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Handling tempting food in a non-consummatory context reduces subsequent consumption of other tempting food: An extension beyond sweet snacks

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ABSTRACT

The modern environment is characterized by an abundance of tempting food. One potential procedure to help consumers deal with food temptations is the pre-exposure procedure. It has been demonstrated that pre-exposing people to a tempting sweet product in a situation that subtly discourages consumption reduces their subsequent consumption of similar sweet temptations. This study investigated whether the pre-exposure effect could be observed with savory products as well, and whether the effect crossed from sweet to savory food and the other way around. The study exposed 144 participants to either salty sticks, chocolate sticks, or wooden sticks (control condition) in the context of geometric puzzles. Compliance with the task implied no consumption. Participants' subsequent consumption of salty nuts or chocolate coated nuts was then measured in the context of a taste test that followed the initial puzzle task. The results revealed that pre-exposing participants to tasty sticks that they handled but did not consume, reduced their subsequent snack consumption compared to the control condition, irrespective of taste. This suggests that the pre-exposure effect generalizes to savory food products, and the consumption reduction effect crosses tastes. These findings are valuable for both researchers and practitioners interested in understanding and developing paradigms to reduce the consumption of high-caloric food.

1. Introduction

With over 250 food decisions every day (Wansink & Sobal, 2007), people are facing a continuous struggle between controlling food intake and immediate indulgence. Especially the abundance of high-caloric food has been seen as one of the major factors contributing to the increasing prevalence of obesity (e.g. Blundell et al., 2005). Exposure to food temptations is known to boost consumption (e.g. Lambert, Neal, Noyes, Parker, & Worrel, 1991). Therefore, strategies to deal with everyday temptations are mainly focusing on either banning temptations (for example, removing soft drinks from vending machines in schools) or on the effortful resistance to temptations (for example by committing to pay an amount of money when failing to reach a previously specified goal; Appelhans, French, Pagoto, & Sherwood, 2016). Banning temptations can only be implemented in restricted environments (e.g. schools, home environment) and it does not seem to have positive spill-over effects to situations outside the restricted environment (e.g. Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016). Resistance strategies often rely on executive functions, as for example inhibitory control (Jansen, Houben, & Roefs, 2015). However, it has been shown that in tempting situations, executive functioning is often weakened (Appelhans et al., 2016). Therefore the focus of this paper will be on the further extension of a procedure that may solve both challenges simultaneously: the pre-exposure procedure. In the pre-exposure procedure, individuals are exposed to a tempting food item in a context where eating would interfere with task compliance (e.g. making a word puzzle with candy letters). Recent research on the pre-exposure procedure suggests that exposure to temptations while resisting the temptation may boost rather than decrease successful resistance to temptation in certain well-designed circumstances (de Boer, de Ridder, de Vet, Grubliauskiene, & Dewitte, 2015; Duh, Grubliauskiene, & Dewitte, 2016; Geyskens, Dewitte, Pandelaere, & Warlop, 2008). These studies demonstrate that exposure to tempting food in a task context that requires consumers to use the temptation in a way that prevents them from eating it, results in reduced consumption of a similar snack in a subsequent consumption opportunity. Up to now, this effect has only been investigated with sweet snacks in both the pre-exposure phase and the consumption phase. Considering that people are not only tempted by sweet snacks, this paper tests

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whether the pre-exposure effect also holds for savory snacks, and whether the effect crosses over tastes.

1.1. The pre-exposure procedure

Exposure to food temptations puts people in an indulgence-resistance conflict. This conflict can be solved by either giving into the temptation (and eat the food), or by resisting and not eating the snack. Although most research is focused on how temptations lead to indulgence (e.g. Baumeister, 2002; Papies, Stroebe, & Aarts, 2008), some researchers also focus on how temptations can actually boost self-control. Under specific conditions, self-control can be boosted rather than reduced in the context of a temptation (Kroese, Evers, & De Ridder, 2009; Myrseth, Fishbach, & Trope, 2009; Trope & Fishbach, 2000). While previously this effect seemed to require the presence of a food restriction goal that the temptation activated (Fishbach, Friedman, & Kruglanski, 2003; Kroese et al., 2009), more recent evidence demonstrated that the presence of the food restriction goal is not required (e.g. de Boer et al., 2015; Geyskens et al., 2008; Grubliauskiene & Dewitte, 2014). In the original pre-exposure task used by Geyskens et al. (2008), participants were instructed to link taste descriptions of Quality Street© candy to the wrappings of the candies (which were physically present). This task implicitly invites them to refrain from consuming in the first phase. In the second phase, and presented as a different study, the participants engaged in a so-called taste test. They were asked to rate M&M's© and were allowed to consume as much as they wanted. The main finding was that participants who had been exposed to candy (without eating) in the first phase, ate less during the taste test than those that had not been exposed to tempting candy before. In other words this study and its replications suggested that the experimental task can provide a temporary food restriction goal that conflicts with eating. There is some evidence that the behavioral conflict in the first phase (i.e. eating the food versus task compliance) triggers cognitive control processes to solve this conflict (de Boer et al., 2015; Dewitte, Bruyneel, & Geyskens, 2009), a mechanism based on cognitive control theory (Miller & Cohen, 2001). These cognitive control processes might divert attention from the taste as a way to solve the behavioral conflict. The strategy to divert attention from the taste would then spill over to subsequent situations with a similar behavioral conflict (Dewitte et al., 2009).

Interestingly, follow-up studies have replicated the pre-exposure effect with different manipulations (word puzzles with food, drawings with food, self-inflicted exposure in a waiting task), different populations (children, South-African sample) and a time-lag between the two phases (de Boer et al., 2015; Duh et al., 2016; Grubliauskiene & Dewitte, 2014). In this paper, we want to extend the applicability of this procedure over taste. The next section will focus on the importance of taste for the applicability of the pre-exposure procedure.

1.2. A taste specific or general effect?

Previous research on the pre-exposure effect per se has only focused on sweet temptations (in both phases). It is not clear from these studies, however, whether the procedure would work for other tastes (e.g. savory temptations in both phases). Given that humans have an unlearned preference for sweet food (Benton, 2004; Birch, 2003) and learn a preference for salty food very early in life (Schwartz, Issanchou, & Nicklaus, 2009; Stein, Cowart, & Beauchamp, 2012), savory temptations should produce an equally robust pre-exposure effect, as long as the products used are experienced as tempting, and induce a behavioral conflict. For example, Fedoroff, Polivy, and Peter Herman (2003) demonstrated the enhanced response of restrained eaters to food cues both for sweet (cookies) and savory (pizza) food. A second, and equally important question is whether the procedure would work for dissimilar tastes as well (sweet temptations in the first phase and savory in the second phase, or the other way around). Given the variety of food cues in the daily environment, a generalizable pre-exposure procedure could be a very promising tool in the battle against overconsumption. According to the cognitive control theory, Dewitte et al. (2009) demonstrated that the behavioral conflict induced by the pre-exposure phase should be similar to the conflict in the subsequent phase in order to generate the pre-exposure effect. However, based on that study it is not clear how similar this conflict should be. Based on food exposure studies, both a food-specific effect or a more generalizable effect could be possible. For example, several studies demonstrated food cue specificity after exposure to the smell of a tempting food (Chambaron, Chisin, Chabanet, Issanchou, & Brand, 2015; Fedoroff et al., 2003; Gaillet-Torrent, Sulmont-Rossé, Issanchou, Chabanet, & Chambaron, 2014; Lambert et al., 1991; Ramaekers et al., 2016). In addition, according to habituation theory, repeated exposure to a stimulus reduces responding to this stimulus. However, switching from one taste to another would recover the response to the food (Epstein, Temple, Roemmich, & Bouton, 2009), although habituation is slower to emerge when there is no consumption (McSweeney & Murphy, 2009). However, studies focusing on the self-regulatory processes do not imply specificity. Kleiman, Hassin, and Trope (2014) showed that cognitive control processes induce a generalized control mind set. In the food domain, Kroese, Evers, and De Ridder (2009, 2011) showed that exposure to tempting food reduced subsequent snack intake (of another type).

Therefore, the aim of this study is two-fold. First, we will test whether the pre-exposure effect can be produced with savory tempting snacks (in both phases). Second, we will manipulate the similarity of the tastes in phase 1 and 2 and test whether the pre-exposure extends across tastes. In order to explore the scope of the procedure, we start from the core paradigm to test the pre-exposure procedure (Duh et al., 2016; Geyskens et al., 2008). In this core version of the paradigm, participants are exposed to sweet temptations (vs. control stimuli that look similar) while they are engaged in a task that prevents them from eating the temptations. In the second phase, participants engage in a taste-test of a (different) sweet snack and their actual consumption is measured. In the present extension, we add a salty condition (in addition to control and sweet) to the first phase, and in the taste test, we add a savory version of the taste test (in addition to the sweet version of it). If the pre-exposure effect can be produced with savory tempting snacks (in both phases), but does not generalize over taste (crossing), we expect a main effect of taste (salty and sweet < control) and an interaction effect between pre-exposure manipulation in phase 1 and taste in phase 2 (sweet exposure reduces sweet consumption and savory exposure reduces savory consumption but no cross link). If the pre-exposure effect extends across taste, we also expect a main effect of pre-exposure, without an interaction (control versus sweet pre-exposure and control versus salty pre-exposure, irrespective of taste in the taste test).

2. Method

2.1. Design and participants

The study used a 3 (pre-exposure: sweet, salty, or control) by 2 (taste test: sweet or salty) between-subjects design. Participants were randomly assigned to one of the conditions, with the restriction that the pre-exposure conditions were run in separate sessions of 6–10 participants for procedural efficiency.