THE ROLE OF DESCRIPTIVE NORMS, GROUP IDENTITY, AND GROUP ORIENTATION ON FLU VACCINATION

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ABSTRACT

Based on the predictions of the theory of normative social behavior (TNSB), the present study is designed to test whether and how messages about the prevalence of flu vaccination influence perceived descriptive norms, how the perceived descriptive norms further impact vaccination intentions, and the hypothesized effects of group identity and group orientation that moderate the relationship between perceived norms and behavioral intentions. To answer these questions, an experiment (N = 134) was conducted where participants were randomly assigned to receive fictitious messages about the prevalence of flu vaccination among their college mates. Their perceptions toward the norms, their group tendencies, as well as their intentions of provaccination behaviors were then measured on scales. Inferential statistics showed that though participants' perceived descriptive norms were successfully manipulated by providing different messages, neither the hypothesized direct effect of perceived norms on behavioral intention nor the moderating effects of group identity/orientation was significant. Potential causes of the result were discussed.

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INTRODUCTION

More and more studies on the influence of social norms on behaviors suggested that, in order to maximize the effectiveness of persuasive messages, it's necessary to identify the attributes of the related behaviors (Lapinski & Rimal, 2005; Lapinski et al., 2007; Rimal & Real, 2005). Certain behaviors may be more likely to be influenced by social norms as they come with specific attributes, like being enacted in public settings or supported by specific social values. Some other behaviors, in contrast, happened in private settings and are related more to personal preferences instead of societal ones, thus will be less likely to be influenced by others' assessments.

More specifically, behaviors like water conservation and waste recycling have outcomes that take place at the collective level (e.g., individual's water conservation behavior is largely for the subsistence of all of humankind instead of individual, most likely financial benefits), which differentiates them from some other behaviors merely related to individual benefits, like exercising and having healthy diets. Normative influences would likely be greater for these procollective behaviors (Lapinski et al., 2007), as they're more likely to be judged by others sharing the same interest. The current study focuses on influenza vaccination as one of these pro-social behaviors.

Influenza, one of the most prevalent infectious diseases that is commonly known as "the flu," is estimated to result in about 3 to 5 million cases of severe illness and about 290,000 to 650,000 deaths annually all around the world (World Health Organization, 2018). Though the vast majority of people can recover from flu-related symptoms within a week without medical care, the epidemic can still result in high levels of absenteeism in workplaces/schools, and severe pressure on healthcare systems, especially during peak illness periods.

The most effective way to prevent the flu is vaccination. Flu vaccination can not only prevent getting flu, but also reduce the severity of illness (Ferdinands et al., 2021; Thompson et al., 2018a, b), reduce the risk of hospitalization (Ferdinands et al., 2014; Rondy et al., 2017), and save infants and children's lives (Olson et al., 2022; Thompson et al., 2018a). Besides all these individual benefits, flu vaccination is considered valuable as it helps protect the community through establishing herd immunity (Anderson, 1992). However, the relatively low influenza vaccine uptake is still a severe public health challenge. According to the Centers for Disease Control and Prevention (2023), only about half of Americans get an annual flu vaccine, which is far less than the 80~90% target to establish herd immunity (Plans-Rubió, 2012). Therefore, it's societally beneficial to study the factors that promote flu vaccination.

A variety of studies have attempted to address normative influences for flu vaccination. For example, Quinn et al.'s (2017) mixed method study reported that people who were vaccinated reported a higher level of perceived norms that "a majority of people around them want them to be vaccinated" on average than those who were not vaccinated (p. 473). Mussio & de Oliveira's (2022) experimental study further found that a normative message increased the proportion of students taking flu vaccine compared with a no normative message condition. However, very few studies explicitly put individuals' pro-group and pro-social tendencies into consideration. The current study is aimed at testing this.

In particular, this study was conducted to test the hypotheses that social norms messages will influence perceived social norms and that perceived social norms will have a direct and positive influence on behavioral intentions to uptake flu vaccination. This relationship is predicted to be moderated by two variables, group identity (Rimal & Real, 2005), and group orientation (Lapinski et al., 2007). In the following sections, the theoretical framework for the

study is described as well as the existing empirical studies of social norms and behaviors. After that, the study hypotheses and a method for testing them will be proposed.

LITERATURE REVIEW

The current study is based on the theory of normative social behavior (Rimal & Real, 2005), which is a theory of social norms. During the past several decades, various theories that address the effects of social norms, like the theory of reasoned action (TRA; Ajzen & Fishbein, 1980) and focus theory (Cialdini et al., 1990) have been developed. One significant contribution of these theories is to illustrate the influence of norms on behaviors, though it is noteworthy that scholars in different fields have conceptualized norms in different manners (Chung & Rimal, 2016). Cialdini et al. (1990) clarified the conceptualization of norms from earlier studies and divided them into two categories: injunctive and descriptive norms. Injunctive norms refer to perceptions of socially appropriate behavior and the potential for social sanctions when one fails to comply with norms. In contrast, descriptive norms refer to what others are doing, specifically the prevalence of the behavior in a particular group, regardless of the appropriateness of the behavior.

Based on prior research (e.g., Cialdini et al., 1990), the theory of normative social behavior (TNSB; Rimal & Real, 2005) addresses the influence of descriptive norms on behaviors; and it proposes that multiple variables, including injunctive norms, can moderate this relationship. The other TNSB moderators include outcome expectations (the expected benefits and risks of taking specific actions) and group identity (the perceived similarity to and aspiration to be like the reference group). Rimal & Real (2005) specifically predicted that, perceived descriptive norms (perceived prevalence) about certain behaviors are positively related to behavioral intentions, but the magnitude of this association will become greater when perceived injunctive norms, outcome expectations, and/or group identity are stronger. The diagram of the original TNSB is shown in Figure 1.

Multiple empirical studies have been conducted during the past two decades to test the predictions of the theory for various topics, including but not limited to bystander intervention in sexual assault (Mabry & Turner, 2016), college student alcohol consumption (Halim et al., 2012), distracted driving behavior among adolescent drivers (Carter et al., 2014), exercise and healthy diet behavior (Yun & Silk, 2011), and COVID-19 prevention behaviors (Liu et al., 2023). In general, researchers reported results that confirmed TNSB's predictions, especially the main effect of descriptive norms on behavioral intentions or behaviors. However, the roles of potential moderators and/or mediators are so far fairly mixed (e.g., Lapinski et al., 2007; Rimal, 2008). The current research focuses on the roles of two possible moderators – group identity (Rimal & Real, 2005) and group orientation (Lapinski et al., 2007).

Group Identity

Based on the assumption that people feel affinity and desire connection with important referent groups (parents, peers, etc.), Rimal and Real (2005) conceptualized the term group identity into two aspects: the similarity an individual perceives between themselves and their referents, and the aspiration or to what degree they desire to be like referents. Though more empirical evidence is needed, it's feasible for us to illustrate the function of group identity as a moderator based on the concept of cognitive consistency, or more specifically, balance theory (Heider, 1958). The more we like someone, or we think we're similar to someone, the more we're likely to do the same things they do, in order to maintain the psychological balance (or in other words, to minimize cognitive dissonance).

In terms of similarity perceptions of group members, empirical evidence is mixed and complex such that no single generalization can encompass all observed effects. For example, Rimal and Real (2005) find that the moderating effects of neither similarity nor aspiration on the

descriptive norm-behavior relationship are significant. In a later study (Rimal, 2008), both the effects are significant but come with small effect sizes. Liu et al.'s (2023) study, in contrast, finds that group identity attenuates, instead of strengthening, the relationship between descriptive norms and behavioral intentions. However, previous literature has indicated that attitudinal similarities between sources and receivers that are relevant to the persuasive issue in a message can have positive effects on changes in attitudes (for a review see O'Keefe, 2015; Simon et al., 1970). Even though a concrete communication source might not exist in the context of normative influence and instead there is a referent identified in the message (e.g., most UT students; Rimal & Real, 2005), it's still reasonable to predict that people's behavioral intentions will be influenced by norms emanating from the hypothetical referent group through a similar mechanism.

Group Orientation

Apart from the construct of group identity, it's also important to examine the moderating effect of group orientation, or "the extent to which group goals prevail over individual goals" (Lapinski et al., 2007, p. 135). Different from group identity, which will vary when different referent groups are specified, group orientation is considered an individual attribute maintaining stability across contexts. For people with a more collective orientation, social behaviors are more likely to be influenced by norms, duties, and obligations (Miller, 1994). Lapinski et al. (2007) further proposed that, group orientation will make the hypothesized positive correlation between descriptive norms and behavioral intention stronger.

As for the empirical evidence about group orientation as a moderator of the descriptive norm-behavior relationship, Lapinski et al.'s (2007) study reported a statistically significant moderating effect of group orientation on the relationship between perceived descriptive norms

and attitudes/behavioral intentions on water conservation, which is in accord with the theoretical predictions. However, some other studies obtained mixed, sometimes contradictory conclusions. For example, Chung & Lapinski's (2018) later study found a significant direct relationship between group orientation and reported behavior (handwashing in this case) but didn't find the predicted interaction between descriptive norms and group orientation. In Liu et al.'s (2023) newest study, group orientation was found to attenuate, instead of strengthening, the relationship between perceived descriptive norms and behavioral intentions.

The existing literature on flu vaccination has not examined the moderators of the normbehavior relationship. And, only one of the prior studies on the role of group orientation in the norm-behavior relationship was experimental (Lapinski et al., 2007). Thus, the current study tests: 1) to what extent perceived norms about vaccination can be manipulated through social norms messages, 2) the causal relationship between perceived norms and behavioral intentions, and 3) the moderating effects of group identity and group orientation on this relationship.

HYPOTHESES

The current study follows Lapinski et al.'s (2007) methods but with some modifications. Former studies have shown that normative beliefs can be altered by manipulating messages conveying social normative information, and this sort of change can further influence behavioral outcomes (Borsari & Carey, 2001, 2003; Lapinski et al., 2007). Similar to what was done in Lapinski et al.'s (2007) study, in the current study, perceptions of the prevalence of flu vaccination (descriptive norm) will be manipulated by providing participants with messages with varying prevalence information. Also, Lapinski et al.'s study demonstrated that descriptive norms can be manipulated independently without altering the perceptions of injunctive norms. Replication of this finding is desired, largely because the central focus of the current study is the moderating effect of group identity/orientation on the relationship between perceived descriptive norms and behavioral intentions, thus injunctive norms should be controlled in the study design. Therefore, the following hypothesis and research question are posed:

H1: There will be a main effect of the experimental condition on perceived descriptive norms, such that participants exposed to the high-prevalence message will rate flu vaccination as more prevalent than those exposed to the low-prevalence message.

RQ1: How will participants in the comparison group perceive the prevalence of the behavior?

The next set of predictions addresses the direct and moderated effects of perceived descriptive norms on behavioral intent and are derived from the TNSB (Rimal & Real, 2005) and Lapinski et al.'s (2007) following work. As discussed above, balance theory (Heider, 1958) predicted that, the more we like, or we think we're similar to, someone, the more we're likely to do the same thing as they do. Therefore, when a certain behavior is perceived as prevalent within the referent group, both components of group identity (similarity and aspiration) should be able

to magnify the effects of descriptive norms on behavioral intention. It is predicted that a high level of group orientation (more collectively oriented) can play the same role if the behavior itself provides benefits to the group (flu vaccination is in accord with this requirement because it helps to prevent the spread of flu in the group if the group members are physically or geographically connected). Thus:

H2: Perceived descriptive norms will have a positive, direct influence on behavioral intentions.H3: The influence of perceived descriptive norms on behavioral intentions will be greater when group identity is higher than when group identity is lower.

H4: The influence of perceived descriptive norms on behavioral intentions will be greater when group orientation is higher than when group orientation is lower.

METHOD

To test the hypotheses, an online experiment was conducted that was modified based on the Lapinski et al. (2007) study. The study involved varying the normative messages that participants received about the prevalence of getting flu vaccination among their college mates (descriptive norms, high prevalence vs. low prevalence vs. comparison) and measured their perceived descriptive norms (prevalence), perceived injunctive norms (social sanctions), behavioral intentions, group orientation, and group identity to test whether the data were consistent with the predicted relationships. A comparison group (with no manipulation of normative messages) was added, following the recommendations of Oyserman et al. (2002). Participants' perceived behavior control, believability on the stimuli, emotional responses, as well as vaccination history during the past 12 months were measured as potential covariates. Details of the sampling, manipulation, and measurement are provided below.

Participants & Procedure

Participants were sampled from a Midwestern university in the United States. Researchers posted the recruitment materials on two subject pools, where eligible participants could freely sign up for the study to get either a \$8 incentive (for subjects in Pool 1) or course credit (for subjects in Pool 2). Because of the nature of the study, participants were strictly limited to currently enrolled students. After removing responses that are marked as potential frauds by Qualtrics, the resulting sample contains a total of 134 participants, with 96 cases in Pool 1 and 38 cases in Pool 2; differences between the two pools will be tested.

Participants who signed up for the study were first given a Qualtrics survey URL and told that they could participate in the study from any computer at any time they preferred. Once participants completed the informed consent procedures, they were asked to complete a set of

questions regarding their own and others' behaviors on a "health/environmental behavior scale." More specifically, they were asked to estimate the percentage of people in the US who engaged in various health- and environment-related behaviors (getting flu vaccination, hand washing, saving energy, etc.) and then to estimate the percentage of time they engage in the same behavior (see Appendix B). The order of the questions was randomized.

Following completion of these questions, participants were told that the website was estimating their perceptions of flu vaccinations using a health behavior database, which was in fact a deception for manipulation purposes. Next, participants were randomly assigned to one of the three experimental conditions (high/low prevalence message/comparison) to receive a message manipulation regardless of their responses to the scales (high prevalence group n = 48, low prevalence group n = 41, comparison group n = 45). Participants were then asked to complete the measures of the primary variables (perceived descriptive norms, perceived injunctive norms, behavioral intention, group identity, and group orientation), covariates (perceived behavior control, message believability, emotional responses, and vaccination history), and some demographic items.

At the end of the study, participants first were debriefed regarding the purpose of the study and the need for deception. After that, participants received compensation of either \$8 US or course credit, depending on the subject pool they were in. Financial incentives were sent as Amazon gift cards to the email addresses they used to sign up for the subject pool. All procedures were approved by the university IRB.

Message Design

The current study followed Lapinski et al.'s (2007) procedures on message design and was based on pilot study data; messages were virtually identical except for the manipulation. In

all three conditions, participants were told that their responses were matched to a (fictitious) health behavior database, and their beliefs about flu vaccination were likely to be incorrect. For participants in the high-prevalence condition, they were told that 60% of people in their university were vaccinated in the year prior to the study; while for those in the low-prevalence condition, they were told that 20% of people were vaccinated. Participants in the comparison condition didn't see any information about the prevalence of vaccination. All other parts of the messages remained the same (see Appendix B).

A potential concern about social norms message design is if stimuli including descriptive norm data are too different from participants' perceptions this may reduce the believability of the message. To help determine the best percentages to use in the stimuli, a pilot study (N = 20) was conducted, using a Social Judgment Theory approach described by Smith et al. (2006). In the pilot, participants were asked to respond to the following stem for each percentage, from 10%, 20%, 30%... to 90%: "The percentage of (the abbreviation of the university) students who got flu vaccinated over the last year was _____." Participants were further provided with a 3-point scale where 1 = very believable, 2 = somewhat believable, and 3 = not believable at all for each item. The higher the score, the lower the believability. Results are shown in Table 1.

As shown in the results, there was not much variability in the scores although responses on the highest and lowest ends have higher scores (i.e., lower believability). As such we used 60% and 20% prevalence as reasonably believable percentages.

Measures

After exposure to the stimulus, participants were asked to respond to a series of questionnaire items aimed at measuring five primary variables in the following order: perceived descriptive norms, perceived injunctive norms, behavioral intention, group identity, and group

orientation. Four potential covariates (perceived behavior control, message believability, emotional responses, and vaccination history) as well as demographic items were also measured. All variables, except vaccination history and demographics, were measured with Likert-type items with 7-point response scales ranging from 1 (strongly disagree) to 7 (strongly agree). See Appendix B for all study measures. To test for internal consistency, confirmatory factor analyses (CFA) were conducted for all measures, except for emotional responses, vaccination history, and demographics. Criteria for evidence of scale internal consistency and reliability we set *a priori*: a) size of the factor loadings (> .6) and b) Cronbach's α for latent variables (approx. > .7).

Perceived Descriptive Norms. The extent to which participants perceived that flu vaccination was prevalent was assessed with four items similar to those used in Lapinski et al.'s (2007) study. Higher numbers indicate great perceived prevalence, except for one item which was reverse coded. Following CFA, one item was removed resulting in a 3-item scale (Cronbach's $\alpha = 0.92$, M = 4.23, SD = 1.72).

Perceived Injunctive Norms. The extent to which participants perceived the potential social sanctions associated with flu vaccination was assessed with four items derived from Lapinski et al. (2007), such as "clearly, most of (the abbreviation of the university) students approve of taking the time to get a flu vaccination." Higher numbers indicate great perceived social sanctions. Following CFA, one item was removed resulting in a 3-item scale (Cronbach's $\alpha = 0.90, M = 4.45, SD = 1.61$).

Behavioral Intention. The likelihood that participants would get vaccinated in the foreseeable future was assessed with a 5-item scale derived from multiple studies (Ajzen, 2015; Ajzen et al., 2011; Lapinski et al., 2007), with items such as "I am planning to get a flu vaccination this year when it is time." Higher scores indicate that participants were more

intended to get vaccinated. Following CFA, all five items were retained (Cronbach's $\alpha = 0.97$, M = 5.04, SD = 1.58).

Group Identity. For the measure of group identity, the 8-item scale proposed by Rimal and Real (2005) was used, where four items measured perceived similarity [e.g., "I think most of (the abbreviation of the university) are similar to me intellectually"] and four items measured aspiration [e.g., "I think (the abbreviation of the university) are respectable"]. Higher scores indicate higher degrees of group identification. Though the original scale was designed with a 5-point Likert-type response scale, the current study modified it to a 7-point Likert-type design, corresponding to the rest of the scales used in the study.

Though the overall factor loadings were ideal (all higher than .7), supporting a solution retaining all items, it is remarkable that Rimal and Real (2005) conceptualized GI as a combination of similarity and aspiration, and from a measurement standpoint, they treated them as two separate variables. To examine whether it's appropriate to treat group identity as a single construct, two separate measurement models were estimated, where Model 1 loaded these eight items to similarity and aspiration separately, and Model 2 further loaded similarity and aspiration to group identity as a second-order latent variable. The likelihood ratio test indicated that Model 1 had a better fit ($\Delta \chi^2 = 20.09$, $\Delta df = 5$, p < .01). Therefore, further analysis treats similarity and aspiration as two separate variables with two 4-item scales, respectively (for similarity, Cronbach's $\alpha = 0.90$, M = 4.68, SD = 1.29; for aspiration, Cronbach's $\alpha = 0.89$, M = 5.26, SD = 1.14).

Group Orientation. Consistent with prior research (Lapinski et al., 2007), the entire 32item individualism-collectivism scale proposed by Triandis (1995) was used, where items originally used to measure individualism, such as "I am a unique individual," were reverse scored. Higher scores indicate stronger orientations toward group goals. The CFA yielded a 5item solution including items such as "I would do what would please my family, even if I detested that activity" (Cronbach's $\alpha = 0.70$, M = 4.55, SD = 1.11).

Potential Covariates

Behavioral Control. An underlying theoretical concern was that perceived accessibility of medical resources, including flu vaccination, may vary across individuals, which can lead to different levels of behavioral intentions. To put this concern into control, an 8-item scale was used to measure perceived behavioral control, including items such as "If I wanted to, it would be easy for me to get flu vaccinated." Higher scores indicate higher confidence in getting vaccinated. Measurement analysis resulted in a unidimensional scale with all eight items retained (Cronbach's $\alpha = 0.90$, M = 5.77, SD = 0.93).

Message Believability. Another potential covariate is message believability or to what extent participants think the message is accurate, authentic, and believable (Appelman & Sundar, 2016). As mentioned previously, a low message believability may lead to failure in manipulation. To examine this issue, a 3-item Likert-type scale derived from Appelman and Sundar (2016) was used in the current study. It asked participants the following questions: "How well do the following adjectives describe the content you just read: Accurate/authentic/believable?" Higher scores indicate higher believability on the stimuli. CFA indicated a unidimensional scale retaining all items (Cronbach's $\alpha = 0.87$, M = 4.98, SD = 1.21).

Emotional Responses. Social norms messages can motivate emotional responses (Koh & Lapinski, 2014). Participants may feel angry, guilty, and/or ashamed if they receive the high-prevalence message, especially when they compare their own behaviors to the fictitious descriptive norms, and find their own vaccination decision is different than the norm. This sort of

emotional response can either enhance (especially when participants feel guilty) or reduce (especially when they feel ashamed) intentions to conduct the focal behavior (for more discussion, see Boudewyns et al., 2013). Or, they may feel satisfied with their current practice when they receive a low-prevalence message. Six items were used to measure six types of discrete emotions: Shame, guilt, anger, mad, satisfaction, and pride.

Vaccination History. People who were vaccinated previously are likely to get vaccinated in the future. A single item was asked to see if participants had received a flu vaccine in the 12 months prior to the study. As a result, 57% of the participants (n = 68) indicated that they were already vaccinated.

Descriptive statistics for the primary study variables are presented in Table 2.

RESULTS

Preliminary Analysis

A one-way ANOVA was conducted to compare the differences among groups on message believability, and the result was not significant, F(2, 131) = 0.885, p = .415. The Tukey's honestly significant difference (HSD) test also showed that there were no significant differences between all three possible pairs of groups. Therefore, it's fair to conclude that participants in different groups (high prevalence vs. low prevalence vs. comparison) perceived the believability of the stimuli to a similar extent.

Several additional ANOVA tests were conducted to see if there were differences in perceived injunctive norms, behavioral control, and emotional responses. Detailed results are shown in Table 3. These analyses show there are differences by condition in perceived injunctive norms (IN), shame, satisfaction, and pride.

Lastly, the difference in behavioral intention between cases from the two subject pools was examined by a Welch two-sample t-test, and the result was significant (Pool 1 M = 5.28, SD 1.30; Pool 2 M = 4.42, SD = 2.02; t(49.53) = 2.45, p < .05, Cohen's d = .56). Therefore, there was a significant difference between subjects from the two pools, and subject pool will be included as a covariate in additional analysis.

Hypotheses Testing

To test the first hypothesis (there will be a main effect of the experimental condition on perceived descriptive norms) and answer the first research question (how will participants in the comparison group perceive the prevalence of the behavior?), a one-way ANOVA with conditions as explanatory variable and perceived DN as response variable was conducted, and the result was significant, F(2, 131) = 35.13, p < .001, $\eta^2 = .35$. Means and SDs for descriptive norm by

condition are listed in Table 4.1. Tukey HSD shows that perceptions of DN were significantly different between all three possible pairs of groups, with details shown in Table 4.2. Therefore, the data is consistent with H1. For the research question, it can be concluded that participants in the comparison group perceived flu vaccination as less prevalent than those assigned to the high-prevalence condition, but more than those assigned to the low-prevalence condition.

A series of regression models were estimated to test the latter hypotheses about the direct effect of perceived descriptive norms on behavioral intentions, as well as the moderating effects of group identity and group orientation. A correlation matrix is provided in Table 5.

As shown in Table 5, message believability and all six emotional response variables are not significantly correlated with behavioral intention as the dependent variable in these hypotheses. Therefore, they were excluded from the further analyses. Three models were then estimated: Model 1 comes with descriptive norm (DN), similarity (Sim), aspiration (Asp), and group orientation (GO) with primary variables, plus injunctive norm (IN), behavioral control (BC), vaccination history (VH), and subject pool as covariates. Models 2 and 3 were based on Model 1, where interaction terms between DN, Sim/Asp, and GO were added to the models, respectively. All variables except for VH and subject pool were centered before analysis. There is no evidence for severe multicollinearity (VIF < 3 for all variables in all models). Results are shown in Table 6.

As presented in Model 1, the effect of descriptive norm on behavioral intention was not significant (coefficient = -0.10, t = -1.05, p = .30). An alternative model with emotional response variables (ashamed, mad, satisfaction, proud) added as covariates was also estimated, and the result didn't change. Furthermore, none of the interactions in Models 2 and 3 were significant (for descriptive norm × similarity, t = -0.072, p = .94; for descriptive norm × aspiration, t = 0.00,

p = .99; for descriptive norm × group orientation, t = -0.66, p = .51). Therefore, the data were not consistent with H2, H3, and H4.

Finally, the current study is interested in how participants' different emotional responses to the messages in different conditions influenced the result. As a post hoc test, four additional models with behavioral intent as the dependent variable were estimated. Four emotional response variables (ashamed, angry, satisfaction, proud) as well as message conditions (high prevalence vs. low prevalence vs. comparison; treated as dummy variable where low prevalence group is the baseline), similarity, aspiration, and group orientation were included in these models with the interaction terms between emotional response and message condition estimated. Results are shown in Table 7.

DISCUSSION

The current study demonstrated that the perceived prevalence of a vaccination behavior was shaped by presenting different information in normative messages, which is consistent with previous literature on situations like HPV vaccination, water conservation, alcohol assumption, vegetable purchase, and physical activities (Guichard et al., 2021; Lapinski et al., 2007; Priebe & Spink, 2012; Rimal, 2008; Xiao & Borah, 2021). This confirms prior research indicating that for some issues, prevalence perceptions can be influenced fairly easily with carefully designed descriptive social norms messages. However, influencing normative perceptions was not associated with a modification in behavioral intention in the current study. Contradictory to some previous studies and social norms theory (Lapinski et al., 2007; O'Keefe, 2015; Simons et al., 1970), we failed to find evidence for the hypothesized moderating effects of group identity and group orientation on the relationship between perceived descriptive norms and behavioral intention. Direct effects of descriptive and injunctive norms on intention were not evidenced but effects for prior behavior, aspiration, and similarity were.

A potential explanation for the findings that perceived norms didn't impact behavioral intentions is the nature of flu vaccination. Different from some previously studied behaviors, like water conservation (Lapinski et al., 2007), where beneficial outcomes are largely at the collective rather than individual level (Lapinski et al., 2007), flu vaccination comes with personal health benefits. Because of this, people may treat vaccination as a personal decision irrelevant to group norms and benefits, which therefore weakens the effect of norms. It's also possible that the number provided in the high-prevalence condition (60%) was not high enough to prompt participants to uptake the behavior, though it was perceived as higher than that in the low-prevalence condition. This percentage was chosen because it was likely to be believable and

greater than 50%. It may also be that the decision to flu vaccinate was considered so important that personal health concerns exerted a greater weight on the decision than normative factors (for more discussion, see Dubé et al., 2013). Both the direct and moderated influence of social norms on intentions to be vaccinated for flu were limited.

It's notable in the current study that, perceived injunctive norms, behavioral control, vaccination history, group identity, and group orientation were positively associated with intent to vaccinate. This is consistent with the literature: empirical studies have shown that perceived injunctive norm is a powerful predictor of vaccination intention (Graupensperger et al., 2021; Ryoo & Kim, 2023; Shi et al., 2024) as is past vaccination (Shaham et al, 2020). Literature outside of vaccine-related studies also showed the association between perceived behavioral control and behavioral intention (Cristea & Gheorghiu, 2016; Netemeyer & Burton, 1990). However, in the regression model controlling for the other study variables, prior behavior, similarity, and aspiration were the only significant predictors. Direct relationships between group identity and behavioral intention are not yet fully described by either theories or empirical evidence, leaving space for further studies.

The current study found a strong correlation between group identity and group orientation (see Table 5). According to Lapinski et al. (2007), these are conceptually distinct: "Whereas group identity is a function of the relationship between an individual and a particular social group, group orientation is an individual-difference variable, which by definition, is not amenable to change" (p. 140). Future studies should also examine the potential factors leading to an association between these two constructs.

It is noteworthy that the current study comes with several limitations. First, analyses and conclusions are based on a domestic sample, which may undermine the variability in group

orientation. According to Lapinski et al. (2007), group orientation may be (at least in part) an "individual difference variable that is related to culture" (p. 135), directly derived from extensive research (labeled as individualism vs. collectivism, allocentrism vs. idiocentrism, independent vs. interdependent self-construals, etc. Also see Oyserman et al., 2002) which addresses the ways in which how people from different cultural backgrounds see the goals of their own and the groups they affiliate to (Hofstede, 1980; Markus & Kitayama, 1991; Triandis et al., 1988). A cross-cultural sample may amplify the variability in group orientation, thus strengthening the power of inferential statistics. Besides, the Triandis (1995) scale used in the current study was not designed for measuring group orientation but individualism vs. collectivism. Future studies could develop a more precise and accurate measure based on the definition of group orientation.

CONCLUSION

In conclusion, this study provided an analysis of the role of norms, group identity, and group orientations on behavioral intentions. It has shown that, though individuals' perceived descriptive norms could be influenced by descriptive norms messages, it did not influence behavior. Also, contrary to the predictions, neither group identity nor group orientation moderates the relationship between perceived descriptive norms and behavioral intentions. Future studies could take both the collectivist/individual nature of the involved behavior as well as the variability in group variables into consideration, and also identify a more focused measure of group orientation.

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APPENDIX A: TABLES & FIGURES

Table 1

Prevalence	M (SD)	95% Confidence Interval
10%	2.1 (0.85)	[1.70, 2.50]
20%	2 (0.79)	[1.63, 2.37]
30%	2 (0.79)	[1.63, 2.37]
40%	2 (0.73)	[1.66, 2.34]
50%	2.05 (0.69)	[1.73, 2.37]
60%	1.95 (0.76)	[1.59, 2.31]
70%	2.05 (0.89)	[1.63, 2.47]
80%	2.15 (0.88)	[1.74, 2.56]
90%	2.25 (0.85)	[1.85, 2.65]

Believability of Vaccine Prevalence Information [Mean (Standard Deviation)]

Note. Higher scores indicate less believable messages. Results are rounded to two decimal

places. Numbers within parentheses are standard deviations.

Variable	Mean	Standard Deviation
Perc. Descriptive Norm (DN)	4.23	1.72
Perc. Injunctive Norm (IN)	4.45	1.61
Behavior Intention (BI)	5.04	1.58
Group Identity (CI)		
Similarity	4.68	1.29
Aspiration	5.26	1.14
Group Orientation (GO)	4.55	1.11

Means and Standard Deviations for Primary Variables

Note. All study variables are measured on 7-point response scales with higher numbers indicating greater levels of the variable. Numbers are rounded to 2 decimal places. Perc. = perceived.

Variable		<i>F</i> -statistics		
-	High	Low	Comparison	
Perc. Injunctive Norm (IN)	5.27	3.40	4.52	19.22***
	[4.97, 5.58]	[2.84, 3.96]	[4.10, 4.94]	
Behavioral Control (BC)	6.00	5.61	5.68	2.30
	[5.75, 6.24]	[5.28, 5.93]	[5.42, 5.95]	
Message Believability (MB)	5.15	4.80	4.96	0.89
	[4.79, 5.50]	[4.39, 5.22]	[4.63. 5.30]	
Emotional Responses (ER)				
Ashamed	2.42	3.49	2.58	5.93**
	[1.99, 2.85]	[2.92, 4.05]	[2.16, 3.00]	
Guilty	2.56	3.20	2.73	1.76
	[2.15, 2.98]	[2.60, 3.79]	[2.27, 3.20]	
Angry	2.46	3.10	2.64	2.01
	[2.07, 2.84]	[2.53, 3.66]	[2.20, 3.09]	
Mad	2.35	3.02	2.60	2.40
	[2.00, 2.71]	[2.47, 3.58]	[2.19, 3.01]	
Satisfied	4.90	3.68	4.69	9.85***
	[4.49, 5.30]	[3.22, 4.15]	[4.33, 5.01]	
Proud	4.85	3.37	4.69	13.99***
	[4.47, 5.24]	[2.85, 3.88]	[4.29, 5.09]	

Differences in Control Variables' Means Among High vs. Low vs. Comparison Conditions

Table 3 (cont'd)

Differences in Control Variables' Means Among High vs. Low vs. Comparison Conditions Note. All study variables are measured on 7-point response scales with higher numbers indicating greater levels of the variable. Numbers in the parentheses indicate 95% confidence intervals. All numbers are rounded to 2 decimal places. Perc. = perceived.

Table 4.1

Condition	Mean	SD	N
High Prevalence	5.40	1.10	48
Low Prevalence	2.91	1.61	41
Comparison	4.18	1.47	45
Overall	4.23	1.72	134

Means and SDs for Descriptive Norm by Condition

Note. Numbers are rounded to 2 decimal places.

Table 4.2

Tukey HSD Results for Pairs of Experimental Conditions including Mean Differences, 95%

Confidence Intervals (CI), and P-Values

Pair	Mean Difference	95% CI	<i>P</i> -value
High vs. Low	2.49	[1.78, 3.19]	<.001
High vs. Comparison	1.22	[0.53, 1.90]	<. 001
Low vs. Comparison	1.27	[0.55, 1.98]	<. 001

Note. Numbers are rounded to 2 decimal places.

	DN	IN	BI	BC	Sim	Asp	GO	MB	Ash	Gui	Ang	Mad	Sat	Pro	VH
DN	1														
IN	.77***	1													
BI	.13	.24**	1												
BC	.25**	.29***	.24**	1											
Sim	.25**	.32***	.41***	.38***	1										
Asp	.43***	.46***	.25**	.40***	.68***	1									
GO	.05	.14	.22*	.04	.39***	.33***	1								
MB	.28**	.23**	.02	.12	.05	.19*	08	1							
Ash	32***	23**	.04	31***	11	38***	.14	29***	1						
Gui	24**	18*	.02	28***	12	38***	.12	27**	.80****	1					
Ang	27**	23**	.03	35***	11	42***	.11	26**	.75***	.81***	1				
Mad	27**	26**	03	43***	21*	44***	.02	17	.65***	.72***	.89***	1			
Sat	.47***	.33***	00	.03	.05	.17	.01	.38***	35***	25**	28**	23**	1		
Pro	.41***	.34***	.04	00	.13	.19*	.02	.32***	38***	25**	24**	17	.80	1	
VH	.27**	.34***	.56***	.23**	-26**	.3***	.01	.12	12	24**	17*	22*	.18*	.2*	1

Correlations Among Primary Study Variables

Note 1. DN = Descriptive Norm, IN = Injunctive Norm, BI = Behavioral Intention, BC =

Behavioral Control, Sim = Similarity, Asp = Aspiration, GO = Group Orientation, MB =

Message Believability, Ash = Ashamed, Gui = Guilty, Ang = Angry, Mad = Mad, Sat = Satisfied,

Pro = Proud, VH = Vaccination History.

Note 2. p < .05, p < .01, p < .01, p < .001. Numbers are rounded to 2 decimal places.

Variable	Model 1	Model 2	Model 3
(Intercept)	3.67***	3.67***	3.67***
Perceived Injunctive norm	0.06	0.06	0.05
Behavioral control	0.19	0.19	
Vaccination history	1.59***	1.59***	1.58***
Subject Pool	0.78^{**}	0.78^{**}	0.79**
Perceived Descriptive norm	-0.10 -0.10		-0.09
Similarity	0.43*** 0.43***		0.43***
Aspiration	-0.30*	-0.30.	-0.29*
Group orientation	0.12 0.12		0.12
Descriptive norm × Similarity		-0.00	
Descriptive norm × Aspiration		0.00	
Descriptive norm × Group orientation			-0.03
Adjusted R^2	0.40	0.39	0.39
F	13.58***	10.47***	11.83***

Regression Analysis Results with Behavioral Intent as the Dependent Variable

Note 1. Vaccination history was dichotomized (Vaccinated = 1, Not Vaccinated = 0)

Note 2. p < .1, *p < .05, **p < .01, ***p < .001. All coefficients are unstandardized. Numbers are rounded to 2 decimal places.

Regression Analysis Results with Behavioral Intent as the Dependent Variable and Emotional Response as Independent Variables

Variable	Model 1	Model 2	Model 3	Model 4
	(Ashamed)	(Angry)	(Satisfied)	(Proud)
(Intercept)	4.87***	4.97***	4.87***	4.91***
Similarity	0.55***	0.53***	0.51***	0.55***
Aspiration	-0.01	0.02	-0.05	-0.09
Group Orientation	0.09	0.08	0.16	0.14
Comparison Group	0.25	0.16	0.30	0.21
High Prevalence Group	-0.01	-0.12	-0.09	-0.09
Emotional Response	0.32*	0.34*	-0.27.	-0.16
Comparison × Emotion	-0.43*	-0.40*	0.20	0.23
High Prevalence × Emotion	-0.40*	-0.48*	0.54*	0.31
Adjusted R^2	0.17	0.18	0.17	0.14
F	4.46***	4.55***	4.40***	3.78***

Note 2. p < .1, *p < .05, **p < .01, ***p < .001. All coefficients are unstandardized. Numbers are

rounded to 2 decimal places.

Figure 1

Original Version of TNSB (from Rimal & Real, 2005)



APPENDIX B: QUESTIONNAIRE ITEMS & STIMULI

Health Behavior Scale (derived from Lapinski et al., 2007):

We're interested in learning about how university students perceive typical health behaviors of all the people who reside in the United States. We are asking you to estimate the percentage of people who engage in certain behaviors. We are also asking you to estimate how often you engage in these behaviors. For each question, your answers can range form 0 to 100%. For example, if one thought about half the people in the country washed their hands after using toilets, one would answer 50%.

- 1. What percentage of people in the country get flu vaccinated each year?
- 2. What percentage of people under the age of 18 in the country get flu vaccinated each year?
- 3. What percentage of people aged 65 years or older in the country get flu vaccinated each year?
- 4. What percentage of people in the country took steps to conserve water in their homes or dorms?
- 5. In the last year, what percentage of people in the country decreased their water consumption in order to conserve water?
- 6. In the last year, what percentage of the time did you take any steps to reduce your water consumption?
- 7. What percentage of people in the country took steps to conserve energy in their homes or dorms?
- 8. In the last year, what percentage of people in the country decreased their energy consumption in order to conserve energy?

- 9. In the last year, what percentage of the time did you take any steps to reduce your energy consumption?
- 10. What percentage of people in the country took steps to better recycle the trash produced by themselves?
- 11. In the last year, what percentage of people in the country took steps to better recycle the trash produced by themselves?
- 12. In the last year, what percentage of the time did you take any steps to help recycling the trash?
- 13. What percentage of people in the country always wash their hands before and after having food?
- 14. In the last year, what percentage of people in the country always wash their hands before and after having food?
- 15. In the last year, what percentage of time did you wash your hands before and after having food?
- 16. What percentage of people in the country took any steps to reduce food waste?
- 17. In the last year, what percentage of people in the country always packed their leftover in restaurants in order to reduce food waste?
- 18. In the last year, what percentage of time did you took any steps to reduce food waste?
- 19. What percentage of people in the country exercise at least 4 times each week?
- 20. What percentage of people under the age of 18 in the country exercise at least 4 times each week?
- 21. In the last year, what percentage of time did you exercise at least 4 times a week?
- 22. What percentage of people in the country eat healthy diets every day?

- 23. What percentage of people aged 65 years or older in the country eat healthy diets every day?
- 24. In the last year, what percentage of time did you eat a healthy diet?
- 25. What percentage of people in the country smoke at least a pack of cigarettes each week?
- 26. What percentage of people aged 65 years or older in the country smoke at least a pack of cigarettes each week?
- 27. What percentage of people in the country drink alcohol once per week?
- 28. What percentage of people in the country get at least 8 hours of sleep every night?
- 29. What percentage of people under the age of 18 in the country get 8 hours of sleep every night?
- 30. In the last year, what percentage of time did you get at least 8 hours of sleep?

High Prevalence Stimulus

Thank you for waiting for the result. We have matched your answers to our health behavior database and calculated your responses about flu vaccinations. It shows that your beliefs about flu vaccinations at your university are likely to be incorrect. According to recent national and local records, approximately 60% of people in your college received flu vaccines over the last year.

Low Prevalence Stimulus

Thank you for waiting for the result. We have matched your answers to our health behavior database and calculated your responses about flu vaccinations. It shows that your beliefs about flu vaccinations at your university are likely to be incorrect. According to recent national and local records, approximately 20% of people in your college received flu vaccines over the last year.

Comparison Group

Thank you for waiting for the result. We have matched your answers to our health behavior database and calculated your responses about flu vaccinations. It shows that your beliefs about flu vaccinations at your university are likely to be incorrect.

Perceived Descriptive Norms (derived from Lapinski et al., 2007)

The following questions ask you about the prevalence of flu vaccination at your university. Please indicate to what degree you agree with the following statements.

- The information presented above indicates that most of (the abbreviation of the universities' names) students have gotten flu vaccinations.
- Clearly, not many of (the abbreviation of the universities' names) students are getting flu vaccinations.
- 3. It is clear that in the last year, many of (the abbreviation of the universities' names) students have gotten the flu vaccination.
- 4. From the information above, it seems that there are many of (the abbreviation of the universities' names) students who take the time to get a flu vaccination.

Perceived Injunctive Norms (derived from Lapinski et al., 2007)

The following questions ask you about how you think of others' attitudes at your university. Please indicate to what degree you agree with the following statements.

- I feel like (the abbreviation of the universities' names) students would think less of me if they knew I didn't get a flu vaccination.
- It is clear from this information that many of (the abbreviation of the universities' names) students believe flu vaccination is important.
- 3. Clearly, most of (the abbreviation of the universities' names) students approve of taking the

time to get a flu vaccination.

4. I think that most of (the abbreviation of the universities' names) students would respect me more if I took steps to get flu vaccination if they knew about it.

Behavioral Intention (Ajzen, 2015; Ajzen et al., 2011; Lapinski et al., 2007)

The following questions ask you whether you intend to get flu vaccinated in the near future.

Please indicate to what degree you agree with the following statements.

- 1. I am planning to get a flu vaccination this year when it is time.
- 2. I intend to get a flu vaccination next year.
- 3. I am likely to get a flu vaccination next year.
- 4. I have decided to get a flu vaccination next year.
- 5. I expect I will get a flu vaccination next year.

Behavioral Control

The following questions ask you how confident you are to get flu vaccinated in the near future. Please indicate to what degree you agree with the following statements.

- 1. If I wanted to, it would be easy for me to get flu vaccinated.
- 2. For me to get flu vaccinated is very easy.
- 3. I am certain that I can get flu vaccinated when it is time.
- 4. I believe I have the ability to get flu vaccinated.
- 5. I feel in complete control over flu vaccination.
- 6. Getting flu vaccinated is completely up to me.
- 7. Whether or not to get flu vaccinated is entirely up to me.
- 8. It is mostly up to me whether or not I get flu vaccinated.

Group Identity (derived from Rimal & Real, 2005)

The following questions are going to ask you about how you think of the students at your university when you consider yourself as a part of them. Please indicate to what degree you agree with the following statements.

- 1. I think (the abbreviation of the universities' names) students are respectable.
- 2. I think (the abbreviation of the universities' names) students are inspiring.
- 3. I look up to most of (the abbreviation of the universities' names) students.
- 4. I think highly of (the abbreviation of the universities' names) students.
- 5. I think most of (the abbreviation of the universities' names) students are similar to me intellectually.
- 6. I think most of (the abbreviation of the universities' names) students are similar to me in the way they think.
- 7. I think most of (the abbreviation of the universities' names) students are similar to me in their values.
- 8. I think most of (the abbreviation of the universities' names) students are similar to me in their behaviors.

Group Orientation (Triandis, 1995)

The following questions are going to ask you about yourself and your identity. Please indicate to what degree you agree with the following statements about yourself based on your general living experiences.

- 1. I prefer to be direct and forthright when I talk with people.
- 2. Winning is everything.
- 3. One should live one's life independently of others.

- 4. What happens to me is my own doing.
- 5. It annoys me when other people perform better than I do.
- 6. It is important to me that I do my job better than others.
- 7. I enjoy working in situations involving competition with others.
- 8. I enjoy being unique and different from others in many ways.
- 9. I often do "my own thing."
- 10. Competition is the law of nature.
- 11. I am a unique individual.
- 12. When another person does better than I do, I get tense and aroused.
- 13. I like my privacy.
- 14. Without competition it is not possible to have a good society.
- 15. When I succeed, it is usually because of my abilities.
- 16. Some people emphasize winning; I am not one of them.
- 17. My happiness depends very much on the happiness of those around me.
- 18. I would do what would please my family, even if I detested that activity.
- 19. I usually sacrifice my self-interest or the benefit of my group.
- 20. It is important for me to maintain harmony within my group.
- 21. I like sharing little things with my neighbors.
- 22. We should keep our aging parents with us at home.
- 23. The well-being of my co-workers is important to me.
- 24. If a relative were in financial difficulty, I would help within my means.
- 25. Children should feel honored if their parents receive a distinguished award.
- 26. If a co-worker gets a prize I would feel proud.

- 27. To me, pleasure is spending time with others.
- 28. I would sacrifice an activity that I enjoy very much if my family did not approve of it.
- 29. Children should be taught to place duty before pleasure.
- 30. I feel good when I cooperate with others.
- 31. I hate to disagree with others in my group.
- 32. Before taking a major trip, I consult with most members of my family and many friends.

Message Believability (adopted from Appelman & Sundar, 2016)

How well do the following adjectives describe the content you just read?

- 1. Accurate
- 2. Authentic
- 3. Believable

Emotional Responses (based on Boudewyns et al., 2013)

We also want to know how you felt when you read the content just now about flu vaccination.

How well do the following adjectives describe your feelings?

- 1. Ashamed.
- 2. Guilty.
- 3. Angry.
- 4. Mad.
- 5. Satisfied.
- 6. Proud.

Vaccination History

1. Have you got flu vaccinated in the past 12 months? (Yes/No)

Demographics

- 1. What is your age? Please fill in the blank here, or choose "not to disclose."
- 2. What is your biological sex? (*Male/Female/Don't want to disclose*)
- 3. What is your year of study? (*Freshman/Sophomore/Junior/Senior*)
- 4. What is your major? Please fill in the blank here, or choose "not to disclose."
- 5. What is your approximate annual household income in US dollar? Please fill in the blank here, or choose "not to disclose."