

# When the frame fits the social picture

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# When the Frame Fits the Social Picture: The Effects of Framed Social Norm Messages on Healthy and Unhealthy Food Consumption

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Saar Mollen<sup>1</sup>, Rob W. Holland<sup>1,2</sup>,  
Robert A. C. Ruiter<sup>3</sup>, Rajiv N. Rimal<sup>4</sup>,  
and Gerjo Kok<sup>3</sup>

## Abstract

We investigated the influence of framed norm messages about food consumption on motivation to consume, and actual consumption of, healthy and unhealthy foods. We proposed that the effects of positive and negative message frames would vary by the type of underlying norms (i.e., injunctive, descriptive). More specifically, based on information processing theories, it was expected that injunctive norms would be more effective when framed negatively compared with positively, while the opposite was expected for descriptive norms. In both experiments, participants were randomly assigned to one of four framed social norm conditions or a no-norm control condition. In Experiment 1, motivation to consume healthy and unhealthy foods was assessed by means of both indirect and self-report measures. In Experiment 2, actual food consumption was assessed. In both experiments, the predicted interaction was found. Results show that injunctive norms benefit from a negative (vs. positive) frame, while preliminary evidence suggests the opposite for descriptive norms.

## Keywords

descriptive norms, injunctive norms, framing, approach-avoidance task, health behavior, food intake

<sup>1</sup>University of Amsterdam, The Netherlands

<sup>2</sup>Radboud University, The Netherlands

<sup>3</sup>Maastricht University, The Netherlands

<sup>4</sup>The George Washington University, DC, USA

## Corresponding Author:

Saar Mollen, Amsterdam School of Communication Research (ASCoR), University of Amsterdam,  
P.O. Box 15791, 1001 NG Amsterdam, The Netherlands.

Email: [s.mollen@uva.nl](mailto:s.mollen@uva.nl)

Perceptions of others' approval of certain behaviors (i.e., injunctive norms) and others' actual behavior (i.e., descriptive norms) have been found to predict people's intentions to consume healthy foods and to pursue a healthy diet (Smith-McLallen & Fishbein, 2009; Yun & Silk, 2011). In addition, descriptive norms have been found to predict whether people make healthy food choices in (field-)experimental designs (Burger et al., 2010; Mollen, Rimal, Ruiter, & Kok, 2013; Stok, de Ridder, de Vet, & de Wit, 2012). Communicating social norm messages that describe that a lot of people eat healthy or approve of healthy eating may therefore be an effective tool to encourage healthy food choices (Mollen, Rimal, Ruiter, & Kok, 2013).

The way messages are framed, however, may differentially affect behavior (Covey, 2014; Gallagher & Updegraff, 2012; Rothman, Bartels, Wlaschin, & Salovey, 2006). Extant social norms research has not sufficiently considered the influence of specific frames used in social norm messages. Some studies use positive message frames (e.g., Jacobson, Mortensen, & Cialdini, 2011; Melnyk, Herpen, Fischer, & Trijp, 2013; Smith & Louis, 2008), describing approval related to positive behavior (e.g., bar graphs showing the percentage of students who approve of or perform a certain behavior; Smith & Louis, 2008). Other studies use negative frames (e.g., Christensen, Rothgerber, Wood, & Matz, 2004; Keizer, Lindenberg, & Steg, 2008), emphasizing disapproval related to negative behavior (e.g., a sign that indicates that one should not spray graffiti; Keizer et al., 2008). And still other studies use mixed wordings ("Don't be lazy take the stairs"; Slaunwhite, Smith, Fleming, & Fabrigar, 2009, pp. 234-235).

Based on theorizing related to the differential impact of positive and negative material on information processing (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) and the differential effectiveness of injunctive and descriptive norms under different levels of cognitive activity (Jacobson et al., 2011; Kredentser, Fabrigar, Smith, & Fulton, 2012), it can be expected that the influence of both norms varies as a function of framing. In this study, we therefore systematically investigate how message frames moderate the effects of injunctive and descriptive norms on motivation and behavior. Knowledge on the effectiveness of using different frames in social norm messages can be of great value to health communication practice, as choosing a frame that fits the specific norm under consideration may increase its effects on health behavior.

## **Descriptive Versus Injunctive Norms**

Injunctive and descriptive norms are likely to influence behavior through different routes (Cialdini, Reno, & Kallgren, 1990; Cialdini & Trost, 1998). Descriptive norms guide behavior because of the implied social proof (Cialdini et al., 1990; Cialdini & Trost, 1998). The behavior of most others in a certain situation provides information about the right way to act, and with that it serves our desire to make accurate decisions (Cialdini & Trost, 1998). In support of this idea, several studies have found that descriptive norms are especially effective in situations that are unfamiliar, uncertain, or ambiguous (Deutsch & Gerard, 1955; Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006; Tesser, Campbell, & Mickler, 1983). The underlying thought here is if others are doing it, it must be correct. Because descriptive norms function as "social

proof,” they often serve as a heuristic or shortcut in the decision-making process (Cialdini, 1984).

Injunctive norms are thought to be effective because they serve our goal for affiliation, a need to belong. We conform to injunctive norms because we have a desire to build and maintain meaningful relationships with others. Through strategic action, we aim to obtain social approval and avoid disapproval and other possible negative social sanctions (Cialdini & Goldstein, 2004; Cialdini et al., 1990; Deutsch & Gerard, 1955). The underlying idea here is that if we do what others approve of, they must approve of us too.

In two studies, Jacobson and colleagues (2011) investigated whether the distinctive qualities of descriptive and injunctive norms underlie different cognitive processes. They found that descriptive norms, because they function as a shortcut in the decision-making process, are more influential under conditions of low effortful cognitive activity. Injunctive norms, on the other hand, require more effortful cognitive activity to be effective because they frequently result in a conflict that has to be resolved, between what one should do (i.e., interpersonal goals) and what one would like to do (i.e., intrapersonal goals). Therefore the differences in the underlying goals between injunctive and descriptive norms have clear information processing implications. While descriptive norms are more influential under conditions of low elaboration, injunctive norms are more effective under conditions of high elaboration (Jacobson et al., 2011; Kredentser et al., 2012).

## **Framing and Cognitive Resource Allocation**

Message framing refers to the different ways in which a message formulates the choice, outcome, or goal with respect to a behavioral decision (Levin, Schneider, & Gaeth, 1998); for example, emphasizing either the gains or losses that result from certain actions or inactions (Kahneman & Tversky, 1979; O’Keefe & Jensen, 2007, 2009). There are several ways in which message frames and their valence (i.e., positive or negative) may affect the cognitive resources allocated to a message. Cialdini and colleagues (2006) proposed that the differential impact of positively versus negatively framed social norm messages originates from the fact that people in general have a negativity bias. A negativity bias means that “in most situations negative events are more salient, potent, dominant in combinations and generally efficacious than positive events” (Rozin & Royzman, 2001, p. 2). Research indicates that people are especially sensitive to elements in the environment that involve negative, compared with positive, affect (Crawford & Cacioppo, 2002; Dijksterhuis & Aarts, 2003). In addition, more attention is generally directed toward negatively, compared with positively, valenced stimuli (Pratto & John, 1991). This negativity bias is highly functional as it means that individuals are forced to process negative stimuli more elaborately than other stimuli (cf. Dijksterhuis & Aarts, 2003). Research indeed suggests that negative information is more likely to result in elaborate processing (Baumeister et al., 2001). In general, a negative message frame will therefore attract more attentional and processing resources in comparison with a positive message frame.

Cialdini and colleagues (2006) investigated how framed norm messages influence behavior. More specifically, they researched how differently framed injunctive and descriptive norm messages affected the amount of theft of petrified wood in a U.S. national park. They hypothesized that a negatively framed norm message would be more effective than a positively framed message (irrespective of the type of norm), because “in general, negative information is accorded greater attention, scrutiny, and weight in consciousness” (Cialdini et al., 2006, p. 4). To test this prediction, injunctive norm messages were constructed to communicate an anti-theft message either by urging visitors to leave petrified wood in the park (i.e., positive) or by asking them not to remove petrified wood from the park (i.e., negative). And indeed, the negatively framed injunctive norm reduced theft to a larger extent than the positively framed injunctive norm message. The highest theft rate was found in the negatively framed descriptive norm condition. The effects of the descriptive norm messages in this study, however, are difficult to interpret in terms of framing. That is, while the positively framed descriptive norm message described the high prevalence of desirable behavior (i.e., leaving wood in the park), the negatively framed descriptive norm communicated the high prevalence of undesirable behavior (i.e., removing wood from the park). This renders two completely different messages across the descriptive norm conditions. As a consequence, it is impossible to interpret the findings related to descriptive norms in this study in light of message framing. It is therefore crucial to bridge this gap in the social norms literature by systematically investigating the role of framing in injunctive norm messages and comparing this to the role of framing in descriptive norm messages.

## Current Study

The goal of the current study was to investigate the joint effects of message frames (i.e., negative and positive) and norms type (i.e., descriptive and injunctive) in promoting healthy food choices. Injunctive and descriptive norm messages were therefore either framed positively or negatively. Contrary to prior research (Cialdini et al., 2006), message frames in the current study did not change the fact that a majority engages in desirable behavior. While the positively framed descriptive norm message in the current study emphasizes that a majority engages in desirable behavior, a negatively framed descriptive norm message emphasizes that a majority does not engage in undesirable behavior, thereby enabling conclusions with regard to framing effects for descriptive norms.

Evidence suggests that a negatively, but not a positively, framed message will result in more elaborate processing (Baumeister et al., 2001). Combining this with the fact that injunctive norms require more effortful cognitive activity than descriptive norms (Jacobson et al., 2011; Kredentser et al., 2012) results in the hypothesis that a negative frame, in contrast to a positive frame, enhances the effect of an injunctive norm message on motivation and behavior. Contrary to prior theorizing in this domain (Cialdini et al., 2006), the opposite is expected for descriptive norms. Descriptive norms are expected to influence motivation more strongly under conditions of low cognitive activity, because they function as shortcuts in the decision-making process. Therefore, a positive frame, in comparison with a negative frame, is expected to enhance the

effect of descriptive norms. In sum, an X-shaped interaction pattern between norms type and message frame is expected.

We test our ideas of norms in the domain of eating behavior. A large proportion of daily food-related choices are made in an impulsive, mindless fashion (e.g., Hofmann, Friese, & Strack, 2009; Marteau, Hollands, & Fletcher, 2012; Wansink & Sobal, 2007). For example, when asked, participants in a study by Wansink and Sobal (2007) estimated that they made an average of 14.4 food- and drink-related decisions per day, while in fact they made on average 59 food-related decisions. This shows that people have relatively little insight into the number of food choices they make on a daily basis and grossly underestimate the frequency with which they make these choices. In addition to that, people appear to have little knowledge on the factors that influence their intake. Wansink and Sobal (2007), in a second study, manipulated environmental cues to trigger overeating (e.g., larger bowl). While this led to an increase in consumption of 31%, compared with a control group, a large majority indicated that they ate as much as they would otherwise. When informed of this bias and asked about why they may have consumed more, a majority indicated that if they ate more it must have been due to hunger. Taken together, these studies demonstrate that a lot of food-related decisions are made impulsively, and that people are likely unaware of the reasons that underlie a lot of their eating behavior.

People are also often unaware of normative influence. It has been shown that even though people may explicitly indicate that the behavior of others is irrelevant for motivating their own behavior, the behavior of others in contrast has quite a strong influence on people's behavior (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Of course, the fact that people are largely unaware of the effects of norms on behavior does not imply that norm information is processed unconsciously (cf. Bargh & Chartrand, 2000). In contrast, in the current study, as well as in many other paradigms testing the role of social norms, participants reflect on normative information. In fact, the deliberation is important for the effects. Despite the deliberate processing of the information, participants may be largely unaware of the behavioral consequences. Therefore, in the current study the main interest is on the effects of framed social norm messages on indirect measures of motivation (Experiment 1) and actual eating behavior (Experiment 2). Note that indirect measures of evaluation or motivation have been shown to be affected by persuasive messages, even when processed elaborately (Horcajo, Briñol, & Petty, 2010).

In sum, in Experiment 1 the main focus lies on the effects of framed injunctive and descriptive norm messages on indirect measures of motivation, and in Experiment 2 actual food intake is measured. In addition, we explore whether processing-related variables may explain framed norm effects.

## Experiment 1

A healthy diet entails a decrease in the consumption of unhealthy foods, as well as an increase in healthy foods, such as fruits and vegetables (World Health Organization, 2015). The current study focused on people's motivation to consume unhealthy snacks,

that is, chocolate and candy, as well as healthy snacks, that is, fruits. For this, an approach-avoidance task (AAT) was used, because it allowed us to measure and contrast motivational responses to healthy and unhealthy foods in a single task. In addition, the AAT could provide valid reflections of behavioral responses participants might be motivated to conceal or are not aware of and therefore unable to report on (Krieglmeier & Deutsch, 2010).

The logic behind the AAT is that humans usually show spontaneous avoidance reactions to unpleasant, threatening stimuli, and spontaneous approach reactions to pleasant stimuli. Avoidance is generally associated with pushing negative objects away from oneself and therefore with moving one's arm away from the body. In contrast, approach to pleasant objects is associated with pulling the objects closer and therefore with moving one's arm toward the body (Rinck & Becker, 2007). For instance, we might immediately reach out to pet a furry kitten (i.e., approach tendency), yet we might automatically back away when encountering a hairy spider (i.e., avoidance tendency). The AAT measures how fast these approach-avoidance reactions are made through arm flexion. How quickly participants approach versus avoid certain stimuli tells us how positive or negative they evaluate these items, respectively.

In the current experiment, participants were first exposed to an experimental or control message, and following that they participated in the AAT. In the AAT participants were requested to respond as fast and accurately as possible to pictures of neutral items (i.e., closets), healthy (i.e., fruit) and unhealthy foods (i.e., candy), by pushing them away from and pulling them toward themselves, by means of a joystick. Once the joystick reached a certain threshold forward or backward to constitute a push or pull, respectively, a reaction time was recorded, as well as whether a participant indeed pushed or pulled (as instructed). The response times allow us to assess how positively or negatively participants evaluated healthy and unhealthy foods. While the main focus was on indirectly measured motivational processes that result from framed social norm messages, self-reported measures for attitudes, self-efficacy, and intentions were also included.

We predicted that those who received a negative injunctive or positive descriptive norm message would show more positive responses to healthy food items, compared with neutral items, as well as unhealthy food items, but that this would not be the case in those exposed to a negative descriptive or positive injunctive norm message. Overall, an X-shaped interaction pattern was expected. This results in the following hypothesis:

**Hypothesis 1:** Social norms interact with message frames to influence the motivation to consume healthy and unhealthy foods, such that a negatively framed, but not a positively framed, injunctive norm message and a positively framed, but not a negatively framed, descriptive norm message results in a stronger motivation to consume healthy, than unhealthy food items.

## Method

*Participants and design.* Eighty-eight students from a Western-European university participated in this study for course credit, or €7.50 per hour. The experiment



comprised of a 2 (norm: injunctive vs. descriptive)  $\times$  2 (frame: positive vs. negative) mixed design, with picture type (i.e., fruit, candy, neutral) and direction (i.e., push, pull) as within-subject factors. In addition, a no-norm control condition was included. Participants were randomly assigned to one of the five different message conditions. To measure motivation, all participants completed an AAT where they had to push and pull pictures of fruit, candy, and neutral items with a joystick, during six experimental blocks. Eleven participants were excluded from the analyses because they were allergic to one or more of the foods shown in the pictures, two were excluded because more than 10% of their approach-avoidance responses were incorrect (i.e., not the correct direction), one because of an incorrect recall of the norm message and one outlier (based on response latencies exceeding 3 *SD* of the grand average score) was removed, resulting in the final sample of 73 participants ( $M_{\text{age}} = 21.48$ ,  $SD_{\text{age}} = 2.16$ ; 13 men). Participants in the sample reported to eat fruit, as often as candy, as a snack in-between meals ( $M_{\text{fruit}} = 3.53$ ,  $SD_{\text{fruit}} = 1.17$ ;  $M_{\text{candy}} = 3.52$ ,  $SD_{\text{candy}} = 1.20$ ), as was the case for the number of times they ate fruit or candy as a snack during the last 7 days ( $M_{\text{fruit}} = 5.05$ ,  $SD_{\text{fruit}} = 4.26$ ;  $M_{\text{candy}} = 4.90$ ,  $SD_{\text{candy}} = 4.24$ ). This suggests that both fruit and candy are common snacks in this sample.

#### *Procedure, materials, and measures*

**Practice AAT.** Participants were seated behind a desk with a monitor and a joystick. All participants started with 15 practice trials, in which they could familiarize themselves with the procedures of the AAT. They were told that they would see pictures (300  $\times$  400 pixels) of chairs and tables. During practice, participants were instructed to pull pictures of tables, by means of pulling the joystick toward themselves, and push pictures of chairs, by pushing the joystick away from themselves. They were told that, in this round, they would receive feedback on incorrect responses. Throughout all trials when the joystick was pushed, the picture moved to the back and decreased in size; the opposite happened when the joystick was pulled. This created a zooming effect. After completing the practice trials, participants proceeded to the actual experiment (see Table 1 for an overview of the full AAT procedure).

**Norm manipulations.** After the practice trials, participants received one of four social norm texts or the control text (at random). Participants were told that the article came from a local student magazine. They were instructed to read the text thoroughly and were told that, later on in the experiment, questions would be asked related to the content of the article. This was done to ensure that participants would indeed read the message.

The *negative injunctive norm message* stated that most students at Radboud University are of the opinion that one should not eat candy when one fancies a snack. This was followed by a negatively framed plea (as in Cialdini et al., 2006): "Try eating candy less often, because eating candy is bad!" The *positive injunctive norm message* stated that most students at Radboud University are of the opinion that one should eat fruit when one fancies a snack. This was followed by a positively framed plea: "Try eating fruit more often, because eating fruit is good!" The word candy or fruit, respectively, was



**Table 1.** Schematic Overview of the Experimental Procedure.

Block	Content	Stimuli	# trials
0	Practice trials	Neutral	15
M	<i>Norm manipulation</i>	<i>Text</i>	NA
1	Neutral-target	Fruit-neutral or candy-neutral	40
2	Target-neutral <sup>a</sup>	Fruit-neutral or candy-neutral	40
3	Neutral-target	Fruit-neutral or candy-neutral	40
4	Target-neutral <sup>a</sup>	Fruit-neutral or candy-neutral	40
M	<i>Norm manipulation</i>	<i>Text</i>	NA
5	Target-target	Fruit-candy	40
6	Target-target <sup>a</sup>	Fruit-candy	40

Note. NA = not applicable.

<sup>a</sup>Indicates a reversed direction in pulling and pushing of a certain category of pictures from the previous block. In between each block, participants were asked to recall the text they had read (experimental manipulation).

mentioned 4 times in the injunctive norm texts. The *negative descriptive norm message* described that increasingly fewer people eat candy. In addition, it stated, “More than 75% of students at Radboud University say they almost never eat candy when they fancy a snack.” The *positive descriptive norm message* stated that an increasing number of people eat fruit. It also stated, “More than 75% of students at Radboud University say they often eat fruit when they fancy a snack.” The word candy or fruit, respectively, was mentioned a total of 3 times in the descriptive norm texts. In the control condition, participants read an article about findings from research on an unrelated topic (i.e., beneficial effects of swearing when experiencing physical pain).

**AAT.** After reading the social norms or control message, participants proceeded with the actual AAT in which pictures of fruit, candy, and neutral items were presented. The AAT consisted of a total of six experimental blocks, 40 trials each, resulting in a total of 240 trials. Participants always started with the target-neutral blocks in which pictures of fruit and pictures of candy were both combined with neutral pictures in separate blocks (four blocks of 40 trials each). The goal of the first four blocks was to compare motivation to consume healthy and unhealthy foods against motivational aspects regarding relatively neutral (non-food) stimuli (comparable with a single category implicit association task [IAT]). The order of these picture combinations (i.e., fruit-neutral/candy-neutral) was counterbalanced. In the final two blocks (40 trials each), motivation to consume healthy and unhealthy foods was measured by directly contrasting pictures of fruit and candy (much like a standard IAT). The goal of the latter two blocks was to compare the motivation to consume fruit directly with the motivation to consume candy.

The order of approach and avoidance responses was counterbalanced. The order in which the pictures appeared on the screen was random; however, the number of pictures per block from each category (i.e., fruit, candy, neutral) was kept equal (50%/50%).

**Target-neutral blocks.** Before starting the first test block, participants received the instruction to pull pictures of one category (e.g., fruit) and push pictures of another category (e.g., neutral). Once the joystick reached a certain threshold upon pushing it backward or pulling it forward, a reaction time was recorded, as well as whether a participant indeed pushed or pulled (as instructed). After the first block of 40 trials, participants were asked to think back on the content of the message they had read; for this, they were presented with the border in which the message was originally presented as a cue to recall. This was followed by a second block of 40 trials, but now participants would have to pull pictures they had just pushed and vice versa. After the first two blocks, participants received another request to recall the experimental text (with cue to recall) and proceeded with the following two blocks in which neutral pictures were combined with the other target pictures (i.e., fruit or candy). In between the third and fourth blocks, another cue to recall was given.

**Target-target blocks.** After finishing the first four blocks, instead of another cue to recall, the actual norm message was presented again for participants to read. Then, participants started the last two blocks of trials in which pictures of fruit and candy were combined (i.e., no neutral pictures). The order of the last two blocks was determined by the previous block (i.e., Block 4). If participants ended with pushing pictures of fruit, the fifth block would start with pulling pictures of fruit and pushing pictures of candy, or vice versa if they ended with pushing pictures of candy. In between the final two blocks, another cue to recall was given. Each participant completed a total of six blocks of 40 trials, resulting in a total of 240 trials.

**Self-report measures.** As the effects of framed norms messages on self-report measures were of secondary interest, they were assessed toward the end, after the AAT. Explicit evaluations of fruit and candy were measured by means of four statements each, which were averaged to reflect *attitude* toward fruit and candy, respectively: "Eating fruit (candy) is tasty, pleasurable, good, enjoyable" (1 = *not at all*, 6 = *very much*;  $M_{\text{fruit}} = 4.92$ ;  $SD_{\text{fruit}} = 0.86$ ;  $\alpha_{\text{fruit}} = .89$ ;  $M_{\text{candy}} = 3.76$ ;  $SD_{\text{candy}} = 0.99$ ;  $\alpha_{\text{candy}} = .82$ ). *Self-efficacy* to eat fruit, and not candy, was measured by means of two items: "It is easy for me to eat fruit when I fancy a snack" and "It is difficult for me to not eat candy when I fancy a snack" (1 = *not at all*, 6 = *very much*;  $M_{\text{fruit}} = 4.08$ ;  $SD_{\text{fruit}} = 1.38$ ;  $M_{\text{candy}} = 3.23$ ;  $SD_{\text{candy}} = 1.49$ ). *Intentions* to consume fruit and candy were measured by means of one item each: "To what extent do you plan to eat fruit as a snack more often in the future?" and "To what extent do you plan to eat candy as a snack less often in the future?" (1 = *not at all*, 6 = *very much*;  $M_{\text{fruit}} = 4.01$ ;  $SD_{\text{fruit}} = 1.24$ ;  $M_{\text{candy}} = 3.82$ ;  $SD_{\text{candy}} = 1.37$ ).

**Norm perceptions.** Following the self-report measures, several questions were asked to analyze whether the social norm messages influenced the perceptions of the descriptive and injunctive norms. For the *descriptive norm* perceptions, two questions were asked pertaining to the consumption of fruit: "How often do you think students at Radboud University eat fruit when they feel like having something to eat in between

meals?” (1 = *never*, 6 = *always*;  $M_{\text{fruit}} = 3.56$ ;  $SD_{\text{fruit}} = 0.99$ ;  $M_{\text{candy}} = 3.89$ ;  $SD_{\text{candy}} = 0.95$ ) and “According to you, how large is the percentage of students at Radboud University who eat fruit when they feel like having something to eat in between meals?” (response options ranged from 0%-100%, at 10% intervals;  $M_{\text{fruit}} = 52.33$ ;  $SD_{\text{fruit}} = 18.37$ ;  $M_{\text{candy}} = 52.60$ ;  $SD_{\text{candy}} = 18.78$ ). The same questions were asked, but rephrased, for the consumption of candy. As for the *injunctive norms*, participants were presented with two statements: “Most students at Radboud University approve of me eating fruit when I feel like having something to eat in between meals” and “Most students at Radboud University disapprove of me eating candy when I feel like having something to eat in between meals” (1 = *not at all*, 6 = *very much*;  $M_{\text{fruit}} = 5.32$ ;  $SD_{\text{fruit}} = 0.74$ ;  $M_{\text{candy}} = 2.74$ ;  $SD_{\text{candy}} = 1.37$ ).<sup>1</sup>

**Statistical analyses.** All incorrect responses (full sample ( $n = 88$ ) = 3.31%; final sample ( $n = 73$ ) = 2.91%), as well as response times lower than 150 *ms* (full sample = 0.66%; final sample = 0.43%) and higher than 1279 *ms* ( $>3 SD$ ; full sample = 1.37%; final sample = 1.15%), were removed from the dataset. This outlier procedure was chosen based on the distribution of the data, as well as prior research on the AAT (Krieglmeyer & Deutsch, 2010; Krieglmeyer, Deutsch, De Houwer, & De Raedt, 2010). From the remaining responses, mean response times were calculated. From the first four blocks where food items were contrasted with neutral items (i.e., target-neutral blocks), eight mean response times were calculated. Four for approach and avoidance responses to fruit and candy and four for approach and avoidance responses to neutral items either paired with fruit or candy. From the latter two blocks (i.e., target-target blocks), four means were calculated for approach and avoidance responses to fruit and candy. To facilitate data interpretation difference scores were computed from these means (Rinck & Becker, 2007). This was done by subtracting each participant’s mean approach response time from his or her corresponding mean avoidance response time (e.g., candy push – candy pull). More positive values therefore indicate more positive responses, reflecting stronger appetitive motivation for fruit, candy, or neutral items (see the appendix).

To analyze the effects of norms and framing on appetitive motivation, two repeated-measures ANOVAs (RM ANOVAs) were conducted, one for the first four blocks in which pictures of fruit or candy were contrasted against neutral items and one for the last two blocks in which pictures of fruit and candy were combined. In the first RM ANOVA, the between-subjects factors norm (i.e., descriptive, injunctive) and frame (i.e., positive, negative), and the within-subjects factors type of block (i.e., candy-neutral, fruit-neutral) and type of appetitive motivation (i.e., target, neutral), as well as their interactions, were entered. In the second RM ANOVA, the same between-subjects factors were included (i.e., norm, frame), as well as the within-subjects factor type of appetitive motivation (i.e., candy, fruit) and their interactions. If significant interactions arose between the within- and between-subjects factors, further analyses were done to examine the direction of motivational effects. On the smallest level of the interaction, pairwise comparisons (Least Significant Difference; LSD) were conducted to examine differences between conditions. To analyze the effects of norms and

framing on self-reported measures, a MANOVA was conducted with norm and frame as the independent variables and attitudes, self-efficacy and intentions as the dependent variables.

## Results

### *Norm perceptions*

*Descriptive norms.* To investigate if the descriptive norm messages affected descriptive norms perceptions, a MANOVA was done on the four descriptive norm perception questions in which all five experimental conditions were entered as one factor. The multivariate test proved significant,  $F(16, 199.22) = 2.32, p = .004$ , Wilks's  $\lambda = .593, \eta_p^2 = .12$ . All subsequent univariate tests were also significant ( $ps < .05$ ). Simple contrasts of the descriptive norm conditions (i.e., positive, negative) with the control condition were in line with expectations. A positive descriptive norm message—about the high prevalence of fruit consumption—resulted in higher norm perceptions regarding fruit consumption and a negative descriptive norm message—on the low prevalence of candy consumption—resulted in lower norm perceptions regarding candy consumption, compared with the control condition (see Table 2). In line with expectations, both injunctive norm conditions (i.e., positive, negative) did not differ significantly from the control condition in their descriptive norm perceptions ( $ps > .30$ ). Findings therefore demonstrate that descriptive norm perceptions changed as a result of the descriptive norm messages.

*Injunctive norms.* The same analysis was done to investigate whether the injunctive norms messages changed subsequent injunctive norm perceptions. The multivariate test, however, did not show a significant effect of condition,  $F(8, 134) = 1.79, p = .085$ , Wilks's  $\lambda = .817, \eta_p^2 = .10$ . This aligns with other research that shows that injunctive norm perceptions do not usually change as a result of an injunctive norm message (Mollen, Rimal, Ruiter, Jang, & Kok, 2013). More likely, injunctive norm messages enhance the salience of injunctive norms, instead of changing norm perceptions (see general discussion). For illustrative purposes, Table 2 reports the means of the injunctive norm conditions (i.e., positive, negative) and the control condition.

### *Main analyses*

*Target-neutral blocks.* To test Hypothesis 1—that social norms would interact with message frames to influence the motivation to consume healthy and unhealthy foods, such that a negatively framed, but not a positively framed, injunctive norm message and positively framed, but not a negatively framed, descriptive norm message would result in a stronger motivation to consume healthy, than unhealthy food items—a RM ANOVA was done, in which appetitive motivation for neutral and target pictures (i.e., fruit, candy) was compared.<sup>2</sup> The test of between-subjects effects showed no significant main effects nor an interaction between the between-subjects variables. The predicted interaction between type of block (fruit-neutral vs. candy-neutral), type of appetitive motivation (target vs. neutral), norm (injunctive vs. descriptive), and frame (positive vs. negative) was not significant,  $F < 1$ .

**Table 2.** Results (Adjusted Means and SEs) of Simple Contrasts of the Descriptive and Injunctive Norm Conditions With the Control Group on Descriptive and Injunctive Norm Perceptions Related to Fruit and Candy Consumption.

	Control n = 14	Descriptive positive n = 14	Descriptive negative n = 14
Frequency fruit	3.50 (0.25)	4.21 (0.25)*	3.57 (0.25)
Percentage fruit	50.71 (4.69)	65.71 (4.69)*	52.14 (4.69)
Frequency candy	4.14 (0.23)	3.93 (0.23)	2.93 (0.23)***
Percentage candy	57.14 (4.66)	50.71 (4.66)	37.14 (4.66)**
		Injunctive positive n = 16	Injunctive negative n = 15
Approval fruit	5.36 (0.20)	5.56 (0.19)	5.00 (0.19)
Disapproval candy	3.00 (0.35)	2.06 (0.33)	2.40 (0.34)

Note. With respect to the injunctive norm measures, no significant contrasts of the injunctive norm conditions with the control condition were found. The same was true for the descriptive norm groups. The contrast of the control condition with the positive injunctive norm condition on disapproval of candy consumption did approach significance ( $p = .055$ ).

An asterisk indicates a significant difference with the control group of \* $p < .05$ . \*\* $p < .005$ . \*\*\* $p < .001$ .

A significant interaction effect did arise between appetitive motivation type and type of norm,  $F(1, 55) = 7.09, p = .010$ , Wilks’s  $\lambda = .886, \eta_p^2 = .11$ . The pattern of results indicates that those who received an injunctive norm showed a stronger appetitive motivation for target items (i.e., both candy and fruit;  $M_{adj} = 36.14; SE = 6.63$ ), compared with neutral items ( $M_{adj} = 5.36; SE = 5.51$ ), while the results of those who received a descriptive norm were in the opposite direction; appetitive motivation for food items ( $M_{adj} = 16.03; SE = 6.98$ ) was somewhat lower compared with neutral items ( $M_{adj} = 22.86; SE = 5.79$ ). This means that especially participants who read an injunctive norm showed stronger appetitive motivation to fruit and candy, compared with neutral items, while those who read a descriptive norm showed a slight pattern in the opposite direction. It is difficult to interpret these findings, however, as they do not differentiate between healthy and unhealthy foods. Taken together, no evidence was found for Hypothesis 1 in the first four blocks, in which target pictures were contrasted against neutral pictures.

**Target-target blocks.** To test Hypothesis 1 for the trials in which pictures of candy were directly contrasted against pictures of fruit, another RM ANOVA was conducted on the response times in the last two blocks.<sup>3</sup> The test of between-subjects effects showed no significant main effects, nor an interaction between the between-subjects variables. A significant main effect of the within-subjects factor type of appetitive motivation (fruit vs. candy) did arise,  $F(1, 55) = 4.49, p = .039$ , Wilks’s  $\lambda = .925, \eta_p^2 = .08$ , showing that people had a higher appetitive motivation for fruit ( $M_{adj} = 48.04, SE = 8.76$ ) than for candy ( $M_{adj} = 21.43, SE = 7.42$ ). No two-way interactions were found between type

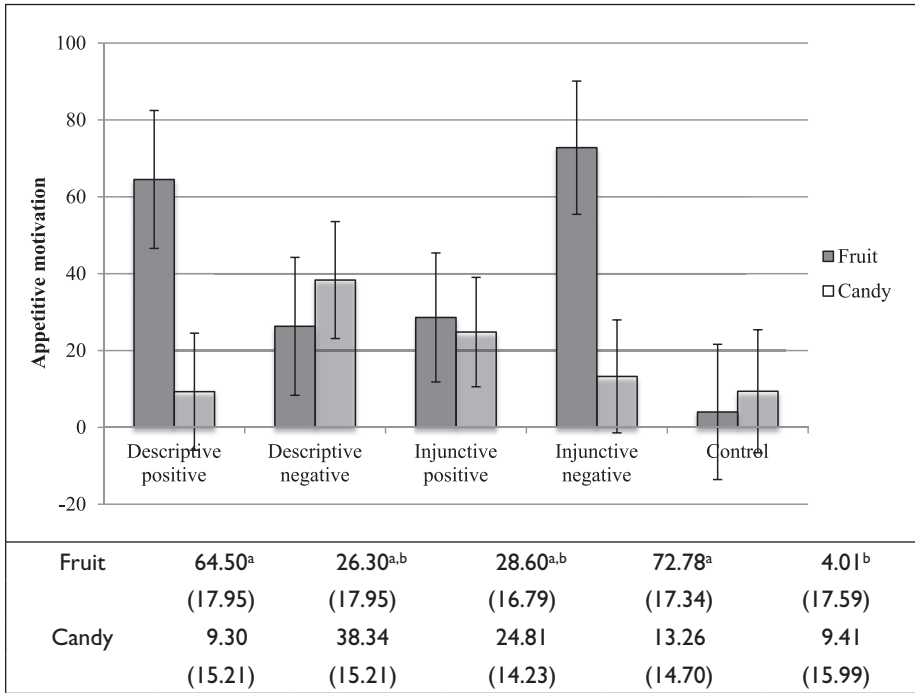
of appetitive motivation and norm or frame ( $F_s < 1$ ). In line with Hypothesis 1, however, a significant three-way interaction was found between type of appetitive motivation, norm, and frame,  $F(1, 55) = 5.99, p = .018, \text{Wilks's } \lambda = .902, \eta_p^2 = .10$  (see Figure 1).<sup>4</sup>

In order to get a better understanding of this three-way interaction, we subsequently conducted two further analyses. First, we tested the interaction between motivation for healthy versus unhealthy food and type of frame within the injunctive and descriptive norms separately. These analyses revealed that within the injunctive condition, the appetitive motivation for fruit compared with candy seemed stronger in the negative than in the positive frame (see Figure 1); however, this interaction was not significant,  $F(1, 29) = 2.44, p = .129, \eta_p^2 = .08$ . Within the descriptive norm conditions, frame had an opposite effect on appetitive motivation. Appetitive motivation for fruit versus candy tended to be stronger when the descriptive condition was formulated positively compared with negatively. This effect was marginally significant,  $F(1, 26) = 3.66, p = .067, \eta_p^2 = .12$ .

Second, we conducted a series of paired-samples  $t$  tests in order to examine whether appetitive motivation for fruit was stronger than that for candy in the negative injunctive and positive descriptive norm conditions, but not the injunctive positive and descriptive negative conditions. In line with our expectations, differences in appetitive motivation for fruit and candy were marginally significant in the negative injunctive,  $t(14) = 2.12, p = .052, r = .49$ , and significant in the positive descriptive norm condition,  $t(13) = 2.21, p = .046, r = .52$ . In the positive injunctive norm condition, negative descriptive norm condition, and control condition, no differences were observed,  $t_s < 1$ . As predicted, those in the negatively framed injunctive and positively framed descriptive norm conditions both showed stronger appetitive motivation for fruit as opposed to candy.

In addition, to investigate differences between conditions (including the control condition), the appetitive motivation scores for fruit and candy of the negative injunctive and positive descriptive norm conditions were contrasted with the other conditions in two univariate ANOVAs, in which all five conditions were entered as one factor. Pairwise comparisons (LSD) showed significantly higher appetitive motivation for fruit in both the negative injunctive and the positive descriptive norm conditions, compared with the control condition (see Figure 1). No other differences between conditions were significant,  $p_s > .061$ . With regard to appetitive motivation for candy, no significant differences between conditions were found,  $p_s > .203$ .

In sum, findings from the latter two blocks provide support for Hypothesis 1 that social norms interact with message frames to influence indirect measures of motivation to consume healthy and unhealthy foods. It was found that a negatively, but not a positively, framed injunctive norm resulted in stronger appetitive motivation for fruit than for candy. For descriptive norms, the opposite was found. Positively framed, but not negatively framed, descriptive norms resulted in stronger appetitive motivation for fruit than for candy. In addition, both negatively framed injunctive and positively framed descriptive norm messages resulted in stronger appetitive motivation for fruit, compared with the control condition.



**Figure 1.** Appetitive motivation for fruit and candy (adjusted means and SEs). Note. Differing superscripts (horizontally) indicate significant pairwise comparisons (LSD) of  $p < .05$  between conditions.

*Self-report measures.* To analyze the effects of framed injunctive and descriptive norm messages on self-reported attitudes, self-efficacy, and intentions regarding fruit and candy consumption, a MANOVA was conducted (with order of the AAT as the covariate). The multivariate test showed no significant main effects of norm, nor frame ( $F_s < 1$ ). The interaction between norm and frame was also not significant,  $F(6, 49) = 1.82, p = .114, \eta_p^2 = .18$ . None of the univariate effects were significant either ( $F_s < 3.48, p_s > .068$ ).<sup>5</sup>

### Discussion

Results of the first experiment provide initial evidence that it is indeed critical that the frame fits the characteristics of the social norm communicated. The results on the indirect, but not self-report, measures confirm the expected X-shaped interaction pattern. More specifically, in Experiment 1, appetitive motivation for healthy foods was strengthened as a result of a negative injunctive and positive descriptive norm message, confirming Hypothesis 1.

Increased motivation to maintain a healthy diet, as a result of a negative injunctive or a positive descriptive norm, was manifest through heightened appetitive motivation



for fruit, but only when fruit was clearly positioned against candy in the latter two blocks. A possible explanation for this can be found in a study conducted by Fishbach and Zhang (2008). They showed that presenting pictures of healthy food apart from pictures of unhealthy food (instead of together in one picture) resulted in direct competition between both food items. Competition between healthy and unhealthy food items is thought to cause the high-order health goal to become activated. In the current experiment, the direct contrast between pictures of fruit and candy (in the latter two blocks) could have strengthened the relationship between the health goal that was reinforced by the negative injunctive or positive descriptive norm and the motivational responses. Differences in motivation to consume healthy foods as a result of health-related messages might be more easily obtained in tasks that increase the accessibility of health goals.

The first experiment yielded promising results, but because of the relatively small sample size, the fact that some of the observed differences were only marginally significant, and the fact that changes in motivation were exclusively found in the latter two blocks, it is sensible to conceptually replicate these findings before we conclude that message framing has a differential influence on injunctive and descriptive norms. The first goal of Experiment 2 therefore was to examine behavioral effects that result from framed social norm messages using a larger sample, and the second goal was to try to establish the underlying processes through which framing enhances the effects of injunctive and descriptive norms.

## Experiment 2

Whereas the emphasis of the first experiment was on motivational effects that resulted from framed norm messages, the goal of Experiment 2 was to establish actual behavioral effects. It was again proposed that positive and negative message frames would differentially affect the influence of injunctive and descriptive norms. More specifically, it was hypothesized that a negative frame would enhance the effects of injunctive norms, while a positive frame was expected to enhance the effects of descriptive norms on healthy eating behavior, again resulting in an X-shaped interaction pattern.

Two processes were hypothesized to underlie the predicted effects. First, as outlined earlier, message framing is proposed to affect a person's processing style. More specifically, it is expected that a negative message frame, due to the fact that people in general have a negativity bias (Rozin & Royzman, 2001), will trigger more attentional and processing resources in comparison with a positive message frame. To assess this assumption, processing measures were included in Experiment 2.

Second, we explored the fit between the processing of the frame and the specific norm communicated, as an additional possible mechanism that may explain the differential effects of framing on injunctive and descriptive norms. In previous studies, it has been repeatedly shown that the frame of a persuasive message (e.g., prevention focus frame) may match a recipient's orientation (e.g., prevention oriented; Cesario, Higgins, & Scholer, 2008; Lee & Aaker, 2004). Such experienced fit has been shown to affect the influence of persuasive communication (Cesario, Grant, & Higgins,

2004). Also, when an individual's decision-making style (either induced by the situation or based on individual differences) matches the instruction of how to make a decision (e.g., deliberately or intuitively), the value of the chosen object increases (Avnet & Higgins, 2003; Betsch & Kunz, 2008; de Vries, Holland, & Witteman, 2008).

Such a transfer of value from fit could also play a role in the current study on normative influences. Specifically, a message frame may not only activate the required processing style for injunctive versus descriptive norms, but the level of fit between the frame and the norm may in addition "feel right," and thereby enhance the subjective value of the norm communication (Higgins, Chen Idson, Freitas, Spiegel, & Molden, 2003). This may subsequently boost individuals' motivation to change their behavior in response to framed norm messages. Subjective experiences associated with the behavior are therefore assessed to explore this assumption.

In sum, the aim of the second experiment was to conceptually replicate the effects of framed social norms on actual eating behavior and to study the proposed processes underlying framing effects on social norms (i.e., message processing and subjective experiences from fit). In Experiment 2, the following hypotheses are tested:

**Hypothesis 2:** Social norms interact with message frames to influence the consumption of healthy and unhealthy foods, such that a negatively framed, but not a positively framed, injunctive norm and a positively framed, but not a negatively framed, descriptive norm message results in more healthy and less unhealthy food intake.

**Hypothesis 3:** Exposure to a negatively framed message results in more elaborate processing, compared with a positively framed message.

**Hypothesis 4:** Exposure to a negatively framed injunctive or positively framed descriptive norm message results in more positive subjective experiences related to eating healthy and not unhealthy snacks, than exposure to a positively framed injunctive or negatively framed descriptive norm.

## Method

**Participants and design.** A total of 213 students from a different Western-European university participated in a second experiment in which the effects of framed social norm messages on actual food consumption were examined. From this sample, a total of 23 participants were excluded, 10 because they were outliers with respect to food consumption ( $>3 SD$ ), nine because they had a relevant allergy that precluded them from eating both foods in one category (i.e., healthy sweet, healthy savory, unhealthy sweet, unhealthy savory), and four because their food weighing was unreliable (for instance, because they took their tangerine peel). Therefore, the final sample consisted of 190 participants ( $M_{age} = 21.79$ ,  $SD_{age} = 4.48$ ; 47 men;  $M_{BMI} = 21.68$ ;  $SD_{BMI} = 2.76$ ). Participants were told that they were taking part in a study on "taste and perception." Participants were randomly assigned to one of five conditions in a 2 (norm: injunctive vs. descriptive)  $\times$  2 (frame: positive vs. negative) between-subjects experiment, with an additional no-norm control condition. They either received money (€10 per hour)

or course credits for their participation.

*Procedure and materials.* The procedure used in the second study was similar to that in the first study, with the main difference being the dependent measure (i.e., food intake). Participants were seated behind a desk with a monitor. A female experimenter brought four covered bowls of food and an evaluation form and placed them on the desk. Participants were informed that the food in the bowls was meant for a taste test later in the experiment, and that instructions for this would appear on the computer screen.

*Norm manipulations.* As in Experiment 1, the first task participants were asked to do was a “memory task.” For this, they were presented with a text, ostensibly from a local student magazine. During this task, participants were exposed to one of four social norms texts or a control text. The norm messages were almost identical to those in Experiment 1. The only difference was that the negatively framed messages did not only pertain to sweet (i.e., candy) but to savory snack consumption as well, which together were referred to as unhealthy snacks. And the positively framed messages, instead of only referring to fruit, also referred to vegetables and were together referred to as healthy snacks. These foods were included in the texts to align with the foods presented to participants in the “taste test.”

*Filler task and taste test.* After participants read the text, they were asked to evaluate eight different abstract paintings. This aligned with the cover story “taste and perception,” but was also meant as a filler task, to make the link between the manipulation text and the “taste test” less obvious. Following the filler task, participants started the “taste test.” They were instructed to taste and evaluate all of the eight foods made available to them and were told that they could eat as much as they liked. The four bowls contained healthy and unhealthy snacks, which were either sweet or savory. The healthy sweet snacks were tangerines and grapes, the healthy savory snacks were cherry tomatoes and cucumber slices. The unhealthy sweet snacks were M&Ms and double chocolate chip cookies and the unhealthy savory snacks were crunchy peanuts and salty crackers (see Figure 2). All participants were therefore presented with eight different foods of which four were healthy and four were unhealthy. The “taste test” took a total of 10 minutes. Time was indicated by means of a timer on the screen. After 10 minutes, participants could continue with the next part of the study. The average time participants spent on the taste test was 10 minutes and 22 seconds. None of the participants ate the full contents of one of the bowls.

*Questionnaire.* To be consistent with the cover story, participants were then asked to answer a few questions about the text they had just read. After this, the norm perception questions were asked. Following that, participants were asked to read the text again and were asked some questions related to processing of the text and subjective experiences related to eating healthy and unhealthy snacks. The experiment ended with the administration of the Restraint Eating scale and self-report measures



**Figure 2.** Four healthy and unhealthy foods presented for the “taste test.”

of height and weight to calculate their body mass index (BMI). Participants were then asked to indicate what they thought the goal of the study was. Finally, participants were rewarded for their participation, thanked, and debriefed after completion of the full experiment.

### Measures

**Norm perceptions.** Norm perception questions were similar to those in Experiment 1. The only difference was that they were rephrased to include fruits and vegetables for the healthy norm perception questions and sweet and savory snacks for the unhealthy norm perception questions, instead of only referring to fruit and candy.

**Message processing.** After a second exposure to the norm or control message, participants were asked six questions related to processing of and involvement with the text (Lee & Aaker, 2004). The first two items were averaged to create a *processing fluency index* ( $r = .67$ ;  $M = 6.17$ ;  $SD = 1.12$ ): “I thought the text was” (1 = *difficult to process* to 7 = *easy to process*) and (1 = *difficult to understand* to 7 = *easy to understand*). *Involvement* ( $\alpha = .84$ ;  $M = 5.23$ ;  $SD = 0.98$ ) while reading the text was measured with an additional four items: “While reading the text I was” (1 = *not at all involved* to 7 = *highly involved*) and (1 = *not at all interested* to 7 = *highly interested*) and “While reading the text I” (1 = *quickly skimmed it* to 7 = *read it carefully*) and (1 = *spent little attention* to 7 = *spent a lot of attention*).

**Subjective experience.** To measure whether fit between the norm and frame changed subjective experiences associated with eating healthy or not eating unhealthy snacks, four questions were asked (Cesario & Higgins, 2008). The first two items pertained to eating healthy snacks: “How right does it feel for you to eat healthy snacks such as fruits or vegetables?” (1 = *not at all right* to 7 = *very right*) and “How wrong does it feel for you to eat healthy snacks such as fruits or vegetables?” (1 = *not at all wrong* to 7 = *very wrong*). The last two items pertained to not eating unhealthy snacks: “How right does it feel for you to not eat unhealthy snacks such as sweets or savory snacks?” (1 = *not at all right* to 7 = *very right*) and “How wrong does it feel for you to not eat unhealthy snacks such as sweets or savory snacks?” (1 = *not at all wrong* to 7 = *very wrong*). Feeling wrong ratings were subtracted from feeling right ratings, thereby creating a feeling right index for eating healthy ( $M = 3.66$ ;  $SD = 2.10$ ) and not eating unhealthy snacks ( $M = 1.41$ ;  $SD = 2.48$ ), respectively.

**Restraint Eating scale.** Ten questions were asked to measure participants’ dietary restraint (van Strien, Herman, Engels, Larsen, & van Leeuwe, 2007). The six questions of the Concern for Dieting subscale were summed ( $\alpha = .68$ ;  $M = 7.45$ ;  $SD = 3.13$ ; range = 1-17). The same was done for the remaining four items in the Weight Fluctuation subscale ( $\alpha = .66$ ;  $M = 4.33$ ;  $SD = 2.80$ ; range = 0-13).<sup>6</sup>

**Statistical analyses.** To test Hypothesis 2, a MANOVA was conducted with the between-subjects factors norm (i.e., descriptive, injunctive) and frame (i.e., positive, negative), as the independent variables and the consumption in grams of each of the four types of food (i.e., healthy sweet/savory, unhealthy sweet/savory), as the dependent variables. On the smallest level of the interaction, pairwise comparisons (LSD) between conditions (including the control condition) were conducted. In addition, standardized consumption scores ( $z$  scores) were computed to allow for a more meaningful within-participant comparison of relative healthy versus unhealthy food consumption (as in Experiment 1). RM ANOVAs were conducted on the standardized scores to test whether participants in the negatively framed injunctive and positively framed descriptive norm conditions indeed consumed relatively more healthy than unhealthy foods. To test Hypotheses 3 and 4, another MANOVA was conducted with norm and frame as the independent variables, and processing measures and subjective experiences as the dependent variables.

## Results

### Norm perceptions

**Descriptive norms.** A MANOVA was conducted for the four descriptive norm perception questions in which all five conditions of the experiment were entered as one factor. The multivariate test proved significant,  $F(16, 556.66) = 2.31$ ,  $p = .003$ , Wilks’s  $\lambda = .821$ ,  $\eta_p^2 = .05$ . All subsequent univariate tests were significant,  $ps < .024$ , except for the univariate test for the frequency of fruit consumption item,  $p = .103$ . Simple contrasts of the social norm conditions with the control group were conducted.

**Table 3.** Results (Adjusted Means and SEs) of Simple Contrasts of the Descriptive and Injunctive Norm Conditions With the Control Group on Descriptive and Injunctive Norm Perceptions Related to Healthy and Unhealthy Food Consumption.

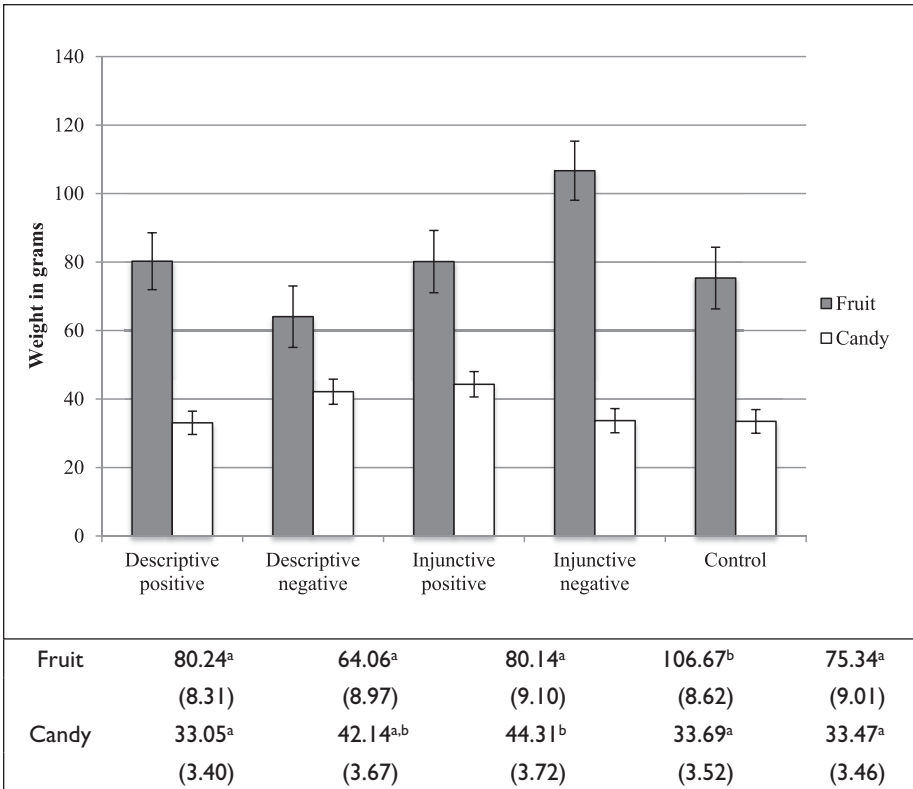
	Control n = 38	Descriptive positive n = 42	Descriptive negative n = 36
Frequency healthy	3.42 (0.15)	3.79 (0.14)	3.50 (0.15)
Percentage healthy	45.76 (2.63)	57.52 (2.50)**	51.08 (2.70)
Frequency unhealthy	4.16 (0.14)	3.98 (0.13)	3.83 (0.15)
Percentage unhealthy	60.05 (2.85)	56.14 (2.71)	55.17 (2.93)
		Injunctive positive n = 35	Injunctive negative n = 39
Approval healthy	4.87 (0.16)	4.97 (0.17)	4.97 (0.16)
Disapproval unhealthy	2.84 (0.22)	2.63 (0.23)	2.74 (0.22)

Note. No significant contrasts of the injunctive norm conditions with the control group were found. The same was true for the descriptive norm conditions. An asterisk indicates a significant difference with the control group of  $**p < .005$ .

Simple contrasts showed that those in the positive descriptive norm condition had a higher perception of the percentage of students who consume fruit and vegetables as a snack, compared with those in the control condition. No other significant differences with the control group were found,  $ps > .064$  (see Table 3). These findings mostly contrast those of Experiment 1, in which descriptive norm perceptions changed as a result of highly similar descriptive norm messages.

*Injunctive norms.* The same analysis was done to investigate whether the manipulation of injunctive norms influenced injunctive norm perceptions. Similar to Experiment 1, no effects were found on the ratings concerning injunctive norm perceptions as a function of the experimental manipulations (multivariate  $F < 1$ ). The univariate tests were also non-significant,  $ps > .650$ . This again shows that injunctive norm perceptions do not likely change as a result of an injunctive norm message. For illustrative purposes, Table 3 also reports the means of both injunctive norm conditions (i.e., positive, negative) and the control condition.

*Main analyses.* The weights eaten in grams from each of the four categories of food were entered as dependent variables in a MANOVA. There was neither a main effect of norm,  $F(4, 145) = 1.72, p = .148$ , Wilks’s  $\lambda = .955, \eta_p^2 = .05$ , nor frame,  $F(4, 145) = 1.23, p = .302$ , Wilks’s  $\lambda = .967, \eta_p^2 = .03$ , on the amount of healthy and unhealthy foods eaten. In line with Hypothesis 2, however, there was a significant interaction between type of norm and type of frame,  $F(4, 145) = 4.68, p = .001$ , Wilks’s  $\lambda = .886, \eta_p^2 = .11$ . The subsequent univariate tests were not significant for healthy,  $F(1, 148) = 1.89, p = .171, \eta_p^2 = .01$ , nor unhealthy savory snacks,  $F(1, 148) = 2.75, p = .100, \eta_p^2 = .02$ . The univariate tests were, however, significant for healthy,  $F(1, 148) = 5.95, p = .016, \eta_p^2 = .04$ , and unhealthy sweet snacks,  $F(1, 148) = 7.59, p = .007, \eta_p^2 = .05$ . As in Experiment 1,



**Figure 3.** Weight eaten in grams (adjusted means and standard errors) from the healthy and unhealthy sweet snacks.  
 Note. Differing subscripts (horizontally) indicate significant pairwise comparisons (LSD) of  $p < .05$  between conditions.

the data show an X-shaped interaction pattern, indicating that framing has a differential effect on descriptive, compared with injunctive, norms (see Figure 3).<sup>7</sup>

Pairwise comparisons (LSD) indicate that those who were exposed to a negatively framed injunctive norm about disapproval related to unhealthy food ate more fruit than those in all other conditions, including the control condition. Contrary to Experiment 1, no difference between the positively framed descriptive norm condition and the control condition was found with regard to fruit consumption. With regard to candy consumption, no differences between the negatively framed injunctive and positively framed descriptive norms and the control condition were found. Results do show that a positively framed injunctive norm that communicates approval related to fruit consumption results in increased candy consumption in comparison with the control condition and the positively framed descriptive norm and negatively framed injunctive norms.

In addition, within-subjects analyses (RM ANOVAs) were conducted on the standardized consumption scores ( $z$  scores). This allowed us to make direct comparisons between the relative amounts of healthy versus unhealthy (sweet and savory) foods



consumed within each condition, as in Experiment 1. The first analysis compared the difference between healthy and unhealthy savory snack consumption and the second between healthy and unhealthy sweet snack consumption. The first RM ANOVA on healthy and unhealthy savory snack consumption did not show any significant effects; no effect of norm was found,  $F < 1$ , the same was true for frame,  $F(1, 148) = 3.06$ ,  $p = .082$ , Wilks's  $\lambda = .980$ ,  $\eta_p^2 = .02$ , nor was there a significant interaction between norm and frame on healthy versus unhealthy savory food consumption,  $F < 1$ .

With regard to sweet snack consumption, the RM ANOVA showed no effect of type of norm on healthy versus unhealthy food intake,  $F(1, 148) = 2.15$ ,  $p = .144$ , Wilks's  $\lambda = .986$ ,  $\eta_p^2 = .01$ . The same was true for frame,  $F < 1$ . There was, however, an interaction effect between norm and frame on the consumption of healthy versus unhealthy sweet foods,  $F(1, 148) = 15.53$ ,  $p < .001$ , Wilks's  $\lambda = .905$ ,  $\eta_p^2 = .10$ .

Subsequently, as in Experiment 1, we tested the interaction between healthy versus unhealthy sweet food consumption and type of frame, within the descriptive and injunctive norm conditions separately. These analyses show interactions between the type of frame and consumption of healthy versus unhealthy food within the descriptive norm condition,  $F(1, 76) = 6.07$ ,  $p = .016$ , Wilks's  $\lambda = .926$ ,  $\eta_p^2 = .07$ , as well as within the injunctive norm condition,  $F(1, 72) = 9.48$ ,  $p = .003$ , Wilks's  $\lambda = .884$ ,  $\eta_p^2 = .12$ . These interactions indicate that food intake as a result of a positively framed descriptive norm is relatively more healthy ( $M_{\text{adj fruit}} = -0.02$ ,  $SE_{\text{fruit}} = 0.13$ ;  $M_{\text{adj candy}} = -0.19$ ,  $SE_{\text{candy}} = 0.16$ ), than when one is exposed to a negatively framed descriptive norm ( $M_{\text{adj fruit}} = -0.31$ ,  $SE = 0.14$ ;  $M_{\text{adj candy}} = 0.24$ ,  $SE = 0.17$ ). The opposite pattern was found for injunctive norms. Food intake is relatively more healthy when one is exposed to a negatively framed injunctive norm ( $M_{\text{adj fruit}} = 0.44$ ,  $SE_{\text{fruit}} = 0.17$ ;  $M_{\text{adj candy}} = -0.16$ ,  $SE_{\text{candy}} = 0.17$ ), compared with positively framed injunctive norm ( $M_{\text{adj fruit}} = -0.03$ ,  $SE_{\text{fruit}} = 0.18$ ;  $M_{\text{adj candy}} = 0.34$ ,  $SE_{\text{candy}} = 0.17$ ).

Paired-samples  $t$  tests show that the negatively framed injunctive norm appears to have the most positive effect on health behavior, as people consumed relatively more fruit compared with candy,  $t(38) = 2.72$ ,  $p = .010$ ,  $r = .40$ . This was not the case in the positively framed injunctive norm condition,  $t(34) = -1.65$ ,  $p = .109$ ,  $r = .27$ , control condition,  $t(37) = .30$ ,  $p = .766$ ,  $r = .05$  ( $M_{\text{adj fruit}} = -0.11$ ,  $SE_{\text{fruit}} = 0.16$ ;  $M_{\text{adj candy}} = -0.17$ ,  $SE_{\text{candy}} = 0.16$ ), or positively framed descriptive norm condition,  $t(41) = .91$ ,  $p = .370$ ,  $r = .14$ . This latter finding contrasts the findings of Experiment 1. The findings do indicate that framing a descriptive norm in a negative way may backfire, as people consumed relatively less fruit, compared with candy,  $t(35) = -2.37$ ,  $p = .023$ ,  $r = .37$ .

In sum, the results provide support for Hypothesis 2 that social norms interact with message frames to influence the consumption of healthy and unhealthy foods. Fruit and candy consumption data show the same X-shaped interaction patterns as in Experiment 1. Specifically, we found that a negatively framed injunctive norm results in more fruit consumption, compared with all other conditions, and that a positively framed injunctive norm results in more candy consumption, compared with most other conditions. Within-subjects comparisons additionally show that a negatively framed injunctive norm results in relatively more fruit compared with candy consumption. While a

positively framed descriptive norm did not result in more fruit consumption compared with a control condition, within-subjects comparisons do show that a negatively framed descriptive norm results in relatively more unhealthy compared with healthy eating.

*Message processing and subjective experience.* To investigate whether the framed texts affected processing of the message and subjective experiences related to the healthy and unhealthy behavior, another MANOVA was conducted with these variables as the dependent variables, and norm and frame as between-subjects factors. The multivariate test showed no significant main effect of norm,  $F < 1$ , or frame,  $F(4, 145) = 1.33$ ,  $p = .261$ , Wilks's  $\lambda = .965$ ,  $\eta_p^2 = .04$ , nor an interaction between both,  $F(4, 145) = 1.51$ ,  $p = .203$ , Wilks's  $\lambda = .960$ ,  $\eta_p^2 = .04$ . All univariate tests were also non-significant ( $F_s < 2.35$ ;  $p_s > .12$ ). Therefore, Hypotheses 3 and 4 had to be rejected.

## Discussion

The goal of the second experiment was twofold: First, to conceptually replicate the effects of framed norms on actual eating behavior and second, to study the proposed processes underlying the effects of framing on injunctive and descriptive social norms. With regard to the first goal, results showed that message frames indeed differentially affected the influence of injunctive and descriptive norms on eating behavior. As expected, a significant X-shaped interaction effect was found between the specific norm that was communicated and the message frame on healthy and unhealthy sweet food intake (i.e., fruit, candy). Savory food intake was unaffected by the social norm messages. This might be due to distaste for savory foods earlier in the day, which may have influenced the results. Corroborating this idea, we obtained significant correlations between the time of day and healthy savory ( $r = .22$ ,  $p = .002$ ) and unhealthy savory ( $r = .15$ ,  $p = .037$ ) food consumption, while the correlation for healthy sweet foods and time of day was marginally significant ( $r = .14$ ,  $p = .054$ ) and non-significant for unhealthy sweet foods ( $r = -.03$ ,  $p = .718$ ). Alternatively, an explanation may be that students are more accustomed to eating sweet snacks at university (e.g., fruit and candy), compared with savory snacks (e.g., cucumber and salty nuts).

Results with regard to sweet food intake confirm that an injunctive norm indeed benefits from a negative frame, as those in the negatively framed injunctive norm condition consumed more fruit than those in all other conditions. In addition, those exposed to a positively framed injunctive norm made less healthy food choices, as they ate more candy than most others. With regard to the effects of framed descriptive norms, results were somewhat less definitive. Those in the positively framed descriptive norm condition did not make more healthy food choices than others. At the same time, our findings do indicate that framing a descriptive norm in a negative way may backfire, as within-subject comparisons of standardized scores showed that people in this condition consumed relatively less fruit compared with candy. Taken together, the current study replicates the X-shaped interaction pattern (i.e., on sweet foods), which

confirms that injunctive and descriptive norms are differentially affected by positive and negative message frames. At the same time, we do recognize that more research with regard to framing effects on descriptive norm messages is needed.

The second aim of Experiment 2 was to establish whether message processing (i.e., fluency, involvement) and subjective experiences related to the behavior under consideration (i.e., resulting from fit) were influenced by the framed social norm messages. No evidence with regard to underlying processes was found in the second experiment (Hypotheses 3 and 4).

## General Discussion

The findings of the current study add to the field of social norms in at least two ways. First and foremost, the current findings provide a more detailed and accurate account of the effects of message framing and social norms. While prior theorizing predicted a main effect of message framing, proposing stronger effects of social norms when using a negative frame (Cialdini et al., 2006), the current investigation shows that this is in fact dependent on the specific type of norm under consideration (i.e., injunctive, descriptive). With regard to motivation to consume and actual consumption of healthy and unhealthy foods, we found an X-shaped interaction pattern, indicating that descriptive norms and injunctive norms differentially affect outcomes depending on how the message is framed. While the effects found in the current study may be small to medium in size (Cohen, 1988), the current study does show that making relatively small changes in the formulation of a message can impact its effects.

The rationale behind this framing effect, as previously proposed by Cialdini and colleagues (2006), is that a negatively framed norm message is more effective because in general people have a negativity bias (Rozin & Royzman, 2001). As a result of this bias, negatively, compared with positively, valenced stimuli tend to attract more attention (Pratto & John, 1991), as well as result in more elaborate processing (Baumeister et al., 2001). Combining this with the fact that injunctive norms require effortful cognitive activity to produce behavior change (Jacobson et al., 2011; Kredentser et al., 2012) resulted in the prediction that an injunctive norm should influence behavior more strongly when framed negatively compared with positively. Descriptive norms, as they have been found to influence behavior more strongly under conditions of low effortful cognitive activity (Jacobson et al., 2011; Kredentser et al., 2012), should influence behavior more strongly when framed positively, compared with negatively (Hypotheses 1 and 2).

In Experiment 1, it was indeed found that motivational processes related to healthy eating are positively influenced by negatively framed injunctive and positively framed descriptive norm messages, as exposure to both framed norms resulted in stronger appetitive motivation for healthy compared with unhealthy foods. In Experiment 2, the same interaction pattern was evident. However, the results with regard to negatively framed injunctive norms were stronger than those pertaining to positively framed descriptive norms, as in the latter case no significant differences in food consumption

with the control group were found. Analyses of the standardized consumption scores did show, however, that a negatively framed descriptive norm led to relatively more unhealthy versus healthy food intake. Although more research is needed to draw firmer conclusions, taken together these experiments provide evidence that a more nuanced view on the role of framing in social norms is required, as they confirm that the frame needs to fit the social picture.

What is further noteworthy about the findings of the current study is that— independent of whether a norm message pertained to fruit or candy consumption— the effects of negatively framed injunctive and positively framed descriptive norm messages were mainly manifest through heightened appetitive motivation and consumption of fruit. No indication was found in the current studies that these norm messages reduce the motivation and actual consumption of unhealthy food (i.e., candy). This contrasts a study by Robinson, Harris, Thomas, Aveyard, and Higgs (2013) but aligns with other studies that show stronger effects of interventions on healthy, compared with unhealthy, behavior (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011; Verplanken & Faes, 1999). Reducing unhealthy snack intake likely means that unhealthy habits need to be broken. Changing behavior that is habitual, by means of communication interventions, is relatively difficult among other things because habitual responses are activated relatively swiftly and without much effort, while overriding habitual responses requires more thought (Verplanken & Wood, 2006). Future research should therefore further explore under which circumstances the social environment can aid the reduction of unhealthy eating behavior. It is possible that social norm messages are more effective in changing unhealthy behavior when they are accompanied by changes in one's (social) environment, as changes in a person's context make habits more vulnerable to change (Verplanken & Wood, 2006). This may, for instance, be the case when students leave for college and are introduced to a new group of friends. Social norms that discourage unhealthy snack intake, set by a new social group, may facilitate change of prior unhealthy snacking habits.

### *Limitations and Directions for Future Study*

Three main limitations of the current studies are worth discussing. The first pertains to the norm perception outcomes. In both experiments, descriptive and injunctive norm perceptions were assessed after exposure to the norm manipulation. With regard to descriptive norm perceptions, Experiment 1 and to some extent Experiment 2 showed that the direction of norm perceptions was in line with the norms as communicated. Because, in both experiments almost identical descriptive norm manipulations were used, we feel confident that the effects found were indeed caused by the descriptive norm manipulations. However, the relatively weak strength of the descriptive norm manipulations in Experiment 2 may have resulted in weaker effects on behavior and may therefore explain the absence of a difference between the positively framed descriptive norm condition and the control condition.

With regard to injunctive norms, in both experiments a difference in injunctive norm perceptions between the injunctive norm conditions and the control condition was absent. This was not unexpected, however, as it aligns with prior research (Mollen, Rimal, Ruiter, Jang, & Kok, 2013). It is likely that people are already aware of the fact that most people approve of consuming healthy and disapprove of consuming unhealthy snacks. A message that stresses this fact will therefore more likely prime or make salient already existing beliefs about the acceptability of healthy eating. The idea that the salience of normative beliefs guides behavior aligns with the focus theory of normative conduct (Cialdini et al., 1990), as well as theory regarding health communication (Fishbein & Cappella, 2006). Future research should therefore include measures that assess the salience or accessibility of injunctive norms, rather than change, to further study this proposed process.

The most important avenue for future research that follows from this study pertains to the processes that underlie the differential effects of framing on injunctive and descriptive norms. In Experiment 2, no evidence for differential levels of processing or enhanced subjective experiences from fit, as a result of framed norm messages was found. There are two possible reasons for the absence of effects. First, it could be that these are simply not the mechanisms through which framing influences the effectiveness of norms. Another reason might be that the current method used was unsuitable to establish the proposed mechanisms. Message processing and subjective experiences were measured by means of explicit self-report measures. The effects are likely driven by subtle distinctions between conditions, which may difficult to distinguish by means of explicit self-report measures. Because the main goal in the current study was to establish motivational strength and behavioral effects, the current procedure was chosen. Future studies should, however, place more emphasis on establishing the underlying processes.

A final consideration is that the current studies were conducted in an artificial environment (i.e., behavioral laboratory) in which people were instructed to read a certain message. In reality, people might not always be able to free up more cognitive capacity in response to negatively framed injunctive norm messages. When processing is more effortful, people may simply opt to ignore those messages. This may mean that negative injunctive norms might not always be appropriate and effective and that, therefore, positive descriptive norms could have a stronger impact in some situations. Replicating these findings in a field setting is, thus, a worthy future goal.

## Conclusion

Our results show that effects of descriptive and injunctive norms need to account for how the normative information is framed. The frame thus needs to fit the social picture. A negative frame is not always more effective than a positive frame. Rather, it appears that normative appeals need to consider the interaction between the framing of the message and the type of norm activated. A negatively framed injunctive norm, telling people what *not to do* (i.e., negative frame), is most effective, as findings with regard to the effect of a negatively framed injunctive norm on motivation

and behavior appeared to be most robust. More research is needed with regard to the role of framing in descriptive norms, because results regarding whether positively framed descriptive norms help motivate people to engage in healthy behavior were less consistent. At the same time, our findings do provide an indication that communicating a positively framed descriptive norm may be preferable to a negatively framed descriptive norm. Clearly, when we communicate norms, we should mind the framing of the message, because a fit or non-fit between the type of norm communicated and frame could entail the difference between successful and non-successful health promotion.

## Appendix

Adjusted Means (SEs) of Response Times (in ms) in the Target-Target Blocks.

Experimental group, stimulus type	Response direction		Appetitive motivation (push – pull)
	Pull	Push	
DN+			
Fruit	566.95 (20.90)	631.45 (20.33)	64.50 (17.95)
Candy	620.38 (19.41)	629.69 (19.83)	9.30 (15.21)
DN-			
Fruit	604.51 (20.90)	630.81 (20.33)	26.30 (17.95)
Candy	599.94 (19.41)	638.27 (19.83)	38.34 (15.21)
IN+			
Fruit	553.16 (19.55)	581.76 (19.02)	28.60 (16.79)
Candy	560.43 (18.16)	585.24 (18.55)	24.81 (14.23)
IN-			
Fruit	553.56 (20.19)	626.34 (19.64)	72.78 (17.34)
Candy	582.68 (18.75)	595.94 (19.16)	13.26 (14.70)
CON			
Fruit	627.35 (20.82)	631.36 (19.56)	4.01 (17.59)
Candy	619.92 (19.46)	629.32 (21.67)	9.41 (15.99)

Note. DN = descriptive norm; IN = injunctive norm; CON = control group; + = positive frame; - = negative frame.

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## Notes

1. For exploratory purposes, several additional potential moderator variables were measured (i.e., identification, personal involvement, behavioral inhibition—behavioral activation); however, they did not interact with norm and frame to influence the indirect measures of appetitive motivation.
2. Whether people started, the approach-avoidance task (AAT) with pictures of fruit or candy (i.e., order) was entered into the analysis as a covariate, but no effect was found for order, and it was therefore removed from the analyses. The same was true for gender.
3. Again no effect was found for order. There was a significant effect of gender ( $p = .039$ ); this, however, did not change the pattern of results and did not interact with either norm or frame. Therefore, both gender and order were excluded from subsequent analyses.
4. An analysis was done that included all participants. Although the data pattern was similar, no significant interaction pattern between appetitive motivation for fruit and candy and norm and frame appeared in the latter two blocks ( $p = .114$ ). The same was true for the analysis that included people with allergies (but not those who were removed for other reasons;  $p = .159$ ). When only those with allergies were removed, but those removed for other reasons were retained, the interaction was significant ( $p = .010$ ). Additional analyses were conducted on a sample that also (in addition to the previously described criteria) excluded participants who reported some insight into the goal of the experiment during the debriefing. However, the interaction effect between norm and frame remained significant ( $p = .012$ ), so these participants were retained.
5. To obtain some more insight into the direction of results of the self-report measures—and how this relates to the indirect measures—the univariate effects that approached a level of significance were inspected. This was the case for the interaction between norm and frame on attitudes toward candy ( $F(1, 54) = 3.12, p = .083, \eta_p^2 = .06$ ) and intentions to not eat candy as often ( $F(1, 54) = 3.48, p = .068, \eta_p^2 = .06$ ). Although these results should be interpreted with caution, inspection of the means shows that they do not align with the effects found in the AAT (target-target blocks), if anything, the opposite pattern seems evident. Participants who were exposed to a negative injunctive norm had more positive attitudes toward candy ( $M_{\text{adj}} = 3.81; SE = 0.24$ ) and lower intentions to not eat candy ( $M = 3.37; SE = 0.31$ ) than those exposed to a positive injunctive norm ( $M_{\text{adj attitude}} = 3.39; SE_{\text{attitude}} = 0.24; M_{\text{adj intention}} = 4.00; SE_{\text{intention}} = 0.30$ ), while those exposed to a positive descriptive norm had more positive attitudes toward candy ( $M_{\text{adj}} = 4.02; SE = 0.25$ ) and lower intentions to not eat candy ( $M_{\text{adj}} = 3.95; SE = 0.32$ ) than those exposed to a negative descriptive norm ( $M_{\text{adj attitude}} = 3.56; SD_{\text{attitude}} = 0.25; M_{\text{adj intention}} = 4.51; SE_{\text{intention}} = 0.33$ ). While of interest, it is not possible to draw conclusions from these findings. Future research should examine whether this discrepancy can be established with more certainty and which processes could explain these findings (e.g., reactance; Stok, de Vet, de Wit, Renner, & de Ridder, 2015).
6. In addition to restraint eating, body mass index (BMI), self-reported hunger and thirst were measured. They were unaffected by the manipulations and were not the main focus of the current study, and are therefore not further discussed. Time since last meal and drink was also assessed; however, responses did not always indicate whether it concerned minutes or hours and could therefore not be reliably recorded.
7. An analysis was done that included all participants. The data pattern was similar, and a significant multivariate interaction between norm and frame appeared,  $p = .005$ . The univariate tests were also significant for both sweet food categories (i.e., healthy,  $p = .013$ ; unhealthy,  $p = .007$ ). The same was true for the analysis that included people with allergies



(but not those who were removed for other reasons, that is, outliers, weighing), multivariate,  $p = .001$ . The univariate tests were also significant for both sweet food categories (i.e., healthy,  $p = .010$ ; unhealthy,  $p = .004$ ). When only those with allergies were removed, but those removed for other reasons were retained, the interaction was still significant,  $p = .003$ . The univariate tests were also significant for both sweet food categories (i.e., healthy,  $p = .010$ ; unhealthy,  $p = .012$ ). Additional analyses were conducted on a sample that also (in addition to the previously described criteria) excluded participants who reported some insight in the goal of the experiment during the debriefing. However, the multivariate interaction effect between norm and frame remained significant ( $p = .001$ ). The same was true for univariate interaction effects on both sweet food categories (i.e., healthy,  $p = .022$ ; unhealthy,  $p = .004$ ), so these participants were retained.

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## Author Biographies

**Saar Mollen** is an assistant professor at the Amsterdam School of Communication Research (ASCoR), University of Amsterdam. Her core research interest is in the role of social norms in health communication.

**Rob W. Holland** is professor of social-psychological determinants of food choice at the University of Amsterdam and an associate professor at the Behavioural Science Institute, Radboud University. His core research interest is in automatic versus controlled forms of behavior regulation across various domains.

**Robert A. C. Ruiter** is a professor of applied psychology and chair of the Department of Work and Social Psychology at Maastricht University. His core research interests are in the domains of persuasion and behavior change.

**Rajiv N. Rimal** is a professor and chair of the Department of Prevention and Community Health at the George Washington University.

**Gerjo Kok** is a professor of applied psychology at the Department of Work and Social Psychology in Maastricht University. His core research interests involve planning models for behavior change interventions: intervention mapping.