean  $\pm$  standard deviation) for individuals in the no-cue condition (low-restraint  $n = 12$ ; medium-restraint  $n = 12$ ; high-restraint  $n = 17$ ) and food-cue condition (low-restraint  $n = 12$ ; medium-restraint  $n = 16$ ; high-restraint  $n = 14$ ).

were in the control (no-cue) condition ( $p < .005$ ). There were no significant differences across the cue conditions for individuals who were either medium or high in dietary restraint ( $p > .7$ ).

## Discussion

As expected, the self-reported value of dieting was not higher after food-cue exposure for individuals who are already high in dietary restraint. Contrary to predictions, however, the only group that was influenced by food-cue exposure was the low-restraint group: the reported value of dieting-related goals for individuals who were low in dietary restraint was significantly higher after exposure to the food cue compared to the control (no-cue) condition. These findings suggest that acute exposure to an olfactory food cue can influence the value attached to dieting-related goals, supporting previous research on counteractive self-control (i.e., Fishbach et al., 2003; Trope & Fishbach, 2000). However, this exposure to temptation appears to influence only individuals with low levels of dietary restraint; those who already value this goal highly are not induced to value it even more.

It was initially hypothesized that individuals who have high levels of dietary restraint might not be influenced by exposure to a food cue because their scores would already be at the ceiling of the possible range of scores. Although both medium and highly restrained eaters reported valuing dieting more than did those low in dietary restraint, their scores were not nearing ceiling levels. However, it is possible that a longer exposure period or a more salient temptation may be necessary to bolster the importance of dieting for those who already value this goal. This being said, previous research (e.g., Fedoroff, Polivy, & Herman, 2003; Jansen & van den Hout, 1991; Rogers & Hill, 1989) has demonstrated that restrained eaters eat *more* after exposure to salient food cues, which suggests that perhaps they experience a *decrease* in the value of dieting after attending to cues for fattening foods. It is possible that differences in the manner of food-cue exposure may account for these apparent inconsistencies with this previous research, and that of Fishbach et al. (2003) which demonstrated food choices consistent with the goal of dieting after cue exposure.

In both the current study, as well as the study conducted by Fishbach et al., the food-cue exposure was incidental and participants were not instructed to attend to the cue. In contrast, in previous studies which have demonstrated that overeating occurs in restrained eaters who are exposed to a food cue, the food-cue exposure typically consisted of instructing participants to attend to and concentrate on a plate of food (e.g., Jansen & van den Hout, 1991). Therefore, it is possible that direct exposure to appealing food-related cues overwhelms individuals' intentions to diet, resulting in increased intake. Future research which delineates how the manner of food-cue exposure influences dieting-related goals and behavior is warranted.

Although the results of the current study may initially appear somewhat paradoxical (i.e., that those who are lowest in dietary restraint are most affected by food-cue exposure), it is important to take into account that weight and shape concerns are in fact normative in young women. For example, in a large sample of college students, 82% reported having a desire to lose weight, despite the fact that less than 2% were actually above a healthy weight (Heatherton, Mahemdi, Striepe, Field, & Keel, 1997). Therefore, even those scoring low on measures of dietary restraint are still likely to have some weight and shape concerns. The fact that Fishbach et al. (2003) excluded only 5 out of a total of 72 potential participants for being nonrestrained provides further evidence for the high prevalence of some degree weight and shape concerns. The current results illustrate the importance of using established measures of dietary restraint (such as the Restraint Scale) when assessing the effects of exposure to food temptations, as different levels of concern with dieting may lead to differences in self-control processes.

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