



## Research report

The moderating role of regulatory focus on the social modeling of food intake <sup>☆</sup>Arnd Florack <sup>a,\*</sup>, Johanna Palcu <sup>a,1</sup>, Malte Friese <sup>b</sup><sup>a</sup> Department of Psychology, University of Vienna, Universitaetsstrasse 7, 1010 Vienna, Austria<sup>b</sup> Department of Psychology, Saarland University, Germany

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## ABSTRACT

Regulatory focus theory proposes two distinct modi of self-regulation, a promotion focus and a prevention focus. According to this theory, individuals in a prevention focus apply behavioral strategies to successfully avoid unpleasant outcomes and maintain a safe and secure state. By contrast, individuals in a promotion focus apply behavioral strategies to realize pleasant outcomes and to advance the current state. Applied to the context of eating behavior, regulatory focus theory suggests that individuals in a prevention focus should be especially sensitive to avoid socially inappropriate eating behavior. A way to ensure socially appropriate eating behavior is to follow social models. In the present research, we therefore tested the assumption that a prevention focus leads to stronger modeling effects in eating behavior than a promotion focus. In two studies, we manipulated individual's self-regulation states by putting individuals in a state of reflection about their hopes and aspirations (promotion focus) vs. a state of reflection about their duties and responsibilities (prevention focus). Participants then observed the consumption behavior of a second participant who either consumed or did not consume offered food (Study 1) or received incidental information about the amount of food an ostensible previous participant had consumed (Study 2). Across both studies, participants in a prevention focus matched their food consumption more closely to that of a present (Study 1) and not-present social model (Study 2), compared to participants in a promotion focus. The results advance our understanding of modeling effects in food intake by showing the importance of regulatory orientations.

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## Introduction

Decisions of whether to eat a given food and how much to eat of it are often driven by internal cues such as satiety (Hermans, Herman, Larsen, & Engels, 2010; Read, French, & Cunningham, 1994), or eating pleasure (Lowe & Butryn, 2007; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008). However, abundant research suggests that these decisions can also be motivated by external cues such as ambience, package size, plate shape, previous exposure to food-related cues, and consumption by other individuals (e.g., Fedoroff, Polivy, & Herman, 1997; Hermans, Larsen, Herman, & Engels, 2011; Pollard, Kirk, & Cade, 2002; Soerensen, Moeller, Flint, Martens, & Raben, 2003; Stroebele & De Castro, 2004; Wansink, 2004).

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Among the external factors guiding individuals' eating behavior, the influence of social factors on eating has constituted a considerable field of research (e.g., Herman & Polivy, 2005; Herman, Roth, & Polivy, 2003). Most research on social modeling of food intake, for instance, has shown that individuals are usually influenced by the eating behavior of fellow eating companions – that is, they eat more when others eat more, and they eat less when others eat less (Brunner, 2012; Nisbett & Storms, 1974; Pliner & Mann, 2004; Rosenthal & McSweeney, 1979). Moreover, individuals follow these social eating guidelines regardless of whether they feel hungry (Herman, Fitzgerald, & Polivy, 2003), whether they are influenced by dietary restraints or suffer from obesity (Conger, Conger, Costanzo, Wright, & Matter, 1980; Polivy, Herman, Younger, & Erskine, 1979), or whether the eating companion is actually present or not (Pliner & Mann, 2004; Roth, Herman, Polivy, & Pliner, 2001).

In illustrating the basis for social modeling effects on food intake, Herman, Roth, et al. (2003, p. 874) argue that “a significant concern for most people is to avoid eating excessively – or more accurately, to avoid being seen (by others and by oneself) as eating excessively” and that “the intake of one's eating companions, then, serves to establish a guideline indicating how much one may eat without eating excessively”. Indeed, reliance on the behavior of

others can be regarded as an adaptive tool, when inner constraints for eating are vague and concrete rules for eating are missing (for example, to empty one's plate).

A hypothesis that directly follows from this reasoning is that individuals should be more likely to follow social models in food intake when they are motivated to show socially appropriate behavior, follow social rules, and avoid inappropriate behavior than when they are less motivated to do so. Although this conclusion is reasonable, to our knowledge, research on this particular question has so far been missing and research on moderating effects of social modeling in food intake has been more concerned with weight-related orientations than with general motivational orientations (e.g., Brunner, 2010; Brunner & Siegrist, 2012). In the present studies, we address this gap and examine the moderating role of motivational orientations on the social modeling of food intake. To this end, we rely on an experimental induction of different motivational orientations and an experimental variation of the behavior of the social model. Based on regulatory focus theory (Higgins, 1997, 1998, 2012), we assumed that individuals who regulate their behavior according to what they feel they ought to do are more likely to show social modeling effects in food intake, compared to individuals who regulate their behavior according to their ideals, aspirations, and accomplishments.

### Regulatory focus

Regulatory focus theory (Higgins, 1997, 1998, 2012) states that people apply different motivational strategies to approach desired (pleasure) and avoid undesired (pain) outcomes. More specifically, regulatory focus theory distinguishes between a promotion and a prevention focus as two distinct motivational orientations that not only influence how individuals experience one and the same goal, but also how they process goal-relevant information and, subsequently, how they regulate their behavior to achieve their goal.

According to Higgins (2012), individuals in a promotion focus are mainly concerned with hopes and aspirations. This leads them to focus primarily on changing an acceptable actual state to reach an improved target state (possible gain). Thus, driven by their desire for growth and advancements, individuals in a promotion focus are inclined to apply eager strategies that support them in achieving a gain from a "0" state to a "+1" state.

By contrast, individuals in a prevention focus are mainly concerned with safety and security needs, leading them to focus on a possible deterioration from a satisfactory actual state to a poorer target state (possible loss). Moreover, although they might have the same goal as individuals in a promotion focus, they normally experience this goal as a responsibility they have to fulfill. Individuals in a prevention focus would, therefore, apply careful and vigilant strategies in order to avoid a loss from a "0" state to a "-1" state, often resulting in a conservative bias – that is, a tendency to behave in a way that supports them to avoid errors of commission and ensure correct rejections (Förster, Higgins, & Taylor Bianco, 2003).

Research on regulatory focus and information processing has shown that both promotion- and prevention-focused individuals tend to rely on those sources of information that are closely related to their respective self-regulatory orientation (e.g., Florack, Friese, & Scarabis, 2010; Florack & Hartmann, 2007; Florack, Ineichen, & Bieri, 2009; Florack, Scarabis, & Gosejohann, 2005; Pham & Avnet, 2004, 2009; Wang & Lee, 2006). For example, Pham and Avnet (2004, 2009) have shown that the preference for eager means of goal-attainment led individuals in a promotion focus to assign more importance to their internal states and affective responses as a valid source of information. Similarly, Florack et al. (2010)

found that, when instructed to choose between two different food options, individuals in a promotion focus (but not individuals in a prevention focus) followed their implicit preferences in deciding which option to choose.

However, when striving for safety and security guides an individual's information processing, as is the case for individuals in a prevention focus, relying on implicit and affective heuristics does not suit these underlying motivational goals. Instead, researchers have argued that the vigilance of individuals in a prevention focus to reject mistakes is associated with deliberation (Pham & Avnet, 2004, 2009), high sensitivity for risks (Herzenstein, Posavac, & Brakus, 2007; Leder, Florack, & Keller, 2013), and errors of commission that are not apparent to individuals in a promotion focus to the same degree (Roese, Hur, & Pennington, 1999). One strategy that individuals in a prevention focus draw on to reduce uncertainty about an appropriate way of conduct is to "copy" the behavior of others (Florack et al., 2005; Zhang, Higgins, & Chen, 2011).

### Present research and hypotheses

In the present paper, we assume that eating is often associated with a conflict between the positive experience of consuming palatable food and the goal to avoid eating too much (Herman, Roth, et al., 2003). In order to attain this goal, individuals might rely on internal or external consumption cues. Research on regulatory focus theory predicts that individuals in a promotion focus are more likely to rely on internal cues, such as pleasure, appetite and satiation when deciding how much to eat in a given situation (Florack et al., 2010; Pham & Avnet, 2004, 2009). By contrast, when no pre-existing routines about how much to eat and how to behave in a specific eating situation are accessible, individuals in a prevention focus are predicted to turn outwards to a greater extent than individuals in a promotion focus to search for cues that provide a guideline for proper behavior, allowing them to avoid making unnecessary mistakes. As put forward above, one such cue could be the behavior that other individuals display in the same situation (cf. Florack et al., 2005; Zhang et al., 2011). Hence, we hypothesized that individuals in a prevention focus would be more strongly influenced by the eating behavior of a social model than individuals in a promotion focus.

It is important to note that regulatory focus varies with contexts and tasks and that the current regulatory focus can be emphasized, for instance, by increasing the salience of ideals or duties (Florack et al., 2005; Higgins, Roney, Crowe, & Hymes, 1994). In addition, based on socialization and learning, a chronic inclination for promotion or prevention self-regulation can influence the likelihood that a certain regulatory focus is predominant in a present context (Florack et al., 2005; Higgins et al., 1994). More important for the present purpose and, in particular, for the test of causal effects of regulatory focus is, however, the idea that the current regulatory focus can be induced by experimental manipulations. Abundant research has shown that experimental manipulations can momentarily induce a particular regulatory focus and largely override chronic predispositions (e.g., Cesario, Grant, & Higgins, 2004; Florack & Hartmann, 2007; Förster, Higgins, & Idson, 1998).

In the present research, we exclusively studied the effects of a momentarily induced regulatory focus. In two studies, we tested the strength of social modeling effects in individuals with a momentarily predominant prevention focus compared to a momentarily predominant promotion focus. In Study 1, a social model that was present consumed a high amount of food or did not consume food at all. In Study 2, the social model was not present; however, incidental cues signaled that the model had consumed either a high or a low amount of food. In both studies, we expected the social model's behavior to more strongly influence

consumption of participants in a prevention focus, compared to consumption of participants in a promotion focus.

## Study 1

In Study 1, we varied participants' regulatory focus experimentally (promotion vs. prevention focus). We assigned half of the participants to a target group and the other half to a social model group. In each session, one participant from the target group and one participant from the social model group took part simultaneously. Participants in the social model group represented the social intake model for the concurrent participant from the target group. Specifically, whereas participants in the target group received the instruction that they could eat as much as they liked, participants in the social model group received the instruction either to eat freely, or not to eat at all. The behavior of the assigned eating partner from the social model group was intended to allow participants in the target group to make inferences about the kind of behavior (consumption vs. no-consumption) that was appropriate in the given situation.

## Method

### Participants and design

One hundred and forty-two students of various disciplines (e.g., social sciences, economics, law, biology, medicine, geography, technical sciences, politics, media and communication sciences, statistics, teaching, philosophy) from a German and an Austrian university participated in this study (54.9% women). The average age was 22.61 years ( $SD = 4.31$  years) with a range from 18 to 49 years. Participants were recruited in the cafeteria of the University and were invited to take part in the study as part of a student project. Six individuals that were initially asked to take part in the study were not included in the mentioned sample, because they did not follow the instructions of the experimenter (e.g., one participant left the room before the study was finished, one participant read a newspaper during the study). All experimental sessions were run between 3:00 pm and 7:00 pm, and the duration of each session varied between 5 and 8 min. We tested participants in dyads, whereby each dyad was composed of a target participant and a social model participant. In the target group, we induced either a promotion or a prevention focus. Moreover, target participants received the instruction to eat as much as they liked. By contrast, participants in the social model group received the instruction that they were allowed to eat (consumption instruction), or requested not to eat the cookies that we provided for them during the experiment (no-consumption instruction). The combination of the regulatory focus manipulation and the instruction of the assigned partner resulted in a 2 (regulatory focus manipulation: promotion vs. prevention)  $\times$  2 (social model: consumption vs. no-consumption instruction) between-subject design for the target group.

### Procedure

Two participants took part in the study simultaneously. By randomly combining participants into dyads, we made sure that the modeling effect would not be confounded with the characteristics of the observed model (gender, age, appearance, etc.), as could be the case when using confederates to model participants' eating behavior (cf. Herman, Roth et al., 2003).

When participants arrived at the laboratory, the experimenter thanked them for coming and handed them the first part of the questionnaire. The experimenter told participants that they could fill out the questionnaires in the survey room, but that they were not allowed to interact with or talk to the other participant in

the room until the study was completed. She then seated participants in a way that allowed them to observe the behavior of the assigned partner. Participants from both the target as well as the partner group first answered a questionnaire that included questions about age, sex, and area of study. Then, the experimenter returned and collected the first part of the questionnaire and provided participants with the second part of the questionnaire. For the target participants, this questionnaire included the regulatory focus manipulation. For the assigned social model, the questionnaire contained the consumption instruction, as well as filler questions (e.g., questions on the quality of the cafeteria) that had no direct bearing on the study, but were designed to ensure that the questionnaires of both groups were of approximately the same length.

When participants started to complete the second questionnaire, the experimenter placed a paper bowl with 50 g of cookies in front of each participant. To vary the consumption behavior of the social models, we gave participants one of two different instructions at the beginning of the second questionnaire. We invited one half of the participants in the partner group to eat as much cookies as they wanted. By contrast, we told the other half of participants that they should not eat the cookies at this point in time, and that they would be allowed to eat them later. All participants in the target group read that, as a thank you for their participation, they were invited to eat the cookies placed in front of them.

For participants in the target group, the second questionnaire contained questions intended to induce either a promotion or a prevention focus. In the promotion focus condition, we asked participants to think about and list two of their past and two of their current hopes, wishes, and aspirations. In the prevention focus condition, we asked participants to think about and list two of their past and two of their current duties, obligations, and responsibilities. This manipulation has been applied effectively in past regulatory focus research (Florack et al., 2010; Higgins et al., 1994; Liberman, Idson, Camacho, & Higgins, 1999; Pham & Avnet, 2004). By applying this procedure, we followed the proposition of regulatory focus theory (Higgins, 1997, 1998), which states that, rendering an individual's hopes and aspirations (ideals) as highly accessible should activate a promotion focus. By contrast, because regulation of behavior in relation to duties and obligations ("oughts") is a main characteristic of a prevention focus, reflecting on these concepts should activate a prevention focus.

In each session, one participant of the target group and one participant of the social model group took part simultaneously; therefore, half of the participants in each regulatory focus condition (promotion vs. prevention condition) observed the behavior of a partner who had been invited to consume the cookies (social model: consumption instruction), whereas the remaining participants observed a partner who was requested not to eat the cookies provided during the experiment (social model: no-consumption instruction).

After 5 min, the experimenter returned and collected the questionnaires and the paper bowls with the remaining cookies, and debriefed participants. In order to assess the amount of cookies participants had consumed, the experimenter measured the weight of each paper bowl and deducted it from its initial weight.

## Results

In Study 1, we compared the food intake of individuals in a prevention and promotion focus in terms of two aspects: (1) the effects of the different consumption norms on the absolute level of food intake, and (2) the degree of intake matching between target and social model.

### Preliminary analyses

On average, participants in the social model role who were allowed to eat cookies (consumption instruction) consumed 13.09 g ( $SD = 10.73$  g) of the quantity of cookies initially offered (50 g; app. 230 kcal). All participants in the social model role who were asked not to eat the cookies (no-consumption instruction) followed the request to postpone eating until the study was finished. Mean comparisons show that the cookie consumption of the social models in the prevention focus condition did not differ significantly from the cookie consumption of the social models in the promotion focus condition,  $t(69) = 0.84$ ,  $p = .405$ .

### Effects of the consumption norms and regulatory focus on absolute level of food intake

We assumed that individuals in a prevention focus would be more strongly affected by the behavior of a social intake model than individuals in a promotion focus. To test this assumption, we computed a 2 (regulatory focus)  $\times$  2 (social model instruction) between-subject analysis of variance on the amount of cookies consumed. The results revealed a significant interaction of regulatory focus (prevention vs. promotion) and social model instruction (consumption instruction vs. no-consumption instruction) on the quantity of cookies consumed,  $F(1,67) = 7.60$ ,  $p = .008$ ,  $\eta_p^2 = .102$ . The interaction is depicted in Fig. 1. Simple effect tests showed that, in the prevention focus condition, participants consumed more cookies when assigned to a consuming partner ( $M = 14.06$  g (64 kcal),  $SD = 10.86$  g (49 kcal)) than when assigned to a non-consuming partner ( $M = 4.17$  g (19 kcal),  $SD = 5.24$  g (24 kcal)),  $F(1,67) = 6.81$ ,  $p = .011$ . In the promotion focus condition, however, food consumption did not vary with the consumption instruction of the assigned partner (no-consumption instruction:  $M = 15.39$  g (70 kcal),  $SD = 14.85$  g (67 kcal); consumption instruction:  $M = 10.44$  g (47 kcal),  $SD = 12.13$  g (55 kcal)),  $F(1,67) = 1.71$ ,  $p = .195$ . All main effects were non-significant,  $F_s \leq 2.00$ ,  $p_s \geq .162$ .<sup>2</sup>

### Food intake matching between target and social model in the regulatory focus conditions

In order to assess the degree of intake matching between target and partner participants, we computed intraclass correlations (ICCs) separately for participants in prevention and promotion focus using a one way random model. Intraclass correlations have been applied in previous research as a measure of intradyadic similarity, because they capture the actual degree of matching between two observations (e.g., Brunner, 2012; Kenny, 1995; McGraw & Wong, 1996; Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007; Shrout & Fleiss, 1979). Results indicated that intake matching between target and model participants was significant within the prevention focus condition,  $ICC(35) = .78$ ,  $p < .001$ , but not within the promotion focus condition,  $ICC(36) = -.13$ ,  $p = .637$ .

We additionally computed the ICCs between the targets and the social model for consuming models only (excluding participants from the condition with the non-consuming model), separately for prevention and promotion focus condition, in order to determine how accurately participants followed the partners' intake.

<sup>2</sup> To rule out possible gender differences, we computed a between-subject analysis of variance with the gender combination between partner and target (both male, both female, target male and partner female, target female and partner male) as additional factor. Results showed that gender in target and partner condition had no effect on the consumption of the target participants. All interactions with gender, as well as the main effect of gender on the consumption difference were non-significant,  $F_s(1,70) \leq 1.39$ ,  $p_s \geq .254$ . Most importantly, the interaction of regulatory focus and the consumption condition on cookie consumption remained significant,  $F(1,70) = 9.95$ ,  $p = .003$ .

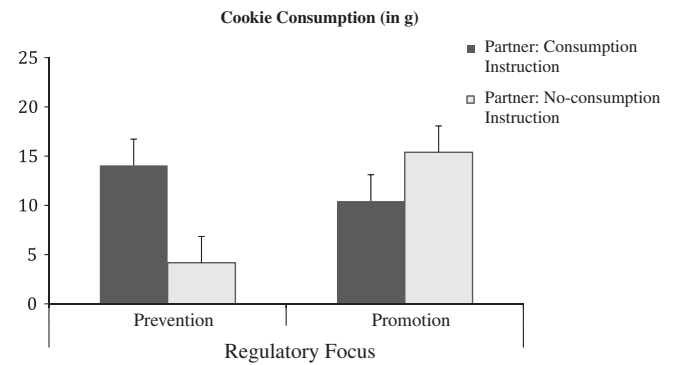


Fig. 1. Cookie consumption (in g) in the target group as a function of regulatory focus (prevention vs. promotion focus) and consumption instruction given to partner (consumption vs. no-consumption instruction). Error bars indicate standard errors of the means (Study 1).

Surprisingly, when participants observed a consuming partner, food intake matching was again significant in prevention focus condition,  $ICC(17) = .69$ ,  $p = .010$ , but also marginally significant in promotion focus condition,  $ICC(18) = .52$ ,  $p = .064$ . Hence, individuals in a promotion focus seemed to have matched their own level of intake to the level of intake of a consuming counterpart at least to some degree when the model consumed cookies.

For the non-consumption condition, ICC between target and model participants could not be computed, because consumption of the models was constant (0 g). Instead, we computed simple effects tests for the mean consumption of participants in a prevention focus compared to participants in a promotion focus in the non-consumption condition. Because consumption of all models was 0 g, mean consumption of the target participants serves as an indicator of the degree of deviation from the models' consumption. In line with our assumptions, deviation from the models' consumption was significantly smaller in the prevention focus ( $M = 4.17$  g,  $SD = 5.24$  g), than in the promotion focus condition ( $M = 15.39$  g,  $SD = 14.85$  g),  $F(1,67) = 8.83$ ,  $p = .004$ . Hence, in the non-consumption condition, individuals in a prevention focus matched their own level of intake more closely to the social model compared to individuals in a promotion focus.

### Discussion

In line with previous findings on social modeling effects on food intake, the results of Study 1 show that the presence of an eating companion operates as an external guideline for the regulation of food intake. But most importantly, the results of Study 1 indicate, for the first time, that the extent to which individuals adjust their level of food intake to this external social guideline depends on their current self-regulatory focus. The results of Study 1 show that individuals in a prevention focus, who are driven by a fundamental concern to make secure decisions and avoid inappropriate behavior, align their own food intake with the food intake of an eating companion, regardless of whether the companion consumes a lot of food or no food at all.

For individuals in a promotion focus, however, effects of the social model on food consumption were less clear. Individuals in a promotion focus did not adjust to a non-consuming partner, but they showed a tendency to adjust to the behavior of the social model when the social model was instructed to eat freely. Given that, for individuals in a promotion focus, matching did not occur when they observed a non-consuming partner, it is not reasonable to attribute this matching effect to a general desire to behave appropriately in an ambiguous situation. Instead, an alternative

explanation might be that individuals in a promotion focus automatically synchronized their own intake gestures with the intake gestures of their consuming counterpart. Indeed, a recent line of research suggests that eating companions synchronize their behavior in dyadic meal interactions, which results in a high degree of intake matching (behavioral mimicry; Genschow, Florack, & Wänke, 2012; Hermans et al., 2012). This explanation also fits recent research showing that behavior of individuals in a promotion focus is often driven by automatic impulses (Florack et al., 2010). The literature on mimicry regards mimicry and imitation as very stable and general mechanisms (e.g., Brass, Bekkering, & Prinz, 2001), and as tools to facilitate social learning, to understand and connect with others, and to accelerate behavioral responses (e.g., Chartrand, Maddux, & Lakin, 2005). Research on whether mimicry and synchronization might differ between individuals as a function of regulatory focus is at an early stage. At present, we think that differences in the explicit use of the behavior of others as information to determine one's own behavior (e.g., if an individual observes another person eating a lot and concludes that eating a lot is a social norm in this context) are much more distinguished than differences in automatic mimicry and synchronization.

## Study 2

Given that internal cues for a proper amount of consumption like satiety or pleasure are often vague and equivocal (Heatherton, Polivy, & Herman, 1989; Wansink, 2004), we assume that individuals in a prevention focus are hesitant to rely on these internal standards. Instead, we suppose that individuals in a prevention focus attend to the behavior of others to establish proper behavior, or more precisely, a proper amount of food intake. We therefore do not think that social modeling in prevention-focused individuals is solely driven by the motivation to impress a social model, nor do we think that individuals in a prevention focus only mimic the behavior of others on an automatic level. Rather, we argue that individuals in a prevention focus rely on the behavior of others to derive a reliable standard for how much food to consume.

Study 1 does not allow differentiating between the different paths of influences of a social model on food intake. A possible way to test whether individuals in a prevention focus show modeling effects independently of the motivation to impress the model or automatic synchronization of behavior would be to observe the food intake of individuals in a context where they have information about the food intake of the model, but where the model is not present during consumption. Therefore, we conducted Study 2 in which participants were aware of the amount of food intake of a social model, but where the model was not present during participants' food intake.

Social impact theory (Latane, 1981) suggests that social influence on eating behavior should be strongly reduced when the social model is not present and its behavior is not salient. However, we expect that, even in situations when the role model is not actually present, prevention-focused individuals maintain their motivation to disambiguate the ambiguous situation with respect to the appropriate food intake by relying on external cues such as visible leftovers of the other participants' consumption behavior. Study 2 also enables us to explore the unexpected social modeling effect in promotion-focused individuals in Study 1. More precisely, if matching effects in promotion-focused individuals are mainly based on an automatic and immediate imitation of the behavior of a consuming counterpart then effects of a social model on consumption should be reduced in promotion-focused individuals compared to prevention-focused individuals when the model is not present during food intake.

In Study 2, we asked participants to test and evaluate three different flavors of ice cream. Unlike in Study 1, participants did not observe the behavior of a physically present eating companion. Instead, when entering the lab, they saw the leftovers of an ostensible previous participant. Participants either saw three empty cups of ice cream (high-consumption model) or three cups of ice cream that were close to being full (low-consumption model). Additionally, when the experimenter provided participants with the ice cream they had to evaluate, she either incidentally mentioned that most of the previous participants just tried a little bit (low-consumption model) or that most participants ate the whole cupful (high-consumption model). Importantly, to make it clear that it was not the experimenter who was setting the guideline, she explicitly told participants in all conditions that it was fine to eat as much ice cream as they liked. Similar to Study 1, we induced either a promotion or a prevention focus before participants consumed the ice cream by increasing the salience of ideals or hopes (promotion focus) or duties and responsibilities (prevention focus).

## Method

### Participants and design

We invited 44 female participants to take part in a market research study at the research facilities of a German University. A total of 67.5% of the participants were non-students and 32.5% were students of various disciplines (e.g., communication and cultural management, politics, international economics).

Up to 3 participants were invited to the lab at the same time, but care was given that participants were separated for the experimental session. More precisely, participants were seated in two different rooms or in one large room separated by partition walls. Moreover, all participants wore headphones. This procedure pre-empted interpersonal contact or the observation of other participants throughout the entire experimental session.

Experimental sessions took place between 3:00 pm and 6:00 pm. We excluded one participant who indicated that she was familiar with the objective of the study, as well as three participants who indicated that they did not speak German fluently. A final sample of 40 women with an average age of 29.40 years ( $SD = 11.56$ ) participated in this study.

We randomly assigned participants to one of four experimental conditions resulting from the 2 (regulatory focus manipulation: promotion vs. prevention)  $\times$  2 (social model: low- vs. high-consumption model) between-factorial design of study.

### Procedure

On arrival at the laboratory, the researcher greeted participants and informed them that the objective of the market-research study was to create a target group profile for a high-quality ice cream brand. For this purpose, they would have to taste and evaluate different ice cream flavors. The researcher then led each participant into the experimental room where each participant saw three cups of ice cream of an ostensible previous participant on a table.

In the high-consumption model condition, participants found three almost-empty single-serving cups of ice cream visibly placed on the table. In the low-consumption model condition, participants saw three similar cups of ice cream, which were close to being full. In both cases, the researcher briefly apologized for not cleaning up after the last participant, removed the cups, and invited the participants to sit down in the respective room or area separated by partition walls. Participants could not see or communicate with other participants during the experimental session.

Before the actual ice cream tasting took place, participants were requested to fill out a questionnaire, including questions about their age, gender, height, hunger status ("How hungry are you at the moment?") 1 = *not at all*, 5 = *very hungry*), body weight, and

dieting behavior (“Are you currently on a diet?” *yes/no*), as well as questions aimed at inducing either a prevention or a promotion focus.

We manipulated participants’ regulatory focus by applying two consecutive procedures (for a similar manipulation, see Florack et al., 2010; Pham & Avnet, 2004). First, we provided each participant with two lists of basic statements. In the promotion focus condition, these lists consisted of 23 past, and 23 current hopes, wishes, and aspirations. Participants were asked to select those hopes, wishes, and aspirations they had actually tried to achieve in the past, as well as those hopes, wishes, and aspirations they were trying to achieve at the time of the study or were striving to accomplish in the future (e.g., “I would like to travel the world”). Similarly, in the prevention focus condition, we asked participants to select those duties, responsibilities, and obligations they had tried to meet in the past, as well as those duties, responsibilities, and obligations they were trying to fulfill at the time of the study (e.g., “I should prevent environmental pollution”), respectively. Second, similar to the manipulation applied in Study 1, in the promotion (prevention) condition, we additionally asked participants to think about and list at least two past and two current wishes, hopes, and aspirations (duties, responsibilities, and obligations) that they considered to be of particular importance.

After participants had completed the questionnaire, the experimenter returned and placed three full cups of ice cream (100 g each) of different flavors (vanilla, strawberry, and chocolate) on the table. Thus, each participant was offered a total of 300 g (app. 670 kcal) of ice cream to consume. Participants were told that they were allowed to consume as much ice cream as they wanted. Additionally, based on the experimental condition participants were assigned to, the experimenter made the following remarks: In the high-consumption model condition, the experimenter incidentally mentioned that the other participants usually ate all of the ice cream. In the low-consumption model condition, the experimenter incidentally mentioned that other participants usually just tried a little bit of ice cream. Importantly, by previously telling participants that they were allowed to eat freely, we made sure that the social consumption model was not represented by the experimenter, but solely by the behavior that other participants displayed in the same situation. Participants were then asked to taste and evaluate each of the three ice cream flavors based on 10 items ( $1 = \text{does not apply at all}$ ,  $7 = \text{fully applies}$ ) with regard to its taste (seven items, e.g., “The ice cream has a creamy taste”) and other sensory characteristics (three items on consistency, temperature and appearance, example: “The ice cream has a pleasant consistency”). Moreover, we assessed participants’ intentions to buy and recommend the ice cream to their friends with two items. Finally, we asked participants to state which of the tested ice cream flavors they enjoyed the most, and which ice cream flavor they usually prefer. We then debriefed participants and thanked them for their participation.

We assessed the total quantity of ice cream (g) participants consumed by measuring the weight of each ice cream cup and deducting this from its initial weight.

## Results

Distributions of descriptive variables by condition are depicted in Table 1. On average, participants consumed 134.01 g ( $SD = 77.11$  g) of the 300 g (app. 670 kcal) of ice cream initially offered. Mean liking judgments for the three ice cream flavors did not vary as a function of regulatory focus condition, consumption model, or their interaction,  $F_s \leq .902$ ,  $p_s \geq .349$ .

To test our assumption that the social model does not have to be present to serve as a guiding cue for participants’ food intake behavior, we computed a 2 (regulatory focus: promotion vs. prevention)  $\times$  2 (social model: low- vs. high-consumption model) ANOVA on the amount

**Table 1**  
Descriptive statistics for baseline variables in Study 2.

Variables	Regulatory focus							
	Prevention				Promotion			
	Consumption Cues				Consumption Cues			
	Low (N = 10)		High (N = 10)		Low (N = 11)		High (N = 9)	
	M	SD	M	SD	M	SD	M	SD
BMI	20.69	2.20	21.88	4.64	21.30	2.33	23.14	3.75
Age	29.70	13.14	33.60	14.77	26.55	9.10	27.89	8.48
Hunger <sup>a</sup>	3.50	0.09	3.40	0.67	3.64	0.51	3.67	0.50

All mean comparisons between the conditions are non-significant,  $t_s < 1.406$ ,  $p_s > .168$ .

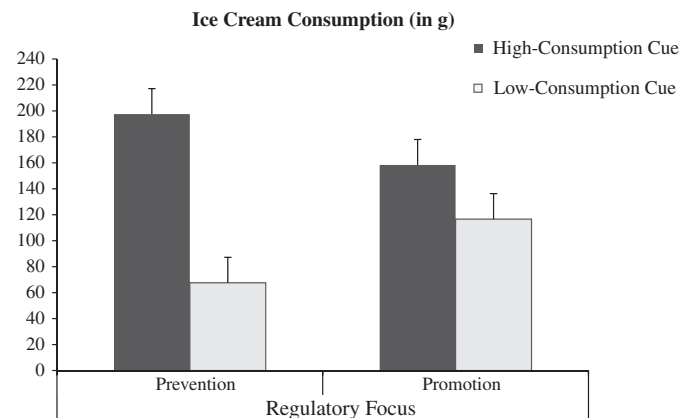
<sup>a</sup> 5-Point likert scale from 1 (very hungry) to 5 (not hungry at all).

of ice cream consumed. We found a significant interaction between regulatory focus and consumption model,  $F(1,36) = 5.03$ ,  $p = .031$ ,  $\eta_p^2 = .123$ . The interaction is depicted in Fig. 2. Simple effects revealed that participants in the prevention focus condition ate significantly more ice cream when incidental cues about a high-consumption model were provided ( $M = 197.57$  g (435 kcal),  $SD = 62.35$  g (137 kcal)) as compared to when incidental cues about a low-consumption model were provided ( $M = 67.60$  (149 kcal) g,  $SD = 81.31$  g (179 kcal)),  $F(1,36) = 21.91$ ,  $p < .001$ . However, for participants in the promotion focus condition, food intake did not differ significantly between experimental groups provided with cues for either a high- or a low-consumption model ( $M_{\text{high}} = 158.38$  g (348 kcal),  $SD_{\text{high}} = 47.50$  g (105 kcal);  $M_{\text{low}} = 116.67$  g (257 kcal),  $SD_{\text{low}} = 51.20$  g (113 kcal)),  $F(1,36) = 2.19$ ,  $p = .147$ . When controlling for body mass index, dieting behavior, and hunger status, the interaction of regulatory focus and consumption model remained significant,  $F(1,36) = 5.19$ ,  $p = .029$ ,  $\eta_p^2 = .136$ .

Additionally, we found a significant main effect of the consumption model on food intake,  $F(1,36) = 19.02$ ,  $p < .001$ ,  $\eta_p^2 = .346$ , indicating that, in general, individuals ate significantly more ice cream when provided with cues about a high-consumption model ( $M = 179.00$  g (394 kcal),  $SD = 57.88$  g (127 kcal)) than when provided with cues about a low-consumption model ( $M = 93.30$  g (205 kcal),  $SD = 70.12$  g (154 kcal)). The main effect of regulatory focus was non-significant,  $F(1,36) = 0.63$ ,  $p = .803$ .

## Discussion

Study 2 provides further evidence for the assumption that in situations, which are ambiguous with respect to the appropriate



**Fig. 2.** Ice cream consumption (in g) as a function of regulatory focus (prevention vs. promotion focus) and consumption cue (low- vs. high-consumption cue). Error bars indicate standard errors of the means (Study 2).

amount of food intake, individuals in a prevention focus rely more strongly on external guidelines such as a social model than do individuals in a promotion focus. Study 2 also shows that this effect even occurs when the social model is not actually present in the situation, but left subtle cues that hint to the social model's previous eating behavior. As the social model was not actually present in the consumption situation, Study 2 rules out the possibility that individuals in a prevention focus follow social models primarily to receive a positive evaluation by these models or because they automatically synchronize their behavior with the behavior they observe during food intake. Rather, the results are in line with the reasoning that individuals in a prevention focus rely on the eating behavior of others to find a solution for the difficult question of how much to eat in a given context.

## General discussion

In the present paper, we argued that a momentarily activated regulatory focus influences the extent to which individuals rely on a social models' eating behavior as a guideline for how much food to consume in a situation, in which the socially appropriate intake amount is unclear. In two studies, individuals in a prevention focus matched their food consumption to that of a social model, regardless of whether they observed the eating behavior of an actually present eating companion (Study 1), or were merely provided with a cue that indicated how much a previous participant had consumed in the same situation (Study 2). By contrast, individuals in a promotion focus were less influenced by a model that did not consume (Study 1), and by cues about the food intake of a model not present in the current context (Study 2).

These studies offer support for previous assumptions on the mechanisms that underlie the social modeling of food consumption. Herman, Roth, et al. (2003) suggested that social modeling effects mainly occur because individuals have a fundamental concern to avoid eating excessively. If this is the case, individuals who are motivated to show proper behavior and avoid improper behavior, such as those in a prevention focus, should show enhanced social modeling effects in food intake. Our results support this hypothesis. We identified social modeling effects on food intake in both studies for individuals in a prevention focus, but only limited social modeling effects for individuals in a promotion focus. Importantly, the present studies do not only show that the effect of social modeling is stronger for individuals in a prevention focus than for individuals in a promotion focus. They also extend our understanding of the process that underlies these modeling effects on eating behavior. Since the differences in modeling effects between individuals in a prevention and promotion focus occurred not only when the model was present, but also when participants merely saw the leftovers of an ostensible previous model, we can conclude that modeling effects in a prevention focus are (a) not exclusively driven by an automatic synchronization of behavior and (b) not exclusively driven by the desire to receive a positive evaluation by the model. Indeed, in Study 2 participants neither saw the model nor did they expect to meet the model later. Furthermore, the experimenter explicitly mentioned that participants are allowed to eat as much as they liked.

We suppose that the context of Study 2 is typical for many contexts in which food is available in abundance. Individuals then often have to face the decision of whether they should take some more food or stop eating. In such contexts, it is difficult to determine the proper amount of food intake. Internal signals of satiation are often vague and affected by multiple sources like emotions, mood, and various other bodily sensations, and feelings of satiety can be induced without changing the metabolic and physiological states (Heatherton et al., 1989). A study by Wansink, Painter, and

North (2005) highlights the difficulty to determine a proper amount of consumption in a given situation particularly well. In this study, participants consumed soup from a bowl with an automatic refill mechanism. Without participants realizing, the bowl never emptied. In this study, participants consumed 73% more soup from the bowl with the automatic refill function than from a normal bowl. There is a parallel between the study by Wansink and colleagues and the present studies in that in both of our studies participants received more food than what they would normally eat in such a context. In Study 2, for example, participants received three cups of ice cream, that is, a total of approximately 670 kcal – more than participants would purchase in a café. But what would be an appropriate amount to eat? (Note that 670 kcal correspond to more than 30% of the calorie requirement of an average person per day (2000 kcal)!) Our results show that individuals in a prevention focus use the eating behavior of a social model as guideline, irrespective of whether the model is present or not. Hence, the model provides individuals in a prevention focus with valuable information they can use to resolve the difficulty of how to determine appropriate eating behavior. We do not argue that individuals in a prevention focus do not have the intention to impress other people and follow norms for this reason or that individuals in a prevention focus do not automatically imitate other individuals. We argue that the results of the present studies suggest that individuals in a prevention focus use the behavior of models when there is no model to impress or when there are no basic movements to mimic, as well. This finding is in line with a normative interpretation of social modeling effects in food intake (Herman, Roth, et al., 2003), which suggests that the goal to avoid eating excessively is the core driver of social modeling in food intake.

The present research also contributes to the advancement of regulatory focus theory by showing the importance of social models for individuals in a prevention focus. Previous research has suggested that individuals in a promotion focus rely on simple heuristics, whereas individuals in a prevention focus apply systematic information processing (Pham & Avnet, 2004, 2009). The reliance on a social model is a simple heuristic as well (Gigerenzer, 2008), but one that fits the needs of individuals in a prevention focus (i.e. to avoid socially inappropriate behavior in a situation in which the appropriate way of conduct is unclear). The present research shows that individuals in a prevention focus indeed apply simple heuristics, as soon as they provide a reliable signal for safe and appropriate behavior.

It is important to note that the results of the present study should not be misinterpreted in the sense that individuals in a prevention focus would be susceptible to *any* form of social influence. Indeed, research has pointed to the fact that, when the source of information appears not to be trustworthy, or when manipulative intents become salient, individuals in a prevention focus are *less* likely to follow other individuals' recommendations (Kirmani & Zhu, 2007).

## Limitations

The present studies show that the amount of food consumed by social models has an effect on eating behavior and that this effect is enhanced in a prevention compared to a promotion focus. However, we cannot rule out that the mere presence of social models can affect the eating behavior of individuals in a promotion focus, as well. Research on social facilitation has shown that the presence of others can increase the amount of food consumed (de Castro, 1990, 1991, 1994; de Castro & Brewer, 1992; Herman et al., 2003). Indeed, individuals eating together often spend more time on eating than individuals who are eating alone (de Castro, 1990). It is reasonable that such social facilitation effects affect

participants in a promotion and prevention focus to the same degree, or that, because of the reinforcing value of social situations this effect is even stronger for individuals in a promotion focus. However, the present studies were mainly concerned with social modeling and not with social facilitation effects. We therefore controlled for the time period of consumption in Study 1, where a social model was present and social facilitation might have occurred. In order to examine whether the presence of others generally enhances or inhibits food intake, future studies might increase the time participants spend with food intake, vary the group sizes, and integrate an eat-alone condition to allow testing the effects of the mere presence of other individuals on food consumption in a promotion and prevention focus.

Furthermore, the samples recruited for the present studies are based on selected samples. The ranges of age are limited, we recruited students as participants, and Study 2 relied on a female sample. We did not find differences between male and female participants in Study 1<sup>3</sup> and age, BMI, and hunger did not affect the results of Study 2. Nevertheless, future research should apply more heterogeneous samples that include more information about the participating individuals to help develop a more detailed picture of the multifaceted mechanisms that underlie social modeling effects in food intake. Such studies could examine possible moderators of the effects we found in the present studies, and, in particular, could test the role of personality factors and a chronic inclination for a promotion or prevention focus (cf. Schokker et al., 2010).

### Implications

The present research implies that stressing responsibilities and duties and increasing a prevention focus will not help much to reduce the amount of unhealthy food consumed as long as there are models showing the undesired food intake. By contrast, a campaign that increases the prevention focus of individuals might increase rather than decrease social modeling effects in food consumption. The present research suggests that attempts to positively influence individuals' eating behavior by addressing responsibilities and duties might be more successful when this approach is accompanied by role models that show the desired behavior. For example, if the objective is to increase the consumption of healthy food (e.g., fruits) by high school students, there could be a claim to emphasize a prevention focus (e.g., "Think about your health responsibilities"). To bolster the effectiveness of this intervention, a further sign in the school cafeteria could indicate how many students chose fruits during the previous week. At present, such implications are untested, but the presented results provide promising results that point to the possible effectiveness of such interventions.

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<sup>3</sup> Mean comparisons between the cookie consumption of male and female participants point to a slightly higher consumption of male participants ( $M_{male} = 13.77$  g,  $SD_{male} = 13.93$  g;  $M_{female} = 9.36$  g;  $SD_{female} = 10.43$  g), though this difference was non-significant ( $t(69) = 1.404$ ,  $p = .168$ ). In light of the fact that men have often a higher food intake than women (cf. Kiefer, Rathmann, & Kunze, 2005), this difference might have been more accentuated if participants would have spent more time with eating.



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