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Short communication

How chocolate keeps you slim. The effect of food temptations on weight watching goal importance, intentions, and eating behavior

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ABSTRACT

In the Western rich food environment, people are constantly confronted with palatable but unhealthy food products. For those who would like to watch their weight, the appeal of immediate satisfaction is in conflict with their long-term weight watching goal, constituting a classic self-control dilemma. The current studies were designed to test the effect of food temptations on self-regulation mechanisms. Hypotheses were based on counteractive control theory stating that temptations trigger goal-directed behavior, thereby forming an adaptive self-regulation mechanism. Two experimental studies showed that exposure to food temptations, compared to a control condition, yielded enhanced goal importance (Study 1), goal intentions, and goal-directed behavior (i.e., healthy eating; Study 2). It is concluded that confrontation with temptations is not always undermining self-control and may even be beneficial for long-term goal pursuit.

In our Western 'obesogenic environment' (e.g., French, Story, & Jeffery, 2001), people are confronted everywhere with palatable but unhealthy food products. Billboards with giant ice cream cones, the smell of fresh apple pie in supermarkets, and windows exposing the most delicious chocolates are all designed to seduce customers. With many people trying to watch their weight, these food temptations inevitably evoke a conflict between immediate satisfaction and the long-term weight watching goal. Finding a balance between the two sides of this temptation dilemma involves self-regulation processes (e.g., Baumeister & Heatherton, 1996). As self-control (i.e., "control over the self by the self", Muraven & Baumeister, 2000) to resist the appeal of immediate satisfaction is required but not always available, people tend to think they should better avoid temptations. Taking a counteractive control approach (following Trope & Fishbach, 2000), the current paper aims to show that food temptations do not always lead to indulgence, but can rather trigger healthy eating behavior by boosting the importance of the weight watching goal and increasing intentions to initiate goal-directed behavior.

Within the self-control literature, temptations are typically seen as responsible for triggering impulsive behavior aimed at immediate satisfaction, thereby undermining the long-term weight watching goal (e.g., Muraven & Baumeister, 2000). For example, the hot/cool framework proposed by Metcalfe and Mischel (1999) predicts that temptations activate the 'hot', impulsive system. As a result, people give in to the temptation while the 'cool', rational system representing long-term goals becomes powerless. In order to suppress impulses, cognitive resources are required (Baumeister & Heatherton, 1996). As these resources are limited and easily reduced, successful self-control is complicated (e.g., Baumeister & Heatherton, 1996; Muraven, Tice, & Baumeister, 1998; Vohs & Heatherton, 2000). When cognitive resources are not available, behavior is best predicted by automatic impulses (e.g., Hofmann, Rauch, & Gawronksi, 2007), often leading to indulgence when confronted with temptations.

In contrast with the classic view of temptations compromising long-term weight goals, counteractive control theory (Trope & Fishbach, 2000) posits that rather than inhibiting the long-term goal, temptations may automatically trigger goal-directed behavior by mentally activating the long-term goal. In the context of self-regulation of eating behavior, this means that food temptations would actually remind people of their weight watching goal and thus consequently lead to successful self-control. A mechanism as such would be very adaptive as it allows for successful goal pursuit in difficult situations, because the *automatic* activation of goal-directed behavior implies that cognitive resources are not necessarily needed. Indeed, it has been shown that confrontation with temptations enhances the mental accessibility of long-term goals and facilitates goal-directed behavior (Fishbach, Friedman, & Kruglanski, 2003). Along the same lines, it has been found that restrained eaters consumed less after exposure to olfactory food

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cues as compared to a neutral scent condition (Coelho, Polivy, Herman, & Pliner, 2009), and that exposure to palatable foods that were available for consumption (so-called 'actionable temptations') lead to reduced consumption on a subsequent taste test compared to non-actionable temptations (Geyskens, DeWitte, Pandelaere, & Warlop, 2008).

An interesting perspective on the mechanism underlying temptations triggering self-control is provided by recent work conducted by Myrseth, Fishbach, and Trope (2009): the subjective valuation of temptations was reduced when they were made available as compared to when they were unavailable. That is, the confrontation with the self-control dilemma lead unhealthy snacks to be considered less attractive. A reduction of temptation attractiveness could be viewed as being an important factor that has its effect on one side of the temptation dilemma, with the long-term (i.e., weight watching) goal on the other side. Complementary to a devaluation of temptations, then, a boost of the goal value would be a plausible effect of exposure to temptation, thereby counteractively assisting goal-directed behavior. A first indication of this effect is provided by Coelho, Polivy, Herman, and Pliner (2008), who showed that unrestrained eaters who were exposed to an olfactory food cue indeed reported higher weight watching goal importance than unrestrained participants in a control condition with no food cue.

One intriguing aspect of their results, however, was that the effect of boosted goal importance after temptation exposure was found only for unrestrained eaters (i.e., women who were not or only little concerned about their weight), raising the question whether weight watching was an actual 'goal' for this group. Although the authors state that also unrestrained women may have a desire to lose weight, this was not assessed in their studies. Therefore, the first aim of the current paper was to further establish the effect of exposure to temptations on weight watching goal importance. To provide a more direct test of this effect, the current studies will be conducted among samples consisting of women who report they want to lose weight.

The second aim of the current paper was to put forward goal intentions as a relevant factor in counteractive control mechanisms. Being one of the main predictors of behavior (Theory of Planned Behavior, Ajzen, 1985), the lack of research showing counteractive control processes affecting goal intentions constitutes a surprising gap in the literature. Based on the implications of the studies described above, it is predicted that confrontation with temptations yields boosted goal intentions, which in turn are precursors of goal-directed behavior (i.e., healthy eating).

Finally, to complete the story, the third aim was to show that the predicted counteractive control effects translate into actual behavior. Although an effect of confrontation with temptations on goal importance and intentions is interesting by itself, the ultimate counteractive control effect is to be demonstrated on a behavioral measure. Fishbach et al. (2003; Study 5) showed that participants who were primed with food temptations were more likely to choose an apple over a chocolate bar, as compared to participants in a neutral control condition. To minimalize any possible demand or social desirability effects, in the current studies a particularly subtle measure of snack choice will be employed by letting participants choose between two snacks that are equally liked and priced, but differ with regard to the extent that they are considered healthy foods.

Two studies were conducted manipulating exposure to temptation and assessing the effects on weight watching goal importance (Study 1), goal intentions, and goal-directed behavior (Study 2). It was expected that exposure to food temptations, compared to a neutral control condition, boosted (a) the importance attached to the weight watching goal; (b) intentions to perform goal-directed behavior; and (c) healthy eating behavior.

Study 1

Study 1 was designed to test the effect of food temptations on the importance of the weight watching goal. The study was conducted among female students, as this is a group known to be concerned with their weight (e.g., Wardle, Haase, & Steptoe, 2006). Exposure to food temptations was manipulated using pictures of a chocolate cake, as chocolate can be regarded as an important food temptation for this population (Weingarten & Elston, 1991). It was expected that exposure to temptations, compared to a neutral control condition, enhanced the importance of the weight watching goal.

Method

Participants

Ninety-six female students were recruited from the university campus and participated in exchange for money or partial course credit. Data from participants who did not have the goal to lose weight ($n = 21$) were not included in the analyses, as the weight watching goal was deemed not relevant for these women. Furthermore, data from three obese women (BMI [Body Mass Index = weight/(length $\times$ length)] > 30) were excluded from analyses, as obesity has often been related to abnormal responses to food cues (e.g., Stice, Spoor, Ng, & Zald, 2009). Inclusion of data from obese women did not yield different results, though. The final sample consisted of 73 women, with a mean age of 24.4 years ($SD = 7.0$) and a mean BMI of 23.5 kg/m^2 ($SD = 2.2$). On average, participants wanted to lose 5.5 ($SD = 4.4$) kilograms of weight.

Procedure and materials

Participants were welcomed and seated individually in a quiet place in the university restaurant. The first part of the experiment consisted of a bogus memory task in which participants were exposed to either a food temptation (temptation condition) or a flower (control condition), entailing a between-subjects design. Immediately afterwards, the dependent variable (i.e., goal importance) was assessed.

Temptation

Participants were presented with a picture of either a chocolate cake (temptation condition) or a flower (control condition) for 30 s that were unobtrusively timed by the experimenter with a stopwatch. To shield the purpose of the manipulation, the pictures were presented as part of a memory task. Participants had to answer six oral questions about the picture (e.g., 'what colors did you see') after it was shown. The pictures were pilot tested in a separate study among 30 female students. The chocolate cake picture was considered very attractive ($M = 6.40$, $SD = .83$ on a 7-point scale), indicating it being a valuable temptation manipulation. To make sure that any found effects would not be due to differences in induced positivity, the neutral flower picture was matched to be rated equally positive ($M = 5.53$, $SD = .64$) as compared to the temptation picture ($M = 5.40$, $SD = 1.18$); $F < 1$.

Goal importance

Goal importance was assessed with 1 item assessing 'the extent to which the goal of losing weight was important' for participants. The question could be answered on a Likert scale ranging from 1

(*not at all important*) to 7 (*very important*), and was embedded in between filler questions. Both the pictures and the goal importance questions were presented on paper.

Results and discussion

An Analysis of Variance (ANOVA) with condition as independent variable and goal importance as dependent variable yielded a significant condition effect; $F(1, 70) = 6.11$, $p < .05$, $\eta_p^2 = .08$. For participants in the temptation condition the weight watching goal was more important ($M = 4.7$, $SD = 1.2$) than for participants in the control condition ($M = 3.9$, $SD = 1.3$). Neither BMI nor the amount of weight participants wanted to lose were significant covariates ($p = .68$ and $p = .57$, respectively).

The results confirmed our hypothesis that goal importance was enhanced after exposure to temptation, replicating the findings of Coelho et al. (2008). The findings add to the implications brought forward by Myrseth et al. (2009), who showed that temptations were valued less when made available. The combination of reduced temptation attractiveness and an enhancement of goal importance promises to be an adaptive self-regulation mechanism. Study 2 aimed to extend the findings of Study 1 by incorporating goal intentions and actual behavior.

Study 2

Study 2 was designed to test whether the effect of temptation exposure also translates into actual goal intentions. Moreover, a behavioral measure was included to test whether participants exposed to temptations display more healthy behavior as compared to participants without such exposure. The temptation manipulation procedure was slightly changed, to rule out the possibility that posing the bogus memory questions *after* the pictures (as in Study 1) lead to a diminished experience of temptation due to the time interval between the temptation exposure and the assessment of the dependent variable.

Method

Participants

Seventy female students participated in exchange for partial course credit or money. Participants who indicated they did not have the goal to lose weight ($n = 16$) were not included in the analyses. The final sample consisted of 54 women, with a mean age of 21.2 ($SD = 2.6$) years, and a mean BMI of 22.2 ($SD = 2.0$). No participants were underweight (BMI < 18) or obese (BMI > 30). On average, participants wanted to lose 4.0 ($SD = 2.5$) kilograms of weight.

Procedure and materials

The experiment was conducted in a laboratory, where participants were seated individually behind laptop computers. All instructions, the manipulation pictures, and the questions were programmed on the computer such that no interruption by the experimenter was required during the procedure.

Temptation

Participants were presented with pictures of either a chocolate cake (temptation condition) or a flower (control condition). Two copies of the picture were presented on a screen, and participants were given 30 s to find the alleged differences between the two, to make sure they would pay attention to the stimulus.

Goal intention

Immediately after the temptation manipulation goal intention was assessed with two items ('To what extent are you planning to eat more healthily' and 'To what extent do you intend to eat more healthily'; Cronbach's alpha = .86), that could be answered on Likert scales ranging from 1 (*not at all*) to 7 (*very much*).

Snack choice

At the end of the experiment, participants were instructed to open a box containing a healthy and an unhealthy snack from which they could choose one, ostensibly as a reward for participation. Importantly, there was no interaction with the experimenter at this stage, reducing the possibility of choices being driven by social desirability. Participants' choice was recorded by the experimenter once they had left the room, by looking which snack was left in the box. The healthy snack was a wholegrain cookie; the unhealthy snack a chocolate cookie. A pilot test revealed that both snacks were equally liked and priced, but the wholegrain cookie was evaluated as being more healthy than the chocolate cookie.

Results

Goal intention

An Analysis of Covariance (ANCOVA) was conducted with condition as independent and goal intention as dependent variable. Both BMI and the amount of weight participants wanted to lose were included as possible covariates, but only the latter had a significant effect and was kept in the analysis; $F(1, 51) = 13.85$, $p < .01$. A main effect of condition was found; $F(1, 51) = 4.82$, $p < .05$, $\eta_p^2 = .09$. Participants who were exposed to the temptation had stronger goal intentions ($M = 4.0$, $SD = 0.9$) as compared to participants in the control condition ($M = 3.2$, $SD = 1.1$).

Snack choice

A Chi-square analysis was conducted to test whether a difference existed between conditions on snack choice. A marginally significant effect of condition was found; $\chi^2(1) = 3.65$, $p = .056$. Participants in the temptation condition more often chose a healthy snack ($n = 16$) than an unhealthy snack ($n = 11$), whereas participants in the control condition more often chose an unhealthy snack ($n = 18$) than a healthy snack ($n = 9$). Neither BMI nor the amount of weight participants wanted to lose were significant covariates ($ps > .22$).

General discussion

Two studies were conducted testing the effect of exposure to food temptations on weight watching goal importance, goal intentions and behavior. It was shown that participants who were exposed to temptations reported higher goal importance and intentions as compared to participants in the control condition. Additionally, behavioral effects were found, showing that participants who were exposed to temptations more often chose healthy snacks than unhealthy snacks, whereas for participants in the control condition a reversed pattern was found; albeit the effect was only marginally significant. The studies confirmed our hypotheses based on the implications of counteractive control theory.

The enhanced goal importance, intentions and behavior after exposure to temptations are illustrative of an adaptive self-regulation mechanism, helping people to resist temptations in difficult situations. It should be noted, though, that a mechanism as such cannot always work this way. That is, if temptations would

always trigger goal-directed behavior, people would not experience so many difficulties trying to lose weight. Therefore, individual or situational characteristics that facilitate or impede the working of counteractive control mechanisms should be investigated in future research. For example, temptation strength could be an important moderator, such that strong temptations do indeed trigger counteractive control processes, whereas weak temptations do not (see also Geyskens et al., 2008). Alternatively, it could be the case that a certain threshold of temptation strength exists above which counteractive control mechanisms are no longer activated or overruled by impulses.

The current studies have a number of methodological strengths. First, the use of pictures forms a relevant presentation mode for the study of temptations. Pictures comprise an important part of visual advertisements surrounding our environment aiming to seduce people into indulgence (e.g., Seiders & Petty, 2004). Second, goal importance and intentions were assessed by asking explicit questions. This nicely adds to studies that use implicit measurements in reaction to temptations (e.g., goal accessibility; Fishbach et al., 2003). With temptations having similar effects on implicit and explicit measures of self-regulation processes, the counteractive control effect appears rather solid. A third strength of our studies is the inclusion of a behavioral measure by letting participants choose a healthy or unhealthy snack. Rather than using two extremes of the healthy-unhealthy spectrum (e.g., apple vs. candybar), participants were deliberately offered two more closely related products (wholegrain vs. chocolate cookie), in order to prevent a choice driven by demand characteristics or social desirability.

Some limitations have to be mentioned as well. First, goal intention and behavior (Study 2) were operationalized in terms of healthy eating, which can actually be viewed as a subgoal but not a requirement for losing weight. Nevertheless, the use of this subgoal was believed to be justified. Firstly because the assessment of intentions and behavior demanded a more specified concrete goal, as 'losing weight' is not an actual behavior. Secondly, healthy eating is the pathway most taken to weight reduction among young women (e.g. Serdula et al., 1999). A second limitation concerns the external validity of the current results. We chose to use a sample of young women, as the food temptation – weight watching goal dilemma that was used as a framework for the current studies is particularly applicable to this population (e.g., Wardle et al., 2006). Although we have no indications that our results would be different for other non-pathological samples, the current sample only included female students (i.e., a young and highly educated sample). Future research may be needed to specifically investigate the extent to which the current results are generalizable to other self-regulation dilemmas or different populations.

Another interesting point for future research is the use of real 'consumable' temptation manipulations, rather than pictures. Requiring actual resistance, consumable temptations form a different category of temptations. Based on studies conducted by Geyskens et al. (2008), it can be expected that even stronger counteractive control effects will emerge when real products are used. In addition, deprivation may be a relevant factor to study in this regard. When people have been deprived from palatable, fattening food products for a long time, impulses to indulge may take over more easily.

Finally, future research would be needed to investigate the practical applicability of the current results. As mentioned before, people are frequently confronted with pictures of 'forbidden foods'. Although these pictures (e.g., advertisements) are believed to seduce people into indulgence, they may in fact prepare for effective self-regulation. Taking it one step further, based on the current studies it could be speculated that putting up pictures of food temptations on your fridge may help to keep your weight watching goal in mind. These or other possible applications could be valuable for intervention programs helping people to watch their weight.

Altogether, the current studies add to research on self-regulation and counteractive self-control by showing that exposure to temptations leads to enhanced goal importance and intentions, assisting successful self-regulation. Besides being theoretically relevant, the present results suggest that there is no necessity to always avoid temptations: confrontation with temptations from time to time may actually be helpful.

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