How Norms Work: Self-Identification, Attitude, and Self-Efficacy Mediate the Relation between Descriptive Social Norms and Vegetable Intake

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Background: The current studies aim to show that descriptive social norms influence vegetable intake and to investigate three potentially underlying processes (self-identification, attitude, and self-efficacy). **Methods:** In two studies, descriptive social norms regarding vegetable intake were manipulated (majority vs. minority norm). Study 1 investigated both the relation between baseline vegetable intake and self-identification, attitude, and self-efficacy, as well as the effect of the norm manipulation on vegetable intake over a one-week period. Study 2 investigated potential mediation of the effect of the manipulation on vegetable intake intentions through self-identification, attitude, and self-efficacy. **Results:** Study 1 showed that the proposed mediators were related to a baseline measure of vegetable intake. Moreover, in participants identifying strongly with the norm referent group, majority norms led to higher vegetable consumption than minority norms. Study 2 showed that the direct effect of the social norm manipulation on vegetable intake intentions was partly mediated

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by self-identification, attitude, and self-efficacy. **Conclusions:** These studies shed first light on processes underlying the effect of descriptive social norms on health behavior. A norm describing the behavior of a salient social group leads people to identify more with, have more positive attitudes toward, and feel more self-efficacious regarding that behavior.

INTRODUCTION

In the so-called obesogenic food environment, calorie-dense unhealthy foods are cheap and easily accessible, and many people find it difficult to resist these tempting foods (e.g. Popkin, 2007; Rosenheck, 2008). Healthy food products such as fruit and vegetables, on the other hand, are consumed far too infrequently (Huang et al., 2003; Rolls, Ello-Martin, & Tohill, 2004). It is of crucial importance for public health to gain better insight into the processes that influence people's eating habits and subsequently use these insights to tailor interventions that will effectively curb the consumption of unhealthy foods and increase healthy eating. One factor that has been shown to exert powerful influence over health behavior, but of which the underlying processes are not yet fully understood, is that of descriptive social norms (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010; Sieverding, Decker, & Zimmermann, 2010). The current studies investigate whether descriptive social norms influence vegetable intake and also aim to shed light on how this influence of descriptive social norms works by examining three potential underlying processes: self-identification, attitude, and self-efficacy.

Descriptive Social Norms

Descriptive social norms are one of two main types of social norms (Cialdini, 2008; Knight Lapinski & Rimal, 2005) and they provide information regarding the acceptable or typical way to behave within a certain group. In other words, descriptive norms *describe* what fellow group members actually *do* (Cialdini, Reno, & Kallgren, 1990; Deutsch & Gerard, 1955). The other type of social norms, injunctive norms, *prescribe* behavior by indicating what behaviors fellow group members *approve of* (Cialdini et al., 1990; Deutsch & Gerard, 1955). Both types of norms can be manipulated and intervened in (Cialdini et al., 1990; Jacobson, Mortensen, & Cialdini, 2011). A third social norm term that is often mentioned in research, especially in research regarding the Theory of Planned Behavior (Ajzen, 1990), is the so-called subjective norm. A subjective norm captures an individual's (typically self-reported) perceptions of the norms that exist in their environment (these could be either descriptive or injunctive norms).

Focusing on descriptive norms, it has been shown that they are a powerful motivator for behavior because of what Cialdini (2008) has called the *social proof principle*. This principle is based on the idea that if most people are behaving in a certain way, it must be the most appropriate or most effective way to behave. Indeed, a convincing body of literature exists to demonstrate that descriptive social norms constitute an important source of influence on behavior (Asch, 1951; Sherif, 1936), including health behavior (Ball et al., 2010; Sieverding et al., 2010). A growing body of literature provides strong indications that descriptive norms play an important role in determining eating behavior too (for review articles, see Herman & Polivy, 2005; Robinson, Thomas, Aveyard, & Higgs, 2014; Stok, de Vet, de Wit, & de Ridder, 2014). It has been shown, for example, that leaving snack bar wrappers of a supposed previous participant in the bin influenced subsequent participants to conform their snack choice to that of the supposed earlier participants (Burger et al., 2010). Moreover, adolescents' perceptions of the descriptive eating norms among their peers strongly influenced their own consumption of both healthy (fruit and vegetables) and unhealthy (soft drinks and unhealthy snacks) foods (Lally, Bartle, & Wardle, 2011). Similarly, giving individuals positive descriptive norm information ("a majority of your peers eat sufficient fruit") increased fruit consumption relative to a control group that received no normative information, while a negative descriptive norm ("only a minority of your peers eat sufficient fruit") decreased subsequent fruit consumption (Stok, de Ridder, de Vet, & de Wit, 2012).

Social norms thus seem to constitute a powerful tool for behavior change, and much effort has gone into understanding the effect of social norms on health behavior, including eating behavior specifically (e.g. Herman & Polivy, 2005; Robinson et al., 2014; Stok et al., 2014). Nevertheless, a recent review article postulated that discovering *how* and *why* social norms influence health behavior is a priority on the social norms research agenda (Burchell, Rettie, & Patel, 2013), indicating that the mechanisms through which social norms work are not yet fully understood. The current studies aim to extend the literature with an investigation of how social norms influence eating behavior. In order to gain a better understanding of the underlying mechanisms of social norms, we turn to a seminal theory about intragroup processes, self-categorisation theory.

Self-Categorisation Theory

Self-categorisation theory (Hornsey, 2008; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) stipulates that when a certain social identity is made salient, a process called depersonalisation occurs. Through this process, people perceive themselves (and others within the same social group) less as individual

persons and more as prototypes of that particular social group. We propose that in a social norm intervention, this is exactly what happens: a norm referent group is made salient and that particular social identity becomes activated, prescribing group-appropriate attitudes and behaviors and motivating the individual to conform to the group's behavioral standards. Based on self-categorisation theory, three mechanisms are proposed to underlie this shift toward norm-appropriate behavior. With this proposition about mechanisms underlying normative influence, we aim to contribute novel insight to the current literature.

First, it is proposed that if the norm referent group is an important part of one's identity and this social identity is made salient, group behavior can become internalised (Hornsey, 2008). This means that people may adopt the norms of the group they identify with and internalise them, such that they become part of their personal identity (Bagozzi & Lee, 2002; Steinel et al., 2010; Turner et al., 1987). In other words, if a group *that one identifies with* commonly consumes vegetables, one may adopt the behavior of consuming vegetables and, with time, that behavior may be internalised and come to be part of one's self-identity, such that "the consumption of vegetables" becomes part of one's self-identity. The first mechanism through which health-promoting social norms are thought to influence behavior is thus through boosting self-identification with the described standard behavior.

Second, to the extent that a relevant social group is perceived to perform a certain behavior, and one identifies positively with that social group, it is hypothesised that positive attitudes toward the behavior should increase. This is because when depersonalisation occurs, a positive association between the group's normative behavior and individual attitudes toward that behavior is expected (Ajzen & Fishbein, 1980; Terry, Hogg, & McKimmie, 2000). The second mechanism through which health-promoting social norms are thought to influence behavior is thus through strengthening positive attitudes toward the behavior.

Third, if an individual perceives that others similar to him are able to perform the stipulated behavior, this should induce a perception of personal control over the behavior in that individual (the idea that "if others like me can do it, I must be able to do it as well"). This idea is supported by evidence showing that perceptions of self-efficacy mediated the positive effect of making salient social identity on behavior in a public goods dilemma (de Cremer & van Vugt, 1998). Similar results were found in studies on health risk behaviors, such as alcohol use and marihuana smoking (Cicognani & Zani, 2011; Walker, Neighbors, Rodriguez, Stephens, & Roffman, 2011): peer norms that promote risky behaviors decrease self-efficacy for being able to stay away from these risky behaviors, while peer norms that discourage risky behavior increase such self-efficacy. The third mechanism through

which health-promoting social norms are proposed to influence behavior is thus through increasing self-efficacy for performing the behavior.

Current Studies

In the current studies, a first step is taken toward testing the potential underlying processes that can explain the influence of social norms on behavior. Study 1 has two goals: to investigate the effect of a descriptive social norm message on vegetable intake over a period of a week and to determine whether self-identification, attitude, and self-efficacy are related to vegetable intake. Study 2 then aims to investigate whether these three proposed mediators indeed underlie the influence of descriptive social norms on eating.

In both studies, a majority and a minority descriptive social norm are compared: people in the majority norm condition receive information that most people eat sufficient vegetables, while people in the minority norm condition receive information that only few people eat sufficient vegetables. Moreover, the extent to which people identify with the norm referent group is taken into account, as a large body of research indicates that social norms have a larger effect on behavior when participants identify with the norm referent group (e.g. Johnston & White, 2003; Stok et al., 2012).

STUDY 1

In this first study, we investigate two things. First, we look at baseline scores on the three proposed mediator variables (self-identification, attitude, and self-efficacy) and at their relation with baseline vegetable intake. These variables are assessed with a baseline questionnaire. Second, we investigate the direct influence of a majority versus minority descriptive social norm manipulation (which is delivered at the very end of the baseline questionnaire) on subsequent vegetable intake (assessed at follow-up one week later). The main goals of Study 1 were to replicate findings regarding the significant effect of majority and minority norms on eating behavior (Stok et al., 2012) and to show the existence of a baseline correlation between the three proposed mediators and eating behavior, as preconditions of subsequent mediation analyses in Study 2. Expectations are, first, that the three proposed mediators are related to baseline vegetable intake, and second, that there are significant differences in vegetable consumption in the week after receiving the norm message between people receiving the majority descriptive norm and people receiving the minority descriptive norm. We expect that vegetable consumption will be higher in people receiving the majority descriptive norm than in people receiving the minority descriptive norm. Importantly, we expect to find effects of either manipulation only for participants who strongly identify

with the norm referent group. To that end, we also measure identification with the norm referent group in the baseline questionnaire, before the social norm manipulation is delivered.[1]

Method

Participants.   Participants were recruited in a psychology class. Those who consented to participate filled in the questionnaires, constituting a convenience sample. Sixty-eight students with a mean age of 20.9 years (SD = 3.2) from two Dutch universities (Utrecht and Wageningen)[2] filled out the first questionnaire. Eighty-four per cent of the participants were women. Only 57 participants returned the next week to complete the follow-up measure (29 participants in the majority norm condition, 28 in the minority norm condition). Participants who dropped out did not differ from participants who returned in terms of age and baseline vegetable consumption, both Fs (1, 65) < 1, nor in terms of gender, χ^2 (1, N = 68) = 1.19, p = .28.

Procedure.   Participants were asked to fill out a questionnaire on vegetable consumption in class. Informed consent was obtained. They recorded their date of birth (to be able to match their responses to the follow-up measure one week later) and gender. For the present study, we used the information they provided about (1) baseline vegetable consumption; (2) their self-identification as a person who eats sufficient vegetables; (3) their attitude toward eating vegetables; (4) their self-efficacy for eating sufficient vegetables; and (5) their strength of identification with the norm referent group. Following this, participants had to turn the form over, after which they were presented with an information sheet that contained the norm manipulation (which was covered up by presenting this information in the form of bogus results from supposed earlier research). The form ended with a bogus question about the importance of eating sufficient vegetables, meant to cover up the true meaning of the norm manipulation. Exactly one week later in the same class, participants received a follow-up form. On this form,

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[1] Please note that this means that two types of identification are measured in the baseline questionnaire: self-identification as a vegetable eater (which is one of the three proposed mediators, and as such is expected to be correlated with baseline vegetable consumption) and identification with the norm referent group (which is supposed to moderate the effect of the social norm manipulation on follow-up vegetable consumption).

[2] To correct for a potential clustering effect at university level, all analyses were also run using complex sample analysis with the two universities as strata. The design effect was very small (the square root of the design effects deviated maximally 0.014 from 1.00), which indicates that the standard errors changed by ~1.4 per cent when the university level was taken into account. Because the findings were not different for each type of analysis, regular linear regression analyses are reported here for ease of interpretation.

they again recorded their date of birth and gender (for matching purposes) and replied to a question about their vegetable intake during the past week.

Measures.   Baseline vegetable consumption was assessed by asking participants on how many days of the previous week they had consumed sufficient vegetables (indicating that 200 grams qualified as "sufficient"). Participants responded by indicating a number of days (with possible responses ranging from 0 to 7).

Self-identification as a person who eats sufficient vegetables was assessed with two items derived from Sparks and Shepherd (1992; for a recent similar assessment, see de Bruijn, Verkooijen, de Vries, & van den Putte, 2012): "eating sufficient vegetables is something that fits with who I am" and "I see myself as someone who eats sufficient vegetables", assessed on a 5-point scale ranging from 1 (totally disagree) to 5 (totally agree). The items correlated strongly ($r = .81$, $p < .001$) and one average self-identification score was computed.

Participants' *attitude toward eating vegetables* was assessed by putting four pairs of words with opposite valence (nice–stupid, wise–unwise, pleasant–unpleasant, bad–good) on each end of a scale, following the recommendations laid out in Ajzen and Fishbein (1980; for a recent similar assessment, see de Bruijn et al., 2012). Participants had to indicate which point on the 7-point scale best corresponded with their attitude toward vegetable consumption. One average attitude score was computed (Cronbach's alpha = .76).

Self-efficacy for eating sufficient vegetables was assessed on a 5-point scale ranging from 1 (not at all) to 5 (very much so) with two items based on earlier work by Ajzen (2002; for a recent similar assessment, see de Bruijn et al., 2012), "Eating sufficient vegetables is in my own hands" and "I find it difficult to eat sufficient vegetables" (reverse coded). Both items were correlated ($r = .24$, $p = .05$) and one average self-efficacy score was computed.

Identification with the norm referent group was assessed with three items based on earlier research (Stok et al., 2012), e.g. "I feel a strong connection to Utrecht [Wageningen] university students", assessed on a 5-point scale ranging from 1 (not at all) to 5 (very much so). As this variable is analyzed as a moderator of the effect of the norm manipulation on the follow-up dependent variable, scores from the sample present at follow-up are described. One average norm referent group identification score was computed (Cronbach's alpha = .87). Because scores were not normally distributed (a K-S test showed that $D(57) = .13$, $p = .02$) and because most participants scored around the mean, indicating a nonlinear effect and attenuating the hypothesised influence that the norm manipulation might have on high identifiers, scores on this variable were categorised (see Becher, 2005) as either weak identification (below or equal to -1 SD, $n = 10$), moderate identification (between -1 SD and $+1$ SD, $n = 35$) or strong identification (equal to or above $+1$ SD, $n = 12$).

Follow-up vegetable intake was assessed with one item: "On how many days of the past week have you consumed sufficient (at least 200 grams) vegetables?" Participants responded by indicating a number of days (with possible responses ranging from 0 to 7).

Norm Manipulation.   The norm manipulation was delivered at the end of the first questionnaire, after the potential mediators (self-identification as a vegetable eater, attitude toward eating vegetables, and self-efficacy for eating vegetables) and the potential moderator (identification with the norm referent group) were assessed. The manipulation was included in a short information sheet that began the same for both conditions: "Everybody knows that it is important to eat sufficient vegetables (at least 200 grams per day). Nevertheless, we also know that many people do not meet this guideline—most people do not eat a sufficient amount of vegetables." The text then continued with a final sentence that contained the normative information. The true purpose of presenting this information was covered by presenting the normative information as the supposed results from earlier research. In the majority norm condition, participants read: "Previous research has shown that Utrecht [Wageningen] university students, however, do very well: a full 73 per cent of Utrecht [Wageningen] university students eat sufficient vegetables." Participants in the minority norm condition read: "Previous research has shown that Utrecht [Wageningen] university students do not do very well either: 27 per cent of Utrecht [Wageningen] university students eat sufficient vegetables."

Results

Results regarding the three mediator variables and baseline vegetable consumption were calculated across the whole group ($N = 68$). Results regarding identification with the referent group and the follow-up measure of vegetable consumption were calculated in the sample present at follow-up ($N = 57$). This is clearly indicated in the text.

Descriptive Statistics.   Participants scored moderately high on all three supposed mediators (M self-identification = 3.43, $SD = 0.92$; M attitude = 6.00, $SD = 0.67$, M self-efficacy = 3.63, $SD = 0.73$) and they had eaten sufficient vegetables on an average of 4.1 days ($SD = 1.7$) of the week before the first part of the study. The three supposed mediator variables were all interrelated (rs between .50 and .68, ps < .001). During the week after receiving the norm manipulation, participants who were present at follow-up had eaten sufficient vegetables on an average of 4.6 days ($SD = 1.6$). These participants on average indicated moderately identifying with the norm referent group of Utrecht [Wageningen] university students ($M = 3.02$, $SD = 0.84$).

The three identification groups consisted of participants scoring 2.19 or lower (weak identification group; scores ≤ −1 *SD*), those scoring between 2.20 and 3.85 (medium identification group, −1 *SD* < scores < +1 *SD*) and those scoring 3.86 and higher (strong identification group, scores ≥ +1 *SD*).

Relation between Proposed Mediators and Baseline Vegetable Intake.   As expected, there were significant positive correlations between the proposed mediator variables and baseline vegetable intake. More specifically, self-identification ($r = .59$, $p < .001$), attitude ($r = .38$, $p = .001$), and self-efficacy ($r = .56$, $p < .001$) were all strongly correlated with vegetable intake.

Influence of Norm Manipulation on Vegetable Intake.   As a randomi-sation check, a MANOVA was conducted in the follow-up sample with experimental condition as independent factor and age, gender, number of days on which participants had consumed at least 200 grams of vegetables at pre-test, self-identification as a person who eats sufficient vegetables, attitude toward eating vegetables, self-efficacy for eating sufficient vegetables, and strength of identification with the norm referent group as dependent vari-ables. This analysis indicated that randomisation was successful, $F(7, 48) < 1$. The univariate effects obtained indicated that participants in the two experi-mental conditions did not differ from each other on any of the aforemen-tioned variables, all Fs $(1, 54) < 2.80$, all ps $> .10$.

A custom-model ANCOVA in the follow-up sample with experimental condition, strength of identification with the norm referent group, the inter-action between these two, and baseline vegetable consumption as independ-ent variables and the follow-up measure of vegetable consumption as dependent variable indicated that there was a positive main effect of baseline vegetable consumption, $F(1, 49) = 14.68$, $p = .001$, $\eta_p^2 = .23$. Moreover, the main effect of experimental condition was marginally significant, $F(1, 49) = 2.96$, $p = .09$, $\eta_p^2 = .06$. Participants receiving the majority norm tended to eat sufficient vegetables on more days ($M = 4.9$, $SD = 1.6$) than participants receiving the minority norm ($M = 4.2$, $SD = 1.6$). Importantly, while there was no main effect of identification with the norm referent group, $F(2, 49) < 1$, the main effect of experimental condition was qualified by a marginally significant interaction effect with identification strength, $F(2, 49) = 2.91$, $p = .06$, $\eta_p^2 = .11$ (see Figure 1). The descriptive social norm significantly influenced vegetable consumption when participants strongly identified with the norm referent group, $t(11) = −2.82$, $p = .02$, but not when identification was moderate, $t(33) = −0.41$, $p = .68$, or weak, $t(9) = −0.266$, $p = .78$. Among strong identifiers, participants ate sufficient vegetables on 5.7 ($SD = 1.4$) days of the week after receiving the majority norm manipulation, and on 3.5 ($SD = 1.4$) days of the week after receiving the minority norm manipulation.
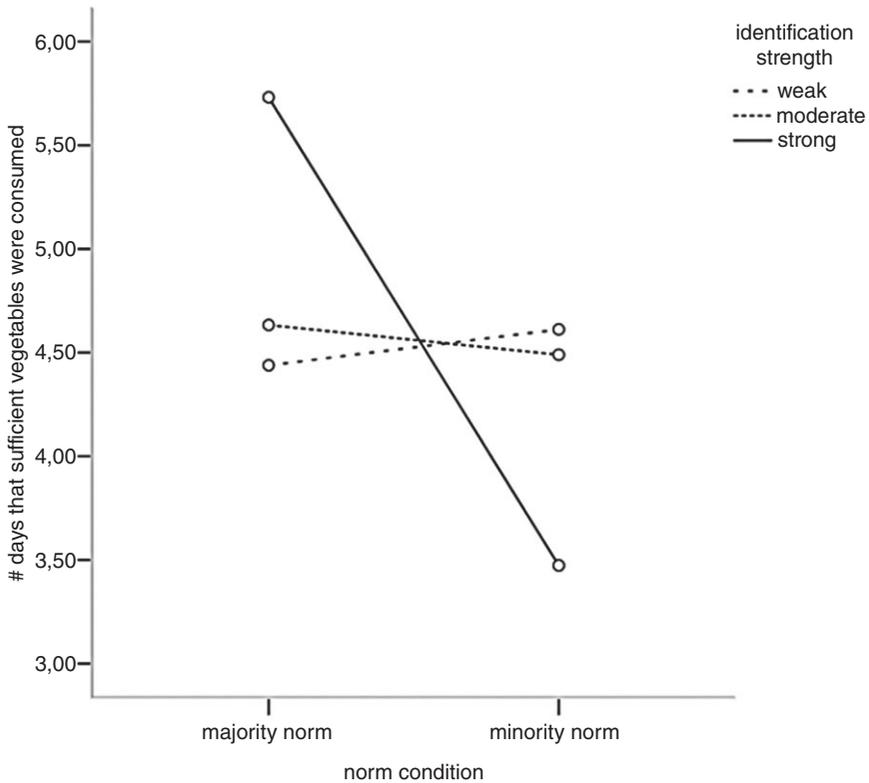
FIGURE 1.   The interaction effect of majority and minority social norms and level of identification with the norm referent group on vegetable intake.

Discussion

The current study indicated that a descriptive norm manipulation influenced participants' vegetable intake over a period of a week; people receiving a majority norm ate sufficient vegetables on more days of the week than people receiving a minority norm. This effect was only found for people who strongly identified with the norm referent group. Furthermore, the three proposed mediating variables were found to be correlated with vegetable intake. This presence of a correlation between the proposed mediators and general vegetable intake suggests that it is likely that these variables may influence eating behavior, rendering support to the mediation hypothesis that will be tested in Study 2.

STUDY 2

Study 1 demonstrated two things: first, the direct effect of a social norm manipulation on vegetable intake was significant for people strongly identifying with the norm referent group, replicating earlier findings, and second, the three variables proposed to mediate this effect were correlated with baseline vegetable intake. Study 2 is conducted to bring these two parts together, investigating whether part of how descriptive norms influence behavior is through the three proposed mediating variables. To that end, this study examines whether descriptive social norms about eating sufficient vegetables influence (1) self-identification as a person who eats sufficient vegetables, (2) attitude toward eating vegetables, and (3) self-efficacy for eating sufficient vegetables. The main hypotheses are that there will be significant differences in scores on self-identification, positive attitudes, and self-efficacy regarding the target behavior between the two experimental conditions. Specifically, we hypothesise that a majority norm, as compared to a minority norm, will lead to higher scores on the three mediators. Moreover, it is hypothesised that these three variables in turn mediate (part of) the influence of the descriptive norm manipulation on participants' intention to consume sufficient vegetables. Further improvements compared to Study 1 were the inclusion of height and weight measurements.

Method

Participants. Participants were 60 university students from Utrecht university. Participants were recruited in a psychology class, constituting a convenience sample. Seven participants indicated not identifying with Utrecht university students (scoring below 2.5 on identification) and one participant did not respond to the norm referent group identification questions. As Study 1 showed that identification with the norm referent group is a necessary condition for a norm message to influence behavior, these participants were excluded from analyses, leaving a sample of 52 participants for analyses.[3] Participants had a mean age of 23.5 years ($SD = 2.5$) and 73 per cent were female. They had a mean BMI of 21.3 ($SD = 2.4$).

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[3] Leaving these seven participants out of the sample did not substantially change any of the results, but did moderate the strength of the effect of the norm manipulation on all dependent measures (self-identification, attitude, self-efficacy, and behavioral intention). Including these participants made the influence of the norm manipulation on these variables less significant (though not non-significant). The group of seven participants is too small to meaningfully conduct separate analyses on, but we would expect that, in line with previous literature, the effect of the norm manipulation would not be significant for these non-identifiers.

Procedure.   Participants were asked to fill out a short form; informed consent was obtained. They first recorded their date of birth, age, gender, height, and weight. Participants then indicated the number of days during the previous week on which they had eaten sufficient vegetables. It was explained that 200 grams qualified as "sufficient". After this, their strength of identification with the norm referent group was assessed. Participants then had to turn the form over, after which they received the experimental manipulation. This was followed by an assessment of self-identification as a person who eats sufficient vegetables, attitude toward eating vegetables, self-efficacy for eating sufficient vegetables, and intention to eat sufficient vegetables (more detailed information about these measures is provided below).

Materials.   *BMI* was computed from participants' self-reported height and weight.

Participants' strength of *identification with the norm referent group* was assessed in the same way as in Study 1. One average referent-group-identification score was computed (Cronbach's alpha = .96).

Self-identification as a person who eats sufficient vegetables was assessed with three items (derived from Sparks and Shepherd, 1992, similar to Study 1), e.g. "Eating sufficient vegetables is something that fits with who I am", assessed on a 5-point scale ranging from 1 (not at all) to 5 (very much so). One average self-identification score was computed (Cronbach's alpha = .95).

Participants' *attitude toward eating vegetables* was assessed in the same way as in Study 1. One average attitude score was computed (Cronbach's alpha = .84).

Self-efficacy for eating sufficient vegetables was assessed with two items (based on Ajzen, 2002, similar to Study 1): "I find it hard to eat sufficient vegetables" (recoded) and "It is easy for me to eat sufficient vegetables", assessed on a 5-point scale ranging from 1 (totally disagree) to 5 (totally agree). The items correlated strongly ($r = .59$, $p < .001$) and one average self-efficacy score was computed.

Participants' *intention to eat sufficient vegetables in the near future* was assessed with four items derived from previous research (e.g. de Bruijn et al., 2012; Stok et al., 2012): "I plan to/want to/expect to/will eat sufficient vegetables in the near future." One average intention score was computed (Cronbach's alpha = .97).

Norm Manipulation.   The norm manipulation was identical to the manipulation used in Study 1.

Data Treatment and Analysis.   Answers from five participants who indicated that the number of days on which they had consumed sufficient vegetables in the previous week was higher than 7 were set to missing for that

specific variable only. These participants were retained for the other analyses and only excluded for the analyses including this specific measure (leaving a sample of $N = 47$ for the analyses including the measure of vegetable consumption). Mediation analyses were conducted to compute the effect of the norm manipulation on the mediators (a paths), of the mediators on intention (b paths), of the total direct effect of the norm manipulation on intention (c path), and of the direct effect of the norm manipulation on intention corrected for the indirect effect through the mediator variables (c' path). Indirect effects were assessed using bootstrapped confidence intervals, because it has been argued that traditional p-value testing makes unrealistic assumptions about the sampling distribution of the indirect effect, while bootstrapping respects the non-normality of this distribution (Hayes, 2009; Preacher & Hayes, 2008).

The indirect effect of the social norm manipulation on intended vegetable consumption via self-identification, attitude, and self-efficacy was tested using the multiple mediation bootstrap procedure for indirect effects outlined in Preacher and Hayes (2008) using Hayes' INDIRECT macro for SPSS. Using 5,000 bootstrap resamples, 95 per cent bias-corrected bootstrap confidence intervals were derived for the total indirect effect as well as for each supposed mediator separately. Furthermore, to test whether the three variables differed in strength of mediation, pairwise contrasts were also computed for which 95 per cent bias-corrected bootstrap confidence intervals were derived.

Results

Descriptive Statistics.   Participants strongly identified with students of Utrecht university ($M = 4.17$, $SD = 0.78$). Participants indicated that, on average, they had eaten sufficient vegetables on 4.4 days ($SD = 2.0$) of the week prior to the study. Moreover, they reported quite a strong intention to eat sufficient vegetables in the near future ($M = 4.02$, $SD = 0.85$).

Randomisation Check.   A MANOVA with experimental condition as independent factor and age, gender, BMI, number of days on which participants had consumed at least 200 grams of vegetables in the previous week at pre-test, and strength of identification with the norm referent group as dependent variables indicated that randomisation was successful, $F(5, 42) < 1$. The univariate effects obtained indicated that participants in the two experimental conditions did not significantly differ from each other on any of the aforementioned variables, all Fs $(1, 46) < 1.5$, all ps $> .23$.

Main Analyses.   An ANOVA with experimental condition as independent factor and intention as dependent variable showed that participants in the

majority norm condition reported a higher intention to consume sufficient vegetables ($M = 4.55$, $SD = 0.54$) than participants in the minority norm condition ($M = 3.45$, $SD = 0.75$), $F(1, 50) = 37.42$, $p < .001$, $\eta_p^2 = .43$. Furthermore, a MANOVA with experimental condition as independent factor and self-identification, attitude, and self-efficacy as dependent variables showed that participants in the majority norm condition scored higher on the mediator variables than participants in the minority norm condition, $F(3, 48) = 5.72$, $p = .002$, $\eta_p^2 = .26$. Participants in the majority norm condition scored higher than participants in the minority norm condition on self-identification ($M = 4.28$, $SD = 0.79$ vs. $M = 3.39$, $SD = 0.83$, $p < .001$), attitude ($M = 6.15$, $SD = 1.07$ vs. $M = 5.21$, $SD = 0.94$, $p = .002$), and self-efficacy ($M = 4.26$, $SD = 0.79$ vs. $M = 3.48$, $SD = 0.90$, $p = .002$).

Subsequently, a multiple mediation analysis was conducted to investigate whether the influence of the norm manipulation on participants' intention to consume sufficient vegetables was (partially) mediated by the changes in self-identification, attitude, and self-efficacy. Table 1 depicts the a, b, c and c' paths. Results show that the direct effect of the norm manipulation on intention is reduced when the indirect effect via the three proposed mediators is taken into account. Bias-corrected 95 per cent confidence intervals from a bootstrap procedure using 5,000 bootstrap resamples indicated that for both the total indirect effect ($B = -.59$, CI [-0.99, -0.30]) as well as for the indirect effects for each of the three proposed mediators separately ($\text{CI}_{\text{self-identification}}$ [-0.54, -0.01]; $\text{CI}_{\text{attitude}}$ [-0.69, -0.04]; $\text{CI}_{\text{self-efficacy}}$ [-0.43, -0.02], zero was not part of the confidence interval, indicating significant mediation. It should be noted that for the separate mediators, the upper limits of the confidence intervals were close to zero, meaning that the results should be interpreted with some care. Pairwise contrasts indicated that the three proposed mediators did not differ in strength; confidence intervals included zero for each of the contrasts.

Discussion

A descriptive norm manipulation about vegetable intake altered participants' intention to eat sufficient vegetables, with higher scores for people receiving a majority norm than for people receiving a minority norm. The norm manipulation also influenced self-identification, attitude, and self-efficacy regarding vegetable intake, again with higher scores when receiving a majority norm as compared to a minority norm. Importantly, changes in these three variables mediated the direct effect of the descriptive norm on behavioral intention. These results thus indicate that norm messages partially affect people's health behavior intentions by influencing self-identification with the target behavior, attitudes toward the target behavior, and self-efficacy for the target behavior—as would also be predicted by self-categorisation theory. However, as the direct path from norms to intentions

TABLE 1
Results from Multiple Mediation Analysis Including Bootstrapping Analysis for Indirect Effects

Direct paths			Coefficients and significance levels (standard errors)
Mediation analysis	a paths (norm manipulation → mediators)	(1) self-identification	$B = -.83^{***}$ (.24)
		(2) attitude	$B = -.88^{**}$ (.32)
		(3) self-efficacy	$B = -.68^{**}$ (24)
	b paths (mediators → intention)	(1) self-identification	$B = .25^{\dagger}$ (.13)
		(2) attitude	$B = .22^{\dagger}$ (.18)
		(3) self-efficacy	$B = .28^{***}$ (.07)
	c path (norm manipulation → intention)		$B = -1.01^{***}$ (.22)
	c′ path (norm manipulation → intention corrected for indirect effect)		$B = -0.40^{**}$ (.13)

Indirect path			Bootstrapped coefficients and confidence intervals
Bootstrap procedure	a*b paths (norm manipulation → intention via mediators)	(1) self-identification	$B = -.20$, CI [−.54, −.01]
		(2) attitude	$B = -.26$, CI [−.69, −.04]
		(3) self-efficacy	$B = -.14$, CI [−.43, −.02]
		total effect	$B = -.59$, CI [−.99, −.30]
	pairwise contrasts between mediators	(1) vs (2)	$B = .07$, CI [−.32, .59]
		(1) vs (3)	$B = -.06$, CI [−.43, .32]
		(2) vs (3)	$B = .12$, CI [−.20, .53]

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; † $p < .07$.

also remained significant, the results also show that these three mediators together cannot fully explain how descriptive norms influence health behavior; part of the variance in intentions is caused by yet other factors.

GENERAL DISCUSSION

The first of the current studies replicates earlier research (e.g. Burger et al., 2010; Stok et al., 2012) showing that a descriptive norm manipulation influences eating behavior. Participants who received a majority descriptive norm, stating that most other referent group members eat sufficient vegetables, themselves consumed sufficient vegetables on more days in the week following the norm manipulation than participants who received a minority norm, stating that only few referent group members eat sufficient vegetables. This effect was only present for people who strongly identified with the norm referent group, however; a finding which is in line with previous literature (e.g. Johnston & White, 2003; Stok et al., 2012). Moreover, the study demonstrated a correlation between the three variables proposed to mediate this effect (self-identification, positive attitudes, and self-efficacy) and an uninfluenced (i.e. measured before any experimental manipulations took place) measure of vegetable intake.

The second study provides a first step in uncovering how such norm manipulations exert their influence. Results showed that a majority descriptive norm increased self-identification, positive attitudes, and self-efficacy regarding vegetable intake behavior as compared to a minority descriptive norm. These changes in turn partially mediated the effect of the norm manipulation on participants' behavioral intentions, indicating that norm manipulations influence health behavior (intentions) in part because they affect changes in these cognitive variables.

Social Norm Interventions: A Powerful Combination of Identity and Behavior

Self-categorisation theory stipulates that when a relevant social identity is made salient, people see themselves less as individuals and more as prototypes of that specific social group. This motivates the individual to be like other group members and conform to the group's behavioral standards. A descriptive norm manipulation is one example of a situation in which social identity is made salient. Importantly, however, a norm manipulation does more than just make salient social identity: it also indicates explicitly the typical behavior of the social group, thus giving individuals a strong pointer on how to put into practice their motivation to conform to the group's behavioral standard. This combination of (1) making salient a social identity and (2) making explicit the behavioral standard belonging to that social identity is inherent to descriptive social norms.

The current studies indicate that this combination provides a promising tool for influencing behavior, and also provide a first insight into the mechanism underlying this influence. Results showed that a descriptive social norm manipulation triggers three cognitive processes: self-identification, attitudes, and self-efficacy. In more detail, a majority norm message, as compared to a minority norm message, leads people to identify more with the stipulated behavior; they indicated seeing eating vegetables as something that was representative of who they were to a larger extent. Moreover, a majority norm message gave people more self-efficacy as compared to a minority norm message; knowing that most others like them were able to carry out the stipulated behavior seemed to give them a boost of confidence in their own ability, too. Finally, a majority norm made people more favorable toward the consumption of vegetables than a minority norm. In other words, if most people (as compared to only a few people) of one's social group perform a certain behavior, attitudes toward that behavior take a turn for the positive.

Limitations and Suggestions for Future Research

The current research has provided an important first step in demonstrating that descriptive social norms influence vegetable intake and that self-identification, attitude, and self-efficacy mediate the relation between a descriptive norm intervention and vegetable intake intentions. However, there are several limitations in the design of the current studies. A first limitation is that sample sizes in both studies were small. In particular, the groups of people identifying either weakly or strongly with the norm referent group in Study 1 contained low numbers of participants. Moreover, convenience samples consisting of college students were used, which may raise questions about the generalisability of our findings to wider populations.

A second limitation is that a no-norm control group was not included in the studies' designs, meaning that we cannot draw conclusions regarding the directionality of the effect of norm manipulations compared to a situation where no norms are provided. Does the majority norm make people (intend to) eat more vegetables and score higher on the mediating variables, or does the minority norm rather decrease consumption and scores on the mediating variables?

Third, it should be noted that the dataset in Study 2 was cross-sectional whereas mediation analyses assume a causal pattern and should therefore, ideally, be conducted on prospective data (Maxwell & Cole, 2007). In addition, the dependent variable in this analysis was vegetable intake intention rather than actual vegetable consumption. While intention and behavior are certainly strongly related, there nevertheless is a gap between the two (for a review, see Sheeran, 2002). Moreover, the bootstrapping procedure showed

confidence intervals that were close to 0, which means that results should be interpreted with some care.

Furthermore, in Study 1 the dependent variable was a recall measure (participants had to recall their vegetable consumption of the past week). This type of self-reported measure is subjective and it cannot be ruled out that recall was biased by the normative information provided in the norm manipulation. Taken together, these limitations mean that before firm conclusions can be drawn, the current findings should be replicated and expanded upon in future research, employing strong, prospective designs in larger, more heterogeneous samples and including more objective, observed measures of actual eating behavior.

Conclusions and Implications

This study is novel in that it investigated how social norms work, something that until now is not yet fully understood (Burchell et al., 2013). The current studies show that a descriptive social norm manipulation influences (1) the extent to which people identify with the norm group's standard behavior, in this case eating sufficient vegetables, (2) the extent to which they feel self-efficacious in eating sufficient vegetables, as well as (3) their attitudes toward eating vegetables, and that these three variables in turn predict vegetable intake intentions. Moreover, results show that this indirect path partially mediates the direct influence of norms on behavioral intentions, thus suggesting that these mediators are part of the mechanism underlying normative influence on health behavior.

With this finding, this study contributes to what has been posited as one of the main questions in the field of social norm interventions: uncovering *how* and *why* social norms work (Burchell et al., 2013). While further research, replicating and expanding upon the current results, is certainly necessary, the current findings provide a first step toward answering this important question, hopefully bringing us closer to developing successful interventions.

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