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The influence of social norms on anticipated snacking: An experimental study comparing different types of social norms

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ABSTRACT

Previous studies have found that social norms affect eating behavior for different types of social norm measures and manipulations as well as different types of eating behavior. The current study investigated the effects of descriptive, injunctive, and liking norms on intentions to consume healthy snacks and anticipated snack choice, compared to a no-norm control condition. Moreover, we distinguished between descriptive norms that stress the frequency versus the quantity of food consumption. An experiment was conducted among 189 young adults. It was hypothesized that participants who received a descriptive quantity or frequency norm would intend to consume, and make an anticipated selection of, more low-calorie snacks than participants who received a no-norm control message. Due to inconsistency or lacking evidence regarding the effects of the other types of norms on eating behavior, no hypotheses were formulated for the injunctive and liking norm conditions. The hypothesis was partly confirmed. Descriptive quantity and frequency norms did not result in a stronger intention to consume healthy snacks in the upcoming week, but they did result in lower-calorie snack choices when people were asked to select three snacks that they planned to eat on the following day. No other differences between the conditions were found. These findings show that emphasizing both how much and how often most other people consume healthy foods affects anticipated healthy food choices. This can provide health professionals more options to mobilize the power of descriptive social norms for affecting health behavior change.

1. Introduction

Social norms, the implicit rules and standards that a group has for the acceptable behaviors of its members (Aronson et al., 2005), have been shown to substantially affect people's behavior (Kallgren et al., 2000; Reno et al., 1993). Social norms have been termed 'secret agents of influence', as they can have strong effects on human behavior while their influence oftentimes goes undetected (Schulz, 2022). A wide knowledge base suggests that social norms also have substantial effect on eating behavior (Higgs, 2015; Robinson, Thomas, et al., 2014; Stok et al., 2016). It is therefore not surprising that health promotion experts consider social norms useful entry points for interventions aimed at improving eating behavior (Robinson, Harris, et al., 2013; Stok et al., 2018). This may be especially effective for adolescents and emerging adults, who have been shown to be more sensitive to peer influences than older adults (Arnett, 2010; Large et al., 2019).

Yet, while many studies have reported on social norm interventions that increased healthy eating behavior or decreased unhealthy eating behavior compared to no-norm control conditions (e.g., Mollen et al., 2013; Schüz et al., 2018; Stok, Verkooijen, et al., 2014; Thomas et al., 2017), some earlier studies have reported no effects compared to control conditions (e.g., Collins et al., 2019) or even counterproductive effects, where social norm interventions increase undesired eating behaviors (e.g.,Stok, de Ridder et al., 2014). These mixed effects suggest that the ways in which social norms affect eating behavior are not yet fully understood. One reason for this might be that social norms can take many different forms (Hawkins et al., 2020; Legros & Cislaghi, 2020). For example, a social norm can either provide information about other people's opinions and expectations or about other people's own behaviors. Furthermore, a social norm can highlight various aspects of other people's opinions, expectations, and behaviors. Yet, not enough is known about which types of social norms are most likely to instigate desired changes in people's eating behaviors. The current article aims to address this research gap.

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1.1. Different types of eating-related social norms

In the literature pertaining to social norms, a broad distinction is made between social norms that stipulate how the members of a given social group behave themselves (*descriptive norms*, Cialdini et al., 1990; e.g., "most people eat fruit every day"), and social norms that stipulate what is considered acceptable behavior for members of that social group (*injunctive norms*, Cialdini et al., 1990; e.g., "most people think you should eat fruit every day"). Descriptive norms are thought to affect behavior mostly because people are motivated to behave efficiently and accurately, and descriptive norms provide cues as to how to achieve this. Injunctive norms are thought to affect behavior mostly because people are motivated to conform to their social group's expectations (Deutsch & Gerard, 1955; Jacobson et al., 2011; Kallgren et al., 2000). Descriptive and injunctive norms are thus associated with different goals and motivate behavior via distinct pathways (Jacobson et al., 2011, 2020). Therefore, it is important to distinguish between these two types of social norms when trying to understand the effectiveness of social norms in promoting healthy eating behaviors.

Besides this broad categorization into descriptive and injunctive eating-related social norms, further distinctions can be made with respect to what specific norms emphasize. To date, such distinctions have mostly been applied to *descriptive* eating-related social norms. Descriptive social norms may, for instance, emphasize the *frequency* or *quantity* of people's food intake or highlight the *liking* of most people of certain foods (Hawkins et al., 2020). It is important to note that while the frequency and quantity of consumption of healthy or unhealthy food are often combined in one measure or message (e.g., "most people eat two portions of fruit each day"; Verkooijen et al., 2015), there are also (cross-sectional) studies that differentiate between frequency norms (e.g., "most people eat fruit every day"; Lally et al., 2011; Robinson et al., 2016) and quantity norms (e.g., "most people eat two portions of fruit on a typical day"; cf. Neighbors et al., 2006; Robinson et al., 2016). There is, however, limited experimental research into the differential effects of norm messages that highlight different aspects of others' eating behavior or opinion regarding that behavior. Furthermore, to our knowledge, no previous research has applied and investigated such distinctions to *injunctive* eating-related social norms.

1.2. How social norms affect eating behavior

Previous studies have found associations between social norms and eating behavior across different types of social norm measures or manipulations and for different types of eating behavior. Experimental evidence shows that food intake is affected by descriptive norms, with people reporting higher fruit and vegetable intake and lower unhealthy food intake when descriptive *quantity* norms show that a majority of people eat a lot of fruit and vegetables or not a lot of unhealthy food (e.g., Liu et al., 2019; Mollen et al., 2013; Robinson et al., 2013; Robinson et al., 2014; Stok et al., 2012; Stok, Verkooijen, et al., 2014; Thomas et al., 2017). On the other hand, experimental evidence regarding the effects of *injunctive* social norms on food intake is inconsistent, with some studies finding that norms reporting that most others approve of eating fruits and vegetables, or disapprove of eating unhealthy foods, actually change eating behavior accordingly (e.g., Mollen et al., 2013; Schüz et al., 2018), while other studies find null or even counteractive effects (e.g., Stok, Verkooijen, et al., 2014).

There is little experimental evidence available about how other types of social norms affect eating behavior. A first experimental study suggests that descriptive *liking* norms can also affect eating behavior, at least for vegetable consumption (Thomas et al., 2016; see also Higgs et al., 2019). To our knowledge, no experimental research has been conducted on eating behavior that investigates descriptive *frequency* norms, although experimental research from the field of alcohol consumption (see e.g., Lee et al., 2010; Perkins et al., 1999; Ridout & Campbell, 2014) suggests that these types of norms can also affect behavior.

It is important to note that, typically, these previous studies have investigated one specific type of social norm and compared its relation to eating behavior to a no-norm control condition. Some prior studies have, however, compared two types of social norms – usually a descriptive versus an injunctive social norm (e.g., Mollen et al., 2013; Stok, Verkooijen, et al., 2014). To truly gain insight into how each of the previously mentioned different types of norms affect eating behavior, it is important to compare the effects of these different types of social norms, systematically and directly, on eating behavior.

A previous study by Hawkins et al. (2020) has already provided some first indications about the relation of different types of social norms and eating behavior. In a cross-sectional survey study, they investigated the associations between (descriptive) frequency norms, (descriptive) quantity norms, (descriptive) liking norms, and injunctive (quantity) norms and fruit and vegetable consumption, energy-dense snack and sugar-sweetened beverage consumption, and BMI. This study showed that descriptive frequency and descriptive quantity norms were both associated with self-reported fruit and vegetable consumption. However, the cross-sectional design means that no conclusions about causality can be drawn from these findings.

Moreover, the norm-referent group used in this study was not targeted to the research population, and it is unlikely that participants had a strong shared identity with the norm referent group considering that almost 20% of the sample was not even part of the norm referent group. Multiple studies have shown that social norms are much more powerful influencers of behavior when identification with the norm referent group is high (e.g., Cruwys et al., 2012; Liu et al., 2019; Louis et al., 2007; Stok, Verkooijen, et al., 2014; Stok, Verkooijen, et al., 2014).

1.3. Current study

The current study investigates the same four social norms as the study by Hawkins et al. (2020) but builds on that study in several ways. This study employs an experimental design to facilitate direct comparison of the effects of different types of social norms promoting fruit and vegetable consumption on anticipated eating behavior. In addition, the effects of the different norms are not only compared to each other but also to a no-norm control condition. Finally, the norm-referent group is tailored to the participant population, such that identification with the referent group is present. Two main dependent variables are measured: intention to eat healthy (low-calorie) foods in the coming time and the selection of three low-, medium-, or high-calorie foods in an online food diary to eat the next day.

Based on earlier findings, described above, the following is hypothesized: Participants who receive a descriptive quantity or frequency norm intend to consume, and select, more low-calorie snacks than participants who receive a no-norm control message. Because previous results are inconsistent or lacking regarding the effects of the other types of norms on eating behavior a research question is drawn up: What are the effects of an injunctive norm and a liking norm on the intention to consume and select more low-calorie snacks, compared to descriptive quantity and frequency norms and a no-norm control message?

2. Method

2.1. Participants and design

Participants in the study were randomly assigned to one of five conditions (i.e., control, frequency norm, quantity norm, injunctive norm, liking norm) in a single factor between-subjects design online experiment. The sample size was not based on an a priori power analysis but based on the number of participants that were feasible to obtain in a short period of time, as the experiment was part of the master's thesis project of the second author. A Master's in Communication Science is 18 EC, which equals 504 h, in which time the student must go through the

entire empirical cycle, typically leaving two weeks for data collection.

A sensitivity power analysis was conducted (G*Power v. 3.1) to check which effect size could be detected given the sample size of 189. With an alpha of .05 and power of .80, a so-called medium effect could be detected (i.e., $f = 0.25$, $\eta_p^2 = 0.06$). Participants were recruited through the University's research platform as well as via social media (i.e., WhatsApp, Facebook). Participants who took part through the research platform could earn research credits as part of their degree. No compensation was provided to participants recruited via social media. Only participants between the ages of 18–25 were allowed to participate in the online experiment. This was done to ensure a minimum level of similarity with the reference group in the norm messages. Two hundred twenty-eight people in this age group fully completed the experiment. Participants were excluded from the sample if they were allergic to more than one food within a food category (i.e., low-, medium-, high-calorie; $n = 11$), when they failed to provide the correct answer in an attention check question ($n = 16$), or when they realized that the goal of the study was to investigate the influence of others on one's own intention or choices to consume healthy foods ($n = 12$). This resulted in a total sample of 189 participants (81% female, 19% male; $M_{age} = 21.41$, $SD_{age} = 1.72$). Most participants were highly educated (85.7%), and the other participants had a medium education level. The research was approved by the Communication Science Institutional Review Board of the University of Amsterdam (2020-PC-12287).

2.2. Procedure

Participants were told they were taking part in a research study with the aim of testing and improving a nutrition website. After signing the informed consent form, participants proceeded to answer several demographic and background questions. Following that, they were told that they were going to read information on a webpage from a well-known Dutch nutrition organization and that this organization wanted to improve the (presentation of) information on their website. They were instructed to read the information carefully. After reading the text on the webpage, participants proceeded to the second part of the study in which they were told that they would view an online food diary that the nutrition organization wanted to add to their website. They were asked to choose in this online diary which three snacks they planned to eat tomorrow. They could choose from 12 different products that were either low, medium, or high in caloric content. Immediately after, they answered questions pertaining to their intention to eat healthy snacks in the upcoming week. They then answered several more questions pertaining to their norm perceptions, message recall, and credibility as well as some filler questions related to the webpage and food diary, an attention check, and suspicion check (in this order). Finally, participants were debriefed and thanked for their participation.

2.3. Manipulation

All messages were presented as an encyclopedic entry on a nutrition website and started with the title "Fruits and Vegetables." The attractive qualities of fruits and vegetables (e.g., colorful, unique flavor, low calorie) were described along with the relation of fruit and vegetable consumption to lower risks for certain diseases. The control message only communicated this message. In addition to that, the norm messages also contained specific norm information. For the descriptive *frequency norm,* it was described that most young adults (18–25 years old) eat fruits and vegetables on a daily basis. The descriptive *quantity norm* message emphasized that most young adults (18–25 years old) eat 200 g of fruit and 250 g of vegetables a day. The *injunctive norm* messages communicated that most young adults (18–25 years old) think that you should eat 200 g of fruit and 250 g of vegetables on a daily basis. Lastly, the *liking norm* message stressed that most young adults (18–25 years old) think that fruits and vegetables taste good. Each message emphasized the main message in a separate text box starting with "Did you know that …," followed by the main message. The different messages were pre-tested, and the pre-test results can be found in the Supplemental File.

2.4. Measures

2.4.1. Intention

The intention to consume healthy snacks in the upcoming week was assessed by means of four statements (Stok et al., 2012). People were asked to indicate whether they agree that they "plan," "will try," "want to," and "expect" to eat healthy snacks in the upcoming week (1 = fully disagree – 7 = fully agree). The reliability of the scale was good ($\alpha = 0.89$; $M = 5.20$, $SD = 1.17$).

2.4.2. Anticipated snack choice

Participants were presented with 12 snacks, four low-calorie (<100 kcals per 100 g), four medium-calorie (100–299 kcals per 100 g), and four high-calorie snacks (≥300 calories per 100 g), which were perceived as high, medium or low on the perceived healthiness scale, respectively. They were asked to choose three options they planned to eat the following day. The different options were presented in a random order. The four high-calorie options were salty crisps, donut, pink-glazed cake, and stroopwafel (Dutch caramel waffle). The medium-calorie options were bapao with beef, eierkoek (light Dutch egg cake), ontbijtkoek (Dutch gingerbread), and yoghurt with muesli. The low-calorie options were apple, tangerine, red bell pepper, and small tomatoes. The foods were selected based on a pre-test in which participants rated the foods on perceived healthiness (see Supplemental File). Low-calorie choices were recoded into a 0, medium-calorie choices into a 1, and high-calorie choices into a 2. The three choices were summed into one score, with higher scores reflecting higher-calorie anticipated snack choices, generally perceived as less healthy (range = 0–5; $M = 2.03$, $SD = 1.32$).

2.4.3. Manipulation check

To measure quantity, frequency, injunctive, and liking *norm perceptions,* respectively, participants were asked which share of young adults, according to them "eats 200 g of fruit and 250 g of vegetables a day" ($M = 48.59$, $SD = 20.10$), "eats fruits and vegetables daily" ($M = 65.20$, $SD = 18.37$), "thinks you should eat 200 g of fruits and 250 g of vegetables a day" ($M = 63.50$, $SD = 21.37$), and "thinks fruits and vegetables are tasty" on visual analogue scales ($M = 66.14$, $SD = 15.16$; 0 = minority – 100 = majority). To measure *message recall,* participants were asked what was said about most young adults (18–25 years old) in the message they read from the nutrition website. They were then asked to choose one of six randomly presented options: "Most young adults eat fruits and vegetables daily," "Most young adults eat 200 g of fruit and 250 g of vegetables a day," "Most young adults think you should eat 200 g of fruit and 250 g of vegetables a day," "Most young adults like fruits and vegetables," "I did not read anything about young adults," and "I don't know." Answers were recoded into 0 if incorrect and 1 if correct (79.4% correct). Moreover, *message credibility* was assessed by asking participants how credible they thought the message on the nutrition webpage was (1 = very incredible – 7 = very credible; $M = 4.76$, $SD = 1.38$).

2.4.4. Background and control questions

In addition to the main measures and manipulation check, participants were asked to report their age, sex, educational level, hunger, and food allergies as well as complete filler questions pertaining to the webpage and food diary, an attention check, and a suspicion check related to the study goal.

2.5. Analysis plan

Whether the different social norm messages had differential effects on anticipated snack choice and intentions was tested by means of two

separate Analyses of Variance (ANOVA) tests. Specific differences between conditions were examined by means of post-hoc tests (Bonferroni correction). As the assumptions of normality could not be met, we used bootstrapping (1000 samples) in the ANOVAs. For all significant pairwise comparisons (Bonferroni correction), bootstrapped results were also checked and were also significant.

3. Results

3.1. Randomization check

To check whether there were differences between experimental groups on several key background and demographic variables, three ANOVAs and a Chi-square analysis were conducted. Age (F (4, 184) = 0.15, p = .963), educational level (F (4, 184) = 0.96, p = .434), hunger (F (4, 184) = 1.25, p = .292), and sex (X^2 (4) = 0.87, p = .930) did not differ significantly between the conditions.

3.2. Control variables

To check whether the analyses needed to control for certain background and or demographic variables, correlations between the dependent variables, intention and snack choice and sex, age, educational level, and hunger were calculated (see Table 1). As there were no significant correlations between the dependent variables and the background and demographic variables, no control variables were included in the analyses.

3.3. Suitability norm manipulations

Across all conditions, 79.4% correctly recalled the main message of the manipulation text they had read. A Chi-square analysis with norm type as the independent variable and recall as the dependent variable was significant (X^2 (4) = 18.06, p = .001), indicating some differences between the conditions in recall. Recall in the order of magnitude was quantitative norm (97.0%), injunctive norm (86.5%), liking norm (84.2%), control (73.2%), and frequency norm (60.0%). The main analyses were repeated on the subsample who, in addition to the earlier specified inclusion criteria, recalled the social norm message correctly (N = 150). The results for both intention as well as anticipated snack choice remained the same.

Overall, the participants considered the message they had read to be quite credible ($M_{estimated}$ = 4.79, SE = 0.10). The credibility scores did not differ between conditions; F (4, 184) = 2.27, p = .063, η_p^2 = 0.05. For illustrative purposes, the credibility scores per condition were control ($M_{estimated}$ = 5.15, SE = 0.21), frequency norm ($M_{estimated}$ = 5.00, SE = 0.22), liking norm ($M_{estimated}$ = 4.71, SE = 0.22), quantity norm ($M_{estimated}$ = 4.42, SE = 0.24), and injunctive norm ($M_{estimated}$ = 4.41, SE = 0.22).

Finally, we examined whether norm perceptions differed depending on the experimental condition participants were assigned to. To this end, four ANOVAs (with bootstrapping) were conducted with norm type as the independent variable and the specific norm perception question as the dependent variable. Post-hoc tests with Bonferroni correction were conducted to test for differences between the control and the experimental conditions (see Table 2). The conditions differed significantly with respect to their *quantity norm perception.* Post-hoc comparisons indicated that those in both descriptive norm conditions (i.e., quantity, frequency) had a higher quantity norm perception, compared to those in the control condition. Conditions also differed significantly with respect to their liking norm perceptions. While the difference between the control and liking norm condition was in the expected direction, the difference was non-significant in the post-hoc comparison when Bonferroni correction was applied. The conditions did not differ with respect to the other norm perceptions (i.e., frequency, injunctive). While norm perceptions were in line with the manipulations – that is, norm perception scores were the highest in the condition wherein the respective norm was manipulated – the differences with the control condition were mostly non-significant.

In sum, in all conditions, the recall and message credibility scores were above the midpoints of the scales. The norm perception scores, while in line with the expectations, mostly did not differ significantly from the control condition.

Table 1
Bivariate Correlations Between Control Variables and Outcome Measures.

	Intention	Hunger	Education	Sex	Age
Snack choice	−.46**	.14	.01	−.08	−.10
Intention		.01	−.10	0.13	−.03
Hunger			.04	−.05	−.01
Education				.15*	.28**
Sex					−.15*

Note. Correlations reported with sex are Spearman's rho correlations. **p < .001, *p < .05 (2-tailed).

3.4. Main analyses

3.4.1. Intention

To examine whether the different norm messages had a differential impact on people's intention to consume healthy snacks in the upcoming week, an ANOVA (with bootstrapping) was performed, with norm type as the independent variable and intention as the dependent variable. There was no significant effect of norm type on intention to consume healthy snacks; F (4, 184) = 1.44, p = .223, η_p^2 = 0.03. For illustrative purposes, the estimated means and standard errors are reported in Table 3.

3.4.2. Anticipated snack choice

An ANOVA (with bootstrapping), with norm type as the independent variable and snack choice as the dependent variable, showed that norm type significantly affected anticipated snack choice; F (4, 184) = 3.74, p = .006, η_p^2 = 0.08. People who were exposed to a quantity or frequency descriptive norm made lower-calorie snack choices compared to those exposed to a health message (in the control condition). No other differences between the conditions were significant (see Table 3).

To summarize, the hypothesis that descriptive quantity and frequency norms would result in higher intended low-calorie snack consumption and selection than the no-norm control condition was confirmed for the measure of anticipated snack choice but not intention. With respect to the Research Question, regarding the effects of injunctive and liking norms on intention to consume and selection of low-calorie snacks, compared to the other conditions, the results showed no differences.

4. Discussion

The current study set out to investigate the effects of different types of social norms on intentions to consume healthy snacks and anticipated snack choice. Based on prior empirical work (e.g., Hawkins et al., 2020; Liu et al., 2019; Thomas et al., 2017), it was expected that descriptive quantity and frequency norms would result in stronger intentions to consume healthy snacks and anticipated snack choices with fewer calories, compared to a no-norm control group. Due to mixed prior findings regarding the influence of injunctive norms and the limited research on the influence of liking norms on eating behavior, no specific predictions were formulated about their effectiveness, in comparison to the other experimental groups. The hypothesis was partly confirmed; while descriptive quantity and frequency norms did not result in a stronger intention to consume healthy snacks in the upcoming week, it did result in lower-calorie snack choices, when people were asked to select three snacks that they planned to eat on the following day. No other

Table 2
Estimated Means and Standard Errors of the Norm Perceptions in the Different Experimental Conditions, Compared to the Control Condition.

Norm perception	F-test	Experimental condition				
		Control	Quantity	Frequency	Injunctive	Liking
		$n = 41$	$n = 33$	$n = 40$	$n = 37$	$n = 38$
Quantity	$F(4, 184) = 5.08$,	41.05	58.55***	54.03*	45.97	44.92
	$p < .001$, $\eta_p^2 = .10$	(3.01)	(3.36)	(3.05)	(3.17)	(3.13)
Frequency	$F(4, 184) = 1.15$,	63.51	62.15	70.43	64.32	65.00
	$p = .335$, $\eta_p^2 = .02$	(2.86)	(3.19)	(2.90)	(3.01)	(2.98)
Injunctive	$F(4, 184) = 1.70$,	58.27	59.36	66.88	68.38	64.42
	$p = .152$, $\eta_p^2 = .04$	(3.13)	(3.69)	(3.35)	(3.49)	(3.44)
Liking	$F(4, 184) = 2.55$,	62.76	61.94	68.88	65.65	71.03
	$p = .041$, $\eta_p^2 = .05$	(2.33)	(2.60)	(2.36)	(2.45)	(2.42)

Note. An asterisk denotes a difference with the control group in post-hoc test (Bonferroni), *$p < .05$, **$p < .01$, ***$p < .001$.

Table 3
Estimated Means and Standard Errors of the Intention and Snack Choice in the Different Experimental Conditions, Compared to the Control Condition.

Norm perception	Experimental condition				
	Control $n = 41$	Quantity $n = 33$	Frequency $n = 40$	Injunctive $n = 37$	Liking $n = 38$
Intention	4.87 (.18)	5.15 (.20)	5.46 (.18)	5.19 (.19)	5.33 (.19)
Snack choice	2.63 (.20)	1.70* (.22)	1.65** (.20)	2.08 (.21)	2.03 (.21)

Note. An asterisk denotes a difference with the control group in post-hoc test (Bonferroni correction), *$p < .05$, **$p < .01$, ***$p < .001$.

differences between the conditions were found.

The positive influence of descriptive quantity and frequency norms on anticipated snack choice aligns with prior research by Hawkins et al. (2020), who found that higher quantity and frequency perceptions of other people's fruit and vegetable consumption was associated with higher self-reported consumption of fruits and vegetables. This study adds to a large body of prior work that has also demonstrated the effects of descriptive quantity norms on food intake (e.g., Liu et al., 2019; Thomas et al., 2017). It is, however, the first experimental study that demonstrates the effect of descriptive norms that focus on the frequency of others' consumption on people's own anticipated eating behavior. This indicates that both the quantity and frequency of others' eating behavior can guide a person's eating decisions.

While descriptive norms influenced anticipated snack choices, they did not have an influence on intentions. This is in line with prior research in which behavior, but not intention, is affected by descriptive norm messages (e.g., Stok, Verkooijen, et al., 2014). Descriptive norms provide a shortcut in the decision-making process. They provide quick information on what the correct course of action in a certain situation is (Kallgren et al., 2000). This may align more with our measure of anticipated snack choice than of intention, as intentions reflect a reasoned process on future plans (Fishbein & Ajzen, 2011).

Communicating that most others think you should consume fruits and vegetables or that most others like eating fruits and vegetables affected neither intentions to consume healthy snacks nor anticipated snack choices. That injunctive norms do not affect eating-related outcomes is in line with other studies that have either not found an effect compared to a control group (Mollen et al., 2013) or even found a negative effect (Stok, Verkooijen, et al., 2014). An explanation that has been put forward, but for which no evidence has been published so far, is that injunctive norms may result in reactance (Stok et al., 2015), due to its more forceful tone. Another explanation may be that because injunctive norms work through the promise of social sanctions (Jacobson et al., 2011), they are more influential when the behavior is visible to peers (Schüz et al., 2018).

Like Hawkins et al.'s (2020) findings, no effect of liking norms, compared to the other conditions was found. A prior study by Thomas et al. (2017) found that liking norms positively affected broccoli consumption, but only for habitually low vegetable consumers. This suggests that liking norms mainly affect eating behavior when people are either unfamiliar with a specific food (Higgs, 2015) or are convinced that it tastes bad, as liking norms can change perceptions in this case. Whether liking norms would have been effective for habitually low fruit and vegetable consumers in the current study remains unanswered.

4.1. Limitations

The main limitation of the current study is that it did not assess actual behavior. Social norms are thought to operate as a shortcut to behavior (Jacobson et al., 2011), which means that their effect may not be mediated by intentions. Some evidence for this is present in the current findings, wherein social norm effects were found for anticipated snack choice, but not intended snack consumption, in the upcoming week. It can be argued that the first measure aligns more closely to actual behavior than the latter and thus can be expected to be more under the influence of such behavioral shortcuts.

A convenience sampling method was used. As a result of this sampling method and the inclusion criterion regarding age (i.e., 18–25), a relatively homogeneous, predominantly young, female, and higher-educated sample was obtained. While this has theoretical (i.e., similarity with the referent group) and methodological advantages (i.e., less error variance), it does hamper external validity. Relatedly, the current sample size was not based on an a priori power analysis. A sensitivity analysis was performed, which showed that, with the obtained sample

size of 189 participants, a so-called medium effect could be detected. Effects should therefore be interpreted considering this. This means that, in the current study, we were unable to detect the smaller effects that are common in social psychology (Schäfer & Schwarz, 2019).

Another limitation of the current study is that the manipulations did not change norm perception for most conditions. This may mean that our norm manipulations were unsuccessful, that the current measures were unsuitable to detect norm perception changes, or that norm perceptions were not changed but, instead, existing perceptions were made more salient because of the norm messages (Fishbein & Cappella, 2006). More implicit norm perception measurements should be applied to test the latter suggestion.

4.2. Implications for future research and practice

Based on the findings and limitations that were discussed, several recommendations for future research can be made. To increase external validity, the study should be replicated in different samples, varying for instance age, gender, and cultural background. This should go hand in hand with a larger sample size to be able to detect smaller effect sizes. As the current study only measures intentions and anticipated choices, future research should measure actual snack choice or food intake as a dependent variable. In line with this, we also suggest that future studies make a distinction between frequency and quantity in the measurement of behavior, as this will elucidate potential differential effects on these outcome measures of frequency and quantity norms.

The current study based its experimental manipulations on Hawkins and colleagues' (2020) study. This meant that we separated out various types of descriptive social norms (quantity, frequency, liking) but only tested one type of injunctive social norm (a quantity norm). This is in line with earlier research, as subdivisions of injunctive social norms have not yet been subject of study. To further advance understanding of how and when injunctive social norms affect eating behavior, effects of different types of injunctive social norms (e.g., injunctive quantity norms, injunctive frequency norms, injunctive liking norms) could be experimentally compared.

In the current study, quantity, and frequency of consumption of most others were teased apart and were found to uniquely influence anticipated snack choice. Nutritional guidelines, as a rule, pertain to both simultaneously. While nutritional guidelines will not change, the current study does provide insight into how health professionals can communicate more strategically about the eating behavior of most people, namely by communicating the norm that is most in line with the desired behavior. In cases where a majority does not yet adhere to the quantity guideline, for instance eating 5 portions of fruits and vegetables a day, a descriptive norm intervention can emphasize the frequency of the fruit and vegetable intake instead. For example, "most people eat fruit and vegetables daily." In the case that both the quantity and frequency of behavior are not yet performed by most people, another promising approach would be to communicate trending norms. Trending norms emphasize a growing minority of people who engage in a certain behavior (e.g., Sparkman & Walton, 2019). For instance, "more and more people are consuming 5 portions of fruits and vegetables a day." Or "a growing number of people consume fruits and vegetables daily."

5. Conclusion

The current study demonstrates that emphasizing both how much and how often people consume healthy foods affect anticipated snack choices. This provides more room for health professionals to mobilize the power of descriptive social norms for health behavior change. Based on the findings of this study, descriptive social norms hold more promise for promoting healthy eating than injunctive and liking norms. Although these results seem promising, replicating these effects with actual eating behavior and in different samples is imperative.

Ethical statements

Participants provided informed consent before starting the study. The research was approved by the Communication Science Institutional Review Board of the University of Amsterdam (2020-PC-12287).

Data statements

Data is stored by the first author. Anonymized data can be obtained from the first author upon request.

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CRediT author statement

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Declarations of competing interest

None.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2022.106372.

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