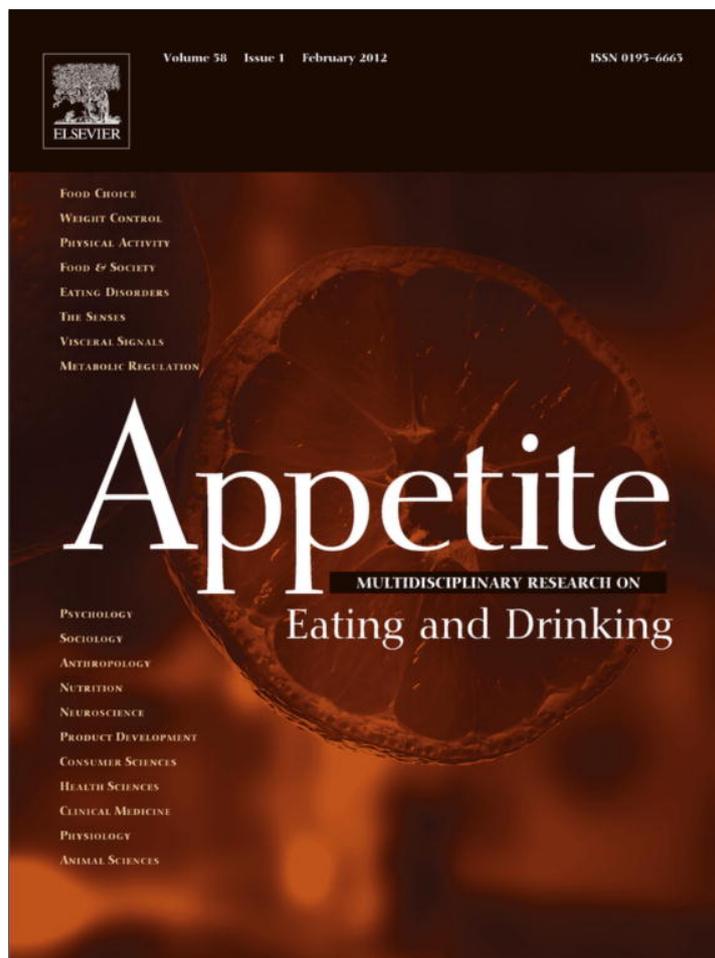


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## Research report

# Healthy dining. Subtle diet reminders at the point of purchase increase low-calorie food choices among both chronic and current dieters<sup>☆</sup>

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## ARTICLE INFO

### Article history:

Received 27 July 2012

Received in revised form 17 October 2012

Accepted 30 October 2012

Available online 6 November 2012

### Keywords:

Current dieting

Chronic dieting

Food choice

Intervention

Behavior change

Goal priming

## ABSTRACT

There is a growing consensus that our food-rich living environment contributes to rising numbers of people with overweight and obesity. Low-cost, effective intervention tools are needed to facilitate healthy eating behavior, especially when eating away from home. Therefore, we present a field experiment in a restaurant that tested whether providing subtle environmental diet reminders increases low-calorie food choices among both chronic and current dieters. For half of the participants, the menu was supplemented with diet-related words, as reminders of healthy eating and dieting. We recorded customers' choices of low-calorie or high-calorie items from the menu, and we assessed chronic and current dieting. Consistent with our hypotheses, we found that diet reminders increased choices for low-calorie foods, among both chronic and current dieters. After a diet reminder, around half of dieters made a healthy menu choice. This study demonstrates the efficacy of providing subtle diet reminders as a low-cost practical intervention to increase low-calorie food choices among weight-concerned individuals, who are motivated to regulate their eating behavior but have been found to often fail in food-rich environments.

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## Introduction

People in industrialized countries are regularly exposed to high and low calorie foods that are relatively inexpensive and easily available. The combination of a food-rich environment and the impulsive tendency to select high-calorie foods likely contributes to current rising numbers of people with overweight, in often subtle ways (e.g., Chou, Grossman, & Saffer, 2004; Cohen, 2008; Levitsky & Pacanowski, 2012; Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). Because policy changes targeting our food-rich environment may require complex and time-consuming political decisions (Swinburn et al., 2011), developing feasible interventions that easily reduce high calorie food choices within this environment is currently an important area for scientific inquiry (Hill, Wyatt, Reed, & Peters, 2003; Levitsky, 2005; Levitsky & Pacanowski, 2012).

However, even though the study of environmental influences on eating behavior is making important advances, little is known about causal mechanisms that effectively change people's food choices within food-rich environments (Glanz & Hoelscher, 2004). Based on the notion that people's behavior, including their

eating behavior, is for a large part influenced by environmental cues (Cohen, 2008; Dijksterhuis & Bargh, 2001; Levitsky & Pacanowski, 2012; Sheeran, Gollwitzer, & Bargh, in press; Wansink, 2004), the present research tests whether subtle environmental cues that remind people of healthy eating and dieting may increase choices for low-calorie rather than high-calorie foods. This way, we offer an innovative perspective on how to apply psychological insights to develop feasible and effective interventions in order to reduce caloric intake in food-rich environments.

Psychological research over the last decade has accumulated an astounding set of findings on how features of our environment can subtly activate mental representations of personal concerns and goals and change people's behavior (Dijksterhuis & Bargh, 2001). Bargh, Lee-Chai, Barndollar, Gollwitzer, and Trötschel (2001), for example, showed that participants who were unobtrusively exposed to words related to performing well (e.g., achievement), which were integrated into a puzzle task in the first phase of an experiment, subsequently behaved in a more achievement-oriented manner than participants who were not exposed to these achievement reminders. Later studies replicated these findings in many domains, and showed that unobtrusive environmental reminders can influence behaviors such as keeping the environment clean, earning money, seeking casual sex, and helping strangers (see Papies and Aarts (2010) for an overview).

However, surprisingly little of these insights have been systematically applied to understanding and modifying health behavior, although they could be especially relevant here (Marteau,

<sup>☆</sup> *Acknowledgements:* Writing this paper was supported by a Grant (VENI-451-10-027) from The Netherlands Organization for Scientific Research awarded to the first author. We would like to thank Erik van Ree for his help in collecting the data.

*Conflict of interest:* The authors declare no conflict of interest.

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Hollands, & Fletcher, 2012; Shalev & Bargh, 2011; Sheeran et al., in press). Indeed, a recent meta-analysis of the degree to which conscious intentions influence behavior has revealed that the impact of intentions (such as dieting intentions) is rather limited, and it has hence been argued that behavior change attempts should go beyond changing people's intentions (Webb & Sheeran, 2006). This notion appears particularly relevant for the domain of eating behavior, in which it has been shown that even people who have strong intentions to restrict their food intake (e.g., chronic dieters, Herman & Polivy, 1980) often fail to act on such intentions. Indeed, successful weight loss and dieting behavior is very difficult to maintain in the long term, and particularly when one is confronted with attractive food cues (Lowe et al., 2006; Mann et al., 2007; Thomas, Doshi, Crosby, & Lowe, 2011).

A growing body of laboratory research (see Papies (2012) for an overview) is now showing how the mere perception of tasty high-calorie foods, as often occurs in food-rich environments, can automatically trigger the motivation to enjoy good food, especially in people struggling with their weight. In response to the exposure to tasty food cues, chronic dieters have been shown to activate hedonic thoughts and positive affect about food, see tasty food as bigger in size, allocate more visual attention to it, and may actually eat more of it, compared to non-dieters (Fedoroff, Polivy, & Herman, 1997; Hofmann, van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010; Papies, Stroebe, & Aarts, 2007, 2008a; van Koningsbruggen, Stroebe, & Aarts, 2011; Veling, Aarts, & Papies, 2011). Integrating such findings, tasty food cues have been argued to activate the hedonic goal of enjoying good food in chronic dieters (Stroebe, van Koningsbruggen, Papies, & Aarts, in press). This goal, however, is usually incompatible with the goal of dieting in order to control one's weight. Indeed, chronic dieters are highly ambivalent about tasty food, particularly because they realize that eating it interferes with their long-term goal of weight regulation (Papies, Stroebe, & Aarts, 2009). Thus, because the goals of enjoying good food and of weight control are conflicting, the goal of weight control is inhibited in mind when the hedonic eating goal is triggered by tasty food cues (Papies, Stroebe, & Aarts, 2008b; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008). As a result of this diet goal inhibition, hedonically driven behavior is more likely to result, at the cost of healthy eating and weight control. One setting where such hedonic effects are problematic is the hedonic environment of eating out in a restaurant.

#### *Restaurants as hedonic environments*

Eating out often entices people to overeat. While it is estimated that US consumers eat more than one third of their daily calories outside the home (Berman & Lavizzo-Mourey, 2008) and the consumption of out-of-home meals has been increasing over the last years (Kant & Graubard, 2004), consumers severely underestimate the levels of fat and calories of food items offered in restaurants (Bates, Burton, Huggins, & Howlett, 2011; Burton, Creyer, Kees, & Huggins, 2006). As a result, eating out, especially in fast-food restaurants, is associated with an excessive intake of calories and with an increased risk of overweight (Chou et al., 2004; Kant & Graubard, 2004), and easy and affordable access to restaurants in one's living environment is associated with a higher body weight (Chou et al., 2004; Inagami, Cohen, Brown, & Asch, 2009). Therefore, research to help consumers make healthier choices in this sector is particularly important (Food and Drug Administration, 2006).

However, healthy choices may be especially difficult in such "hedonic" situations, as the goal of enjoying food is highly salient in restaurant environments, and may be particularly likely to inhibit the goal to restrict one's caloric intake. Patrons go to a restaurant with the hedonic motivation of enjoying good food, so that this is active before they enter the choice setting. Once inside the

restaurant, this motivation is triggered by a variety of cues, such as the eating behavior of other people, the sight and smell of food, and the menu itself (e.g., Levitsky, 2005; Papies et al., 2007; Roefs et al., 2006). Restaurant patrons strongly value the palatability of the food they choose, even if they also consider its health value (Colby, Elder, Peterson, Knisley, & Carleton, 1987). In addition, rather than functioning as a single cue for hedonic eating, hedonic environmental cues serve to reactivate a hedonic motivation and maintain it over an extended period of time and most likely, at the moment of choosing from the menu. As a result, the hedonic cues present in this setting make it particularly important to prevent or counteract the inhibition of the dieting goal, in order to facilitate healthy choices.

#### *The potential of diet reminders*

The research on dieters' responses to hedonic food cues briefly described above suggests that such hedonic cues, as are abundant in restaurants, can lead to the inhibition of the dieting goal, and therefore interfere with healthy choices. Importantly, however, these findings also suggest that goal reminders, which activate cognitions related to the goal of weight control, should be able to undo this goal inhibition (see Custers & Aarts, 2010 for a discussion of relevant studies). Indeed, presenting simple diet-related words or pictures has been shown to shift dieters' attention away from tempting food items (Papies et al., 2008a) and increase their motivation toward healthy food (van Koningsbruggen et al., 2011). Thus, we suggest that diet reminders may facilitate actual dieting behavior in hedonic environments, at least among those who find it personally relevant. In other words, we suggest that in a restaurant setting, diet reminders may increase healthy, diet-congruent choices, particularly among customers who pursue the goal of dieting.

Two highly relevant groups for whom goal reminders may be particularly helpful but whose behavior in restaurants is hardly studied, are chronic dieters, who are characterized by a consistent motivation to regulate their body weight but often fail (Herman & Polivy, 1980; Stroebe et al., in press), and current dieters, who are currently and temporarily following a specific diet in order to lose weight (Lowe, 1993, 1995). Previous research suggests that both of these groups may benefit from environmental cues facilitating dieting behavior, as they are often not successful in sticking to their diet intentions.

Specifically, a large number of studies have shown that chronic dieters respond to food temptations with a hedonic motivation and easily overeat (see Stroebe et al., in press, for a recent review). Although much less studied directly, similar effects have been reported for current dieters. Research shows that following a weight loss diet does not lead to consistent weight reductions over time, that being on a diet is associated with an increase in body weight in prospective studies, and that current dieters easily overeat in tempting situations (French et al., 1994; Lowe, 1995; Lowe et al., 2006; Mann et al., 2007; Stice, Cameron, Killen, Hayward, & Taylor, 1999). In fact, and as a result of such findings, it has been suggested that dieting, rather than a reliable indicator of dietary restriction, should rather be seen as an indicator of future weight gain (Lowe & Levine, 2005).

However, it has also been found that cues that could serve as a reminder to control one's eating reduce intake in dieters. For example, after the consumption of a so-called pre-load, current dieters were found to reduce their intake of tasty food in a taste test, possibly because consuming the pre-load reminded them of their dieting intentions (Lowe, 1995; see also Guerrieri, Nederkoorn, Schrooten, Martijn, & Jansen, 2009). Similarly, in a longitudinal study where participants of a 12-week diet program maintained a focus on the weight loss goal they wanted to achieve, and kept

**Table 1**

Characteristics of non-dieters, chronic dieters, and current dieters, and their distribution over conditions.

	Non-dieters	Chronic dieters	Current dieters	Total
N per condition	$N_{\text{control}} = 21$ $N_{\text{diet reminder}} = 18$	$N_{\text{control}} = 18$ $N_{\text{diet reminder}} = 17$	$N_{\text{control}} = 9$ $N_{\text{diet reminder}} = 6$	$N_{\text{control}} = 48$ $N_{\text{diet reminder}} = 41$
BMI	$M = 22.77_a$ ( $SD = 2.75$ )	$M = 25.41_b$ ( $SD = 3.58$ )	$M = 23.87_{ab}$ ( $SD = 3.28$ )	$M = 24.00$ ( $SD = 3.37$ )
Concern for dieting scores	$M = 4.49_a$ ( $SD = 1.62$ )	$M = 10.03_b$ ( $SD = 1.94$ )	$M = 9.43_b$ ( $SD = 3.18$ )	$M = 7.42$ ( $SD = 3.38$ )

Note: Means with different subscripts within a row differ significantly at the level  $p < .05$ .

this focus active by questionnaires, discussions, and feedback, were found to lose about twice as much weight as dieters without such goal reminders (Conlon et al., 2011). However, the effect of much more direct cues in specific tempting eating situations still needs to be explored. While some evidence exists that diet reminders can affect chronic dieters (see Papies, 2012, for an overview), it remains to be tested whether they also affect current dieters. Here, we suggest that such cues may help chronic and current dieters because they serve to activate the mental representation of the dieting goal that both groups pursue.

#### The present study

The present study, thus, was set up to investigate whether diet goal reminders would facilitate healthy choices in a restaurant setting among both chronic and current dieters. In line with earlier findings, we hypothesized that both chronic and current dieters would not eat more healthily than non-dieters in the control condition, but that they would make healthier choices after a diet reminder. Because a restaurant setting continuously primes the hedonic eating motivation in consumers, which conflicts with the diet reminders, we presented these reminders directly at the point of purchase, i.e., on the menu, to activate the weight control goal at the critical moment.

## Method

### Participants and design

Participants were recruited in a café-style restaurant in a small town in The Netherlands.<sup>1</sup> Vegetarians were not included in the analyses because of the few vegetarian choices on the menu. As a result, 89 adult customers (47 women) were included, with a mean age of 36.49 years ( $SD = 9.48$ ), and a mean BMI of 24.00 ( $SD = 3.37$ ). The study had two conditions (diet goal reminders vs. control). Participants were classified as non-dieters or chronic dieters based on a median split on the concern for dieting subscale of the restraint scale (Herman & Polivy, 1980). In addition, if participants answered “yes” or “yes, a bit” to the question “Are you currently following a weight-loss diet?” (Lowe et al., 2006), they were classified as current dieters, regardless of their score on the concern for dieting scale (Lowe, 1995). This resulted in a 2 (condition: diet goal reminders vs. control)  $\times$  3 (dieting status: non-dieters vs. chronic dieters vs. current dieters) design for our experiment. Table 1 displays participant characteristics. The experiment was conducted on five evenings, namely on three Thursday nights and two Friday nights in three subsequent weeks, with conditions alternating over the weekdays.<sup>2</sup>

<sup>1</sup> This study was conducted in accordance with the institutional guidelines for human experimentation in Psychological Research of Utrecht University.

<sup>2</sup> The day of the week itself did not affect choices,  $B = -.39$ ,  $SE = .60$ ,  $p = .52$ ,  $OR = .68$ , and taking it into account as covariate did not improve the model, and left the results essentially unchanged. Therefore, this variable was not considered further in our analyses.

### Materials

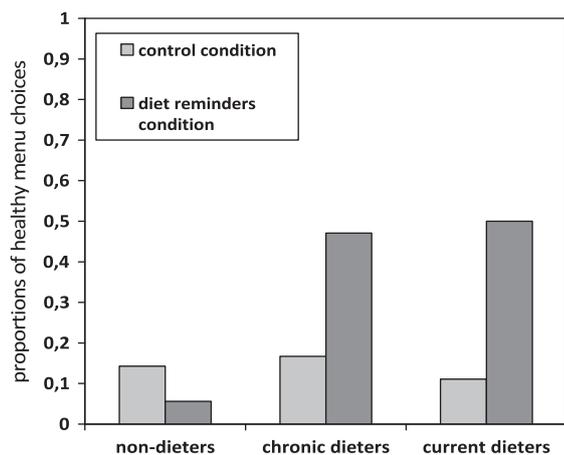
The dinner menus, which were lying on each table, were supplemented with a plasticized sheet announcing a special offer of entree salads in three versions (containing fish, containing meat, or vegetarian). Due to this set-up of the study, all participants at one table received the same prime. These salads were presented in a separate part of the menu (see Fishbach & Zhang, 2008). Each salad was briefly described based on the information provided by the cook, mentioning the main ingredients as well as a serving of whole-wheat bread. In the diet reminders condition, the description of the salads was supplemented by the brief phrases such as “Low in calories”, “calorie-conscious” and “Are you also watching your weight?” (translated to English; based on Papies & Hamstra, 2010), printed on the margins around the main text of the offer. In the control condition, these diet-related words were not added, but replaced by the phrase “special offer”.

### Food choice measure

In addition to these entree salads, the menu of the café-style restaurant offered Saté of pork with fries, a burger with fries, and a dish with steamed fish, salad and potatoes. French fries could also be ordered on the side. Importantly, all items were similarly priced. A pilot study was conducted ( $N = 39$ , mean age = 34.05,  $SD = 11.32$ ) to examine to what degree the dishes on the menu are perceived to be relatively lean and low in calories (seven-point scale). This revealed that both the salads ( $M = 4.97$ ,  $SD = 1.01$ ) and the steamed fish ( $M = 4.54$ ,  $SD = 1.21$ ) were on average perceived as much leaner than the burger ( $M = 1.56$ ,  $SD = .72$ ) and the sate dishes ( $M = 2.44$ ,  $SD = .94$ ). Thus, pilot participants clearly judged salad and steamed fish, on the one hand, as leaner than the burgers and sate, on the other hand,  $F(1, 38) = 268.50$ ,  $p < .001$ ,  $\eta_p^2 = .88$ . Based on these findings, we coded customers' choices in the field experiment as 1 when they chose a salad or steamed fish (perceived as lean, healthy), and choices of Saté or burger were coded as 0 (perceived as fat, not healthy). The choices of participants who ordered an entree salad together with additional fries were also coded as 0.

### Procedure

Customers ordered their choice of food and drinks as usual. Before communicating the order to the kitchen, the waiting staff was intercepted by the experimenter, who noted each customer's orders. Later, when customers had received their check after the end of the meal, the experimenter approached them and asked them if they wanted to participate in the study. After providing informed consent, participants received a brief questionnaire including the Concern for dieting scale of the Restraint Scale (measuring chronic dieting; Herman & Polivy, 1980), one question about current dieting, two questions about weight and height (to calculate BMI), as well as demographic questions about age and gender. Participants completed this while seated at the table. Finally, partici-



**Fig. 1.** Proportion of healthy menu choices (coded as 1) of non-dieters, chronic dieters, and current dieters, in both the control condition and the diet reminders condition.

pants were debriefed, asked not to talk to others about the ongoing study, thanked for their participation, and offered the opportunity to participate in a lottery to win a small gift as a token of appreciation.

## Results

To assess the menu choices of dieters and non-dieters in both conditions, we analyzed whether participants made a choice that was perceived as rather healthy (coded as 1) or rather unhealthy (coded as 0). We first conducted a logistic regression analysis with dieting status (chronic and current dieters vs. non-dieters), condition, and their interaction as predictors. This model had a good fit,  $X^2(3) = 12.86$ ,  $p = .005$ .<sup>3</sup> There was a main effect of dieting status,  $B = 2.75$ ,  $SE = 1.11$ ,  $p = .01$ ,  $OR = 15.58$ . Importantly, however, this was qualified by the predicted interaction of dieting status with condition,  $B = -2.70$ ,  $SE = 1.38$ ,  $p = .05$ ,  $OR = .67$ , suggesting that the diet reminders affected dieters and non-dieters differently.

Next, in order to test the specific hypothesis that dieters made healthier choices than non-dieters when reminded of their dieting goal, we examined the effect of dieting status within each condition. To this end, we conducted two additional logistic regression analyses, where we separately compared chronic dieters and current dieters to non-dieters, first in the control condition and then in the diet reminders condition.<sup>4</sup> As can be seen in Fig. 1, this revealed that in the control condition, there was no effect of dieting status, as the choices of both chronic dieters and current dieters did not differ from the choices of non-dieters,  $p = .84$  and  $p = .82$ , respectively. Importantly, however, in the diet reminders condition, chronic dieters made more healthy choices than non-dieters,  $B = -2.72$ ,  $SE = 1.14$ ,  $p = .017$ ,  $OR = 15.11$ , and similarly, current dieters made more healthy choices than non-dieters,  $B = -2.83$ ,  $SE = 1.31$ ,  $p = .031$ ,  $OR = 17.00$  (see Fig. 1). As Fig. 1 illustrates, almost half of the dieters made a healthy menu choice when they had been reminded of their dieting goal. Chronic dieters did not differ from current dieters in either the control condition,  $p = .70$ , or the diet reminders condition,  $p = .90$ .

<sup>3</sup> BMI itself did not have a significant effect on choices,  $B = -.09$ ,  $SE = .095$ ,  $p = .34$ ,  $OR = .91$ , and including it as a covariate did not improve the model, and left the results essentially unchanged. Therefore, this variable was not considered further in our analyses.

<sup>4</sup> We also conducted these contrast analyses comparing all dieters (chronic and current) with the non-dieters. This also showed that in the control condition, dieting status did not affect choices,  $p = .96$ , whereas in the diet reminders condition, dieters made more healthy choices than non-dieters,  $B = 2.75$ ,  $SE = 1.11$ ,  $p = .013$ ,  $OR = 15.58$ .

Together, these results show that the diet reminders stimulated low-calorie rather than high-calorie food choices among both chronic and current dieters, for whom the dieting goal is personally relevant. Both chronic and current dieters indeed made more diet-congruent choices than non-dieters, but only when they had been reminded of their dieting goal.

## Discussion

The present study was designed to assess whether environmental diet reminders in a restaurant setting can be used to increase choices for low-calorie foods, particularly among weight-concerned customers. Results showed that exposing chronic and current dieters to diet reminders while they made their choice from the menu increased their choices for low-calorie foods, while other consumers were not affected. While dieters made comparable choices as non-dieters in the control condition, they made more healthy choices when they had been reminded of their dieting goal. These findings suggest that diet reminders can change food choices of those consumers for whom the goal of dieting is personally highly relevant, either as a chronic concern, or as a current goal that is pursued temporarily. These findings are in line with work on goal pursuit in other domains, which shows that goal reminders work best when the activated concepts are personally relevant (Custers & Aarts, 2010; Sheeran, Webb, & Gollwitzer, 2005). Thus, the diet reminders were effective mainly among individuals for whom controlling their eating behavior is a personally relevant concern. For the other customers, the diet-related words did not activate the representation of a goal they were pursuing, and therefore most likely dissipated quickly, rather than preparing them for goal-directed action (Aarts, Custers, & Veltkamp, 2008).

Our results are also in line with recent work, mainly done in non-hedonic settings, which suggests that diet reminders may affect snacking behavior. One recent laboratory experiment, for example, showed that exposing participants to slim art sculptures on a screen saver reduced their intake of chocolates during a taste test (Brunner & Siegrist, 2012). Similarly, a poster containing diet-related words reduced chronic dieters' intake of meat snacks in a butcher shop (Papies & Hamstra, 2010; see also Anschutz, Van Strien, & Engels, 2008; Fishbach, Friedman, & Kruglanski, 2003). However, the current work is the first field experiment to examine the effect of diet reminders in a hedonic setting that is typically associated with vast overconsumption of calories (Chou et al., 2004; Inagami et al., 2009; Kant & Graubard, 2004), and to examine their effects on both chronic and current dieters.

These findings are very promising since both chronic and current dieters have been shown to experience difficulties in their weight regulation and to be prone to weight gain and overweight, making it particularly important to facilitate healthier choices among these groups (Lowe et al., 2006). In other words, their healthy intentions are not sufficient to cause healthy behavior (Webb & Sheeran, 2006), and this may be especially difficult in a restaurant setting, where hedonic cues signaling the enjoyment of good food are very salient, making the pursuit of the dieting goal less likely for those who are vulnerable to hedonic overeating (Lowe, 1995; Stroebe et al., 2008). However, subtle environmental reminders activating the weight control goal made it more likely that dieters actually pursued the dieting goal, thus translating their existing health motivation into actual behavior.

Indeed, the fact that low-calorie choices could be stimulated in a hedonic context that is strongly associated with overeating (i.e., a restaurant) is particularly promising and points to the potential of implementing this environmental intervention as a simple but effective means to help consumers restrict their caloric intake

(Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). While earlier studies have examined the effects of menu design on patrons' food choices (e.g., Colby et al., 1987; Fishbach & Zhang, 2008; see Glanz & Hoelscher, 2004, for an overview), these have not yet been examined as a function of both chronic and current dieting, which we identified as crucial moderators of the effects of the weight-related cues we integrated into the menus. Thus, this work provides important insights into the effectiveness of a theory-based intervention tool to facilitate healthy behavior among weight-concerned individuals. Environmental goal reminders have not yet been systematically applied to facilitate health behavior change, despite their recognized potential in this domain, and despite the recognition that behavior change relying on conscious intentions is often not successful (Shalev & Bargh, 2011; Webb & Sheeran, 2006). Future research is needed to further extend these findings, and to examine the full potential of implementing goal reminders in real-life settings.

#### *Implications for research and applications*

This method is relatively easy and inexpensive to implement in many contexts where people purchase or consume high caloric foods (e.g., in grocery stores, kitchens, cafeterias, schools, and restaurants). However, diet reminders can only lead to healthier choices when healthy items are actually available. In restaurant settings, consumers often still have a very limited choice for healthy items, if healthy items are available at all (see Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Thus, policy changes to require the availability of low-calorie options in restaurants may have important public health benefits (Food & Drug Administration, 2006; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008), and the availability of healthy options is in fact a basic requirement for the effectiveness of individual strategies for health behavior change (see Romon et al., 2009; Westley, 2007, for a successful example of an intervention integrating both types of strategies).

In addition, one may argue that restaurants may be reluctant to highlight low-calorie items centrally on their menus, since their main goal of financial profit is better served by indulgence than by dieting. However, broadening the array of tasty, low-calorie foods, at prices comparable to tasty high-calorie foods, may actually make restaurants attractive to health-conscious eaters and thus ensure their patronage. After all, the majority of the population tries to control their weight sooner or later (e.g., Weiss, Galuska, Khan, & Serdula, 2006), and appealing to diet-conscious customers may thus be of increasing economic importance to businesses. We suggest that highlighting a selection of low-calorie menu items in a specific subsection of the menu, and integrating diet reminders into such displays, may be highly effective in stimulating healthy choices (see also Fishbach & Zhang, 2008), while also serving the goals of the restaurants (Wansink & Huckabee, 2005).

An interesting avenue for further research would be to combine the current intervention with interventions providing people with objective calorie information. We suggest that a combination with a diet reminder may be more effective than providing calorie information alone. Interestingly, research on health and calorie labels so far has provided mixed findings, as some studies suggest that these labels may serve as excuses for overconsumption, whereas others show that they assist consumers in making informed and healthy choices (Bates et al., 2011; Chandon & Wansink, 2007; Roberto, Schwartz, & Brownell, 2009; Tandon, Wright, Zhou, Rogers, & Christakis, 2010). Beneficial effects of calorie labels may occur mainly when a perceiver's dieting goal is active at the same time. Specifically, when the dieting goal is activated, for example by a diet reminder, low-calorie food items will be clearly perceived as potential means for pursuing this goal, and are therefore more

likely to be chosen, among those for whom the goal is personally relevant. Importantly, studies on the effects of diet reminders or calorie labels on food choice should take participants' dieting motivation into account as a moderator, as goal reminders will be effective mainly among those individuals who personally value and pursue the behavioral goal being activated (Custers & Aarts, 2007, 2010). Although restaurants have been found hesitant to provide calorie information, possibly due to worries that such information may decrease sales (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008), we suggest that a combination of dieting reminders and objective caloric information can actually be commercially interesting, since it may serve and even increase demand for low-calorie foods among specific sub-populations.

Future studies may also attempt to test the effectiveness of goal reminders across different contexts. Although any given diet reminder may be effective mostly in the direct context where it is placed, healthy eating behavior is the accumulation of many healthy eating decisions in the course of the day, and successful prevention of weight gain will therefore benefit from diet-congruent choices in as many situations as possible. In addition to activating diet-related cognitions, interventions that reduce the hedonic impact of attractive food cues may also be beneficial for facilitating healthy eating (Veling, Aarts, & Stroebe, *in press*; Veling et al., 2011), especially when they work independent of participants' dieting concerns, such as a recent mindfulness applications to reduce food impulses (e.g., Papies, Barsalou, & Custers, 2012).

#### *Limitations*

One potential limitation of the present work may lie in the fact that, for practical reasons, we were not able to assess the actual amount eaten by customers and thus have no precise information about the actual calories consumed, but only about customers' food choice. In addition, we have no information on the drinks customers consumed. This is unfortunate, since beverage consumption has been suggested to differ between dieters and non-dieters in naturalistic settings (Lowe, Goldstein, & Katterman, 2011), and assessing this variable would have allowed us to replicate this finding and further extend the effect of diet goal reminders on this type of behavior. Future research should therefore take this dependent variable into account, too.

In addition, we have no evidence that allows us to assess a potential selection bias in the customers deciding to participate in our study, and we do not have exact information on the percentage of customers deciding not to participate. Future studies should assess this more systematically, while maintaining the unobtrusive nature of the experiment for customers in the field setting. Finally, a limitation that also arose from the field setting of the experiment is that participants were not assigned to conditions in a truly random manner. Rather, conditions were alternating over the days of the week on which the study was conducted, and effects of week-day itself were ruled out statistically. However, finding feasible ways to achieve true random assignment of individual participants to conditions will be important in future studies to rule out alternative explanations, even in naturalistic field settings. However, important strengths of the current work that may at least partially offset these limitations are the fact that our study was conducted among members of the general population, and that it was conducted in a true field setting, which is conducive to its ecological validity.

#### *Conclusion*

Currently, there is a growing consensus that comprehensive efforts are highly needed to combat the obesity epidemic, especially by addressing the effects of tempting food in our living environ-

ment (e.g., Marteau, Hollands, & Fletcher, 2012; Sheeran et al., in press). Here, we showed that a simple diet goal reminder integrated into a restaurant menu strongly stimulated healthy choices among dieters. This study points toward goal reminders as a promising theory-based, low-cost intervention method. Future studies might replicate and validate its effectiveness, strengthen it, and develop it into a feasible intervention tool that can be adapted easily by various stakeholders to facilitate healthy eating.

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