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The Role of Collective Group Orientation and Social Norms on Physical Distancing Behaviors for Disease Prevention

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ABSTRACT
To reduce the impact of communicable diseases like COVID-19, collective action is required and likely to be susceptible to normative influence as well as whether people are more or less collectively oriented. We extend the theory of normative social behavior (TNSB) to account for group orientation and predict the relationships between social norms and physical distancing behaviors. Using a rolling cross-sectional design during 17 weeks of the pandemic, a national sample of US residents from 20 states ($N = 8,778$) participated in the study. The findings show that perceived descriptive norms, injunctive norms, and group orientation are significantly associated with physical distancing. The descriptive norm-behavior relationship and injunctive norm-behavior relationship are moderated by group orientation and the other predicted moderators in the TNSB. The findings extend the TNSB and highlight the need to understand social norms and group orientation in formative research for health communication campaigns designed to promote prevention behaviors.

The COVID-19 pandemic was a significant global public health threat (World Health Organization [WHO], 2020), prompting unprecedented government action around the world (Hale et al., 2021); for example, policies on masking, quarantining, and physical distancing became commonplace – particularly in the first 18 months of the crisis. Physical distancing[1] policies, specifically, varied in form from country to country, but, at their core they aimed to keep people apart from each other to reduce contact rates, slow the spread of the disease, and ultimately decrease mortality (Moosa, 2020). As the effectiveness of physical distancing for reducing the spread of disease has been documented through research (Greenstone & Nigam, 2020; Kwon et al., 2021), it is imperative to better understand what motivates it.

In the U.S. there was substantial variability in the extent to which people adopted physical distancing as a preventive measure for COVID-19 (McCarthy, 2020; Moore et al., 2021); in a national sample of U.S. residents, for instance, roughly 43% were not complying with physical distancing recommendations of the government in mid-March 2020 (Moore et al., 2021). Thus, there have been calls for research that explores key determinants of preventive behaviors during pandemics, particularly physical distancing (Biddlestone et al., 2020; Bonell et al., 2020). Understanding physical distancing and the motivations behind it is an important question for health communication as it has a public health impact across communicable diseases; further, it is fundamentally social and involves interpersonal negotiation to accomplish. Understanding the unique role of social norms in risk behaviors can function as formative data for design of communication campaigns.

Social norms are one factor that has been shown to impact other prevention behaviors and may be associated with physical distancing decisions. The theory of normative social behavior (TNSB) and its extensions predict the effects of social norms on behaviors and the moderators of that relationship (Chung & Rimal, 2016; Rimal & Real, 2005). One limitation of the TNSB and other approaches to norms is their failure to account for cultural variation (Lapinski et al., 2007; Shulman et al., 2017). Group orientation, a culturally-driven element of collectivism-individualism, has been identified as a potential moderating factor in the TNSB, but empirical studies exploring its role in normative influence have been limited and produced inconsistent results (Chung & Lapinski, 2019; Lapinski et al., 2007).

Considering that physical distancing is a behavior that must be enacted with others in society and that many of the benefits accrue to the group (Cato et al., 2020), it may be the case that people who are oriented toward ingroup goals are more likely to do it or be responsive to social norms promoting the behavior. Thus, the current study explores the relationship between perceived social norms and physical distancing behavior through the lens of the recently extended TNSB (Chung & Rimal, 2016) and examines the moderating role of group orientation on the perceived norm – behavior relationship.

The contribution of this paper is two-fold: 1) to better understand the role of social norms in COVID-19 prevention using the TNSB, 2) to test and extend social norms theory by considering cultural differences in the context of communicable disease prevention. Notwithstanding the end of the COVID-19 pandemic (Thomas, 2022), the findings of this study are not only important for the advancement of theory,

but are valuable for informing the design of effective communication campaigns that target specific cultural groups and promote disease prevention behaviors.

Literature review

Physical distancing and social norms

Physical distancing involves keeping at least 6 feet away from other people and avoiding close contact with people, including those whose disease status is unknown and those suspected to be infected (Centers for Disease Control and Prevention [CDCP], 2020). As physical distancing is designed to reduce the odds of virus exposure, governments around the world have enacted recommendations, guidance, and policies related to physical distancing in the wake of the COVID-19 pandemic (Hale et al., 2021). Yet, despite empirical evidence regarding the effectiveness of physical distancing (for a review, Greenstone & Nigam, 2020; Kwon et al., 2021; McGrail et al., 2020), not everyone is willing to engage in this behavior (McCarthy, 2020; Moore et al., 2021). Social norms, or perceptions of what others do and expect those around them to do, might be a critical factor in motivating physical distancing behavior.

People follow social norms for various reasons, such as resolving uncertainty, affirming their group identity, or avoiding social sanctions (Morris et al., 2015; Sherif, 1936). In a similar vein, physical distancing behaviors during the COVID-19 pandemic are likely to have been influenced by social norms for several reasons. First, COVID-19 generated uncertainty and insecurity about the present and future and people felt that their autonomy was reduced (Ornell et al., 2020; Vermote et al., 2022). The severity and susceptibility of COVID-19 and whether COVID-19 was preventable was ambiguous to people (Bruine de Bruin & Bennett, 2020; Garfin et al., 2021). That is, perceptions of risk associated with COVID-19 continued to form and shift along with continued uncertainty about whether risk reduction behaviors worked to prevent infection. People may be more likely to follow approved or common behaviors in ambiguous situations (Sherif, 1936).

Furthermore, infectious diseases like COVID-19 are regarded as the diseases of the collective because individual behaviors result in collective benefits and risks (King et al., 2006); the deviant behaviors of any single person can yield negative outcomes for the group. Specifically, preventive behaviors like physical distancing require collective action and some level of intrinsic or social motivation to help others (Cato et al., 2020). Thus, the outcomes of physical distancing in response to COVID-19 take place primarily at the collective level, and its social benefit may be greater than its personal benefit. Physical distancing by one person decreases not only the probability of her own infection but also that of others. Yet, the action of one individual will not result in the desired benefits at the collective level. To reduce disease transmission, coordinated distancing must be practiced by groups rather than any single person.

Because humans are social animals, physical distancing behavior requires a personal sacrifice for the benefit of the collective (Dheer et al., 2021; Wolf et al., 2020). The personal sacrifice from physical distancing can range from the loss of enjoyable activities, such meeting in social venues (Cato et al., 2020) to feeling awkward or having reduced social connections with family members and friends due to the need to stay physically distant. Cultural values of individualism and collectivism are likely to play a role in collective action scenarios; collectivists should be better able to undertake collective action because of the contributions to group well-being, whereas individualists have a lower willingness to engage in collective action (Biddlestone et al., 2020; Dheer et al., 2021; Triandis & Singelis, 1998).

Thus, considering that physical distancing behavior is a voluntary collective behavior that yields collective benefits, it can be predicted that physical distancing behavior at the individual level would be susceptible to normative influence, and the effect would vary depending on one's orientation toward group goals. The TNSB had not previously accounted for cultural variability measured at the level of the individual, but it provides a framework for the effects of norms on peoples' decisions.

The theory of normative social behavior

Social norms at the individual level refer to individuals' perceived norms, which are of particular interest in this study. Perceived social norms operate at the psychological level and address what we believe most other people typically do or approve; this may differ from the actual prevalence or approval of a behavior (Cialdini & Goldstein, 2004; Lapinski & Rimal, 2005).

There are two types of perceived norms: descriptive norms and injunctive norms (Cialdini et al., 1990). Descriptive norms refer to perceptions about the prevalence of behavior, whereas injunctive norms are conceptualized as perceptions of what is socially approved or disapproved and imply the potential for social sanctions. These two distinct norms have been consistently applied and tested through the lens of the TNSB to explore the conditions under which norms would be expected to influence behavior across different contexts. In particular, the TNSB has been used as a framework for testing the relationship between descriptive norms and various health-related behaviors (Chung & Lapinski, 2019; Jang et al., 2013; Juon et al., 2017; Rimal, 2008). The behavior of physical distancing for communicable disease prevention remains understudied despite its importance for public health (for a recent exception, Cheng et al., 2021).

The TNSB is a framework for assessing how normative influence operates by accounting for perceived social norms and various moderators that affect the magnitude of normative influence on behavior (Chung & Rimal, 2016; Rimal & Real, 2003, 2005). Specifically, it was proposed to predict the association between perceived norms and behaviors. In the original TNSB, behaviors are influenced by perceived descriptive norms, moderated by perceived injunctive norms, outcome expectations, and group identity. Recently, group orientation has been introduced and tested as a new potential moderator (Chung & Lapinski, 2019; Lapinski et al., 2007). Descriptive

norms and the moderators of the norm-behavior relationship will be discussed in the following section.

Descriptive norms

Descriptive norms were originally defined in Cialdini et al.'s (1990) focus theory as a way to delineate what other people commonly tend to do. As Fiske and Taylor (2013) argued, descriptive norms allow people to act as cognitive misers, serving as decision shortcuts when individuals decide how to act (Cialdini et al., 1990). With perceptions and evidence of what most people are doing, people evaluate the effectiveness of an action. Cialdini et al. (1990) posited that the prevalence and popularity of a behavior provides social proof, leading people to believe that a behavior is appropriate (that is, injunctive norms are inferred from prevalence) and to be more likely to enact the behavior.

Since descriptive norms provide clues to evaluate the appropriateness and effectiveness of actions in a given context, individuals adjust their behaviors to conform to perceived descriptive norms. Previous empirical studies (c.f., Rimal, 2008) have shown that descriptive norms are positively associated with greater enactment of behaviors. Thus, the following is predicted as a replication of prior studies in a new behavioral and health context:

H1: *Perceived descriptive norms will be positively associated with physical distancing behavior.*

Injunctive norms

Cialdini et al. (1990) suggested that perceived injunctive norms are peoples' perceptions of social approval (i.e., what behaviors are approved or disapproved) with the threat of social sanctions for deviation. Injunctive norms have direct effects on behaviors and moderate the relationship between descriptive norms and behaviors (Rimal & Real, 2005). According to TNSB, perceived injunctive norms moderate the relationship between perceived descriptive norms and behaviors such that the relationship between perceived descriptive norms and behavior is enhanced when perceptions of injunctive norms are strong (Chung & Rimal, 2016). Although differences in the operationalization of injunctive norms result in their mixed effects in tests of the TNSB (e.g., Carcioppolo & Jensen, 2012; Rimal, 2008; Rimal & Real, 2005), a number of empirical studies have provided consistent support for the original predictions of the TNSB about the interaction between descriptive norms and injunctive norms in the context of health-related behaviors (for a review, Byron et al., 2016; Lee et al., 2007; Neighbors et al., 2008). For example, Carcioppolo and Jensen (2012) documented that stronger perception of injunctive norms strengthened the relationship between college students' perceived peer drinking prevalence and their drinking behaviors.

Perceived injunctive norms not only moderate the descriptive norm-behavior relationship but can be also directly associated with behaviors (Chung & Rimal, 2016; Rimal, 2008). That is, injunctive norms exert an independent influence on behavioral outcomes (e.g., Jain et al., 2018; for a review; Park & Smith, 2007; Rimal, 2008). A recent study (Cheng et al., 2021) indicated that perceived injunctive norms was positively associated with behavioral intentions to practice physical distancing but that perceived descriptive norms was not. This finding could be attributable to little evidence for the prevalence of the behavior in the social environment or perhaps methodological factors (c.f., Benjamini & Hochberg, 1995; Simmons et al., 2011). Although Cheng et al. (2021) examined behavioral intentions rather than behaviors, their findings present some mixed evidence for the injunctive norms predictions of the extended TNSB for disease preventive behaviors. Given the role of injunctive norms in the relationship with behavior and moderating the descriptive norm-behavior relationship, the following hypotheses are proposed:

H2: *Perceived injunctive norms will be positively associated with physical distancing behavior.*

H3: *Perceived injunctive norms will moderate the perceived descriptive norm-physical distancing behavior relationship such that the relationship will become stronger as perceived injunctive norms increase.*

Outcome expectations

Outcome expectations are one of the moderators in the relationship between perceived descriptive norms and behavior (Rimal & Real, 2005). Outcome expectations refer to the anticipated consequences of a person's behavior (Bandura, 1986). As outcome expectations are beliefs regarding whether a given behavior will result in rewards or punishments, they strengthen the relationship between perceived descriptive norms and behavior (Rimal, 2008). Specifically, in the TNSB, outcome expectations have been conceptualized as encompassing multiple factors: perceived benefits to self and others, and anticipatory socialization (Carcioppolo & Jensen, 2012; Rimal & Real, 2005). Concerning perceived benefits, some people may believe that enacting a physical distancing behavior will prevent the spread of disease, both of which can be perceived as positive outcome expectations, or the benefits of the physical distancing behavior. As anticipatory socialization is the belief that engaging in a particular behavior facilitates the development and maintenance of interpersonal relationships (Rimal & Real, 2005), some people may consider the physical distancing behavior as a requisite component for socialization with their referent group if they perceive that others are engaging in the physical distancing. If an individual perceives that physical distancing has positive outcomes and perceives that other people commonly engage in physical distancing, she will be more likely to engage in that behavior. As physical distancing compliance is not typically seen as means to enhance social interaction with others (i.e., anticipatory socialization), this study focuses only on the perceived benefits of engaging in this behavior as an indicator of outcome expectations. Thus, the study aims to investigate the role of outcome expectations (i.e., the perceived benefits of physical distancing) in

moderating the descriptive norm-physical distancing behavior relationship. The following hypothesis is advanced:

H4: *Outcome expectations will moderate the perceived descriptive norm-behavior relationship such that the relationship will become stronger as outcome expectations become more positive.*

The TNSB originally predicted that injunctive norms, outcome expectations, and group identity moderate the relationship between descriptive norms and behaviors. However, Chung and Rimal (2016) proposed a revised framework of normative influences, which suggests that injunctive norms can predict behaviors and the moderators of the descriptive norm-behavior relationship will also moderate the injunctive norm-behavior relationship. In line with this premise, the following is hypothesized:

H5: *Outcome expectations will moderate the perceived injunctive norm-behavior relationship such that it will become stronger as outcome expectations become more positive.*

Group orientation

The original TNSB posited that group identity (i.e., individual aspirations for and perceptions of similarity to a group, Rimal & Real, 2005) moderates the relationship between normative perceptions and behaviors, this factor might not be pertinent in the context of physical distancing. The contexts where TNSB has been most commonly applied, such as problematic drinking (Real & Rimal, 2007; Rimal, 2008) and smoking (Byron et al., 2016), are focused on behaviors where the primary motive largely hinges on personal affiliation with a reference group, rather than the pursuit of collective goals. For these types of behaviors, group identity is an important moderator of the effect of normative perception on behaviors. However, the motive for engaging in physical distancing behaviors is to protect a community from a disease, a collective goal. This characteristic of behaviors makes group identity less suitable as a moderator to strengthen the relationship between normative perceptions and behaviors.

In light of this, group orientation, rather than group identity, was included as a potential moderator in the current project. Group orientation is an important cultural value that reflects the extent to which people prioritize group benefits and goals over self-benefit (Lapinski et al., 2007). The concept of group orientation can be used to identify the cultural conditions under which norms are likely to be influential. It also addresses conceptual and operational challenges that have produced mixed results in the literature on individualism-collectivism (Oyserman & Lee, 2008) and self-construal (Levine et al., 2003). In essence, it simplifies the concept of collectivism described originally in Hofstede's (1980) work back to its core state by homing in on the predominance of group vs. individual goals in people's decisions.

The extent to which one is oriented toward groups may be, in part, an individual level-variable that is related to culture (Hofstede, 1980; Markus & Kitayama, 1991; Triandis, 1989).

The research on cultural variation in group orientation indicates that individual goals are subordinate to group goals for those in collectivist cultures (Markus & Kitayama, 1991; Oyserman et al., 2002). For those who are oriented to the collective, ingroups are often fixed and retain their members even in the face of extreme demands on the individuals in the group. Decisions about whether to take a particular action are contingent on others' decisions and may even involve a lack of distinction between the self and others around them (Sampson, 1985). For those more oriented toward the group rather than the self, normative factors important to maintain group harmony; the primary determinants of social behavior are norms, duties, and obligations (Miller, 1994; Park & Levine, 1999). There has been evidence supporting that differences in the extent to which group goals prevail over individual goals and one desires to maintain relational harmony can modify normative influence (Lapinski et al., 2007; Yang, 2018). For example, a recent study (Yang, 2018) explored the self-construal at the individual level, or the extent to which one prioritizes group conformity and harmony, as a moderator of the relationship between college students' perceived social norms and their intentions to consume alcohol, and found that differences in the extent to which one values interrelatedness and connectedness with others interacted with both descriptive and injunctive norms to predict students' drinking intention, with a significant three-way interaction among perceived descriptive norms, injunctive norms, and interdependent self-construal.

Personal goals take precedence among people who are less oriented toward the group or more individualistic. Admission of conformity to normative pressures is seen as an infringement on individual liberty (Park & Levine, 1999). Groups appear to be less stable in individualist cultures than they are in collectivist cultures; people tend to have more referent groups and are less concerned with complying with social norms for particular groups (Triandis et al., 1988). Importantly, the literature on individualism-collectivism has been criticized for making broad generalizations about people from different countries and for failing to capture within-country variation, as such in this study we address this issue by measuring group orientation at the individual level.

A recent study explored the relationship between individualism-collectivism and physical distancing behavior during the COVID-19 pandemic at the individual level (Biddlestone et al., 2020) but without considering normative influence. The findings evidenced a positive relationship between collective orientation and engagement in physical distancing. According to Pitlik and Rode (2017), those who are more individualistically oriented have negative attitudes toward government intervention and control. Given that physical distancing involves behaviors such as avoiding congregations of people and mass gatherings, maintaining distance from others, and self-isolation, it can be inferred that people who emphasize interdependence and are more concerned about the consequences of their own behavior on group members will more actively participate in physical distancing than those who value individual autonomy and independence. Likewise, group orientation will enhance the relationship between social norms and behaviors such that people who are more oriented toward group

goals are more likely to comply with descriptive and injunctive norms associated with physical distancing. Thus, the following are predicted:

H6: *Group orientation will be positively associated with physical distancing behavior.*

H7: *Group orientation will moderate the relationship between perceived descriptive norms and behavior such that the relationship will become stronger as group orientation becomes stronger.*

H8: *Group orientation will moderate the relationship between perceived injunctive norms and behavior such that the relationship will become stronger as group orientation becomes stronger.*

Methods

Procedures

To test the hypotheses, a rolling cross-sectional survey was conducted in 20 states in the US on a weekly basis from June 22 to October 18 2020. The data were collected in quota-based waves weekly and across four sections of the population during the study period (i.e., 17 weeks). Twenty-five participants were randomly selected per state for each wave, considering their age, sex, race, and education level.

Participants completed a survey instrument containing a series of questions pertaining to participant demographics, physical distancing behavior, perception of descriptive norms, injunctive norms, group orientation, and outcome expectations. To control for order effects, each block in the survey was presented in random order and questions within the individual blocks were randomized as well, except for demographic questions and the block measuring norms.

Participants

The participants were recruited using national non-probability, quota-based sampling from 20 states representing high, moderate, and low COVID-19 prevalence at the time of the survey.[2] Participants were 18 years of age or older ($N =$ 8,778) living in the United States. The average age of participants was 45.52 ($SD = 17.73$, $Min. = 18$, $Max. = 93$). As illustrated in Table 1, there were slightly more female participants (50.9%) than male participants (48.4%).[3] The majority of the participants were Non-Hispanic White (64.5%), followed by Non-Hispanic Black (15.3%), and Hispanic (10.7%). The highest level of educational attainment was variable; the most frequent categories were high school degree (26.7%), followed by bachelor's degree (23.2%).

Measurement

All scales in the survey were developed using adapted versions of measures for which prior literature (Lapinski et al., 2007, 2013) has demonstrated reliability and validity evidence with the exception of the behavior measure which was drawn from work summarized by Merrill (2020) on physical distancing. When measures contained at least four items, confirmatory factor analyses (CFA) were conducted based on *a priori* measurement models prior to assessing scale reliability. To estimate scale reliability, Cronbach's alpha was calculated for the

Table 1. Demographic information of the study sample including number (*N*) and percentage (%) of participants representing each category.

		N	%
Age			
	18–34	2857	32.5
	34–55	2910	33.2
	55+	3011	34.3
Biological sex			
	Male	4250	48.7
	Female	4469	51.3
Race			
	Non-Hispanic White	5663	64.5
	Non-Hispanic Black	1341	15.3
	Hispanic/Latino/Spanish	943	10.7
	Asian	577	6.6
	American Indian or Alaska Native	121	1.4
	Native Hawaiian or Pacific Islander	20	0.2
	Others	113	1.3
Education			
	Less than high school	309	3.5
	High school graduate	2345	26.7
	Some college but no degree	1734	19.8
	Associate degree in college	949	10.8
	Bachelor's degree in college	2040	23.2
	Master's degree	1084	12.3
	Doctoral degree	135	1.5
	Professional degree	182	2.1
Income			
	<30k	2531	28.8
	30k ≦ and < 60k	2436	27.8
	60k ≦ and < 90k	1605	18.3
	90k ≦	2206	25.1

Note. N = 8778.

measures with more than three items or Pearson's correlation coefficients for scales with two items. Items forming a unidimensional scale were averaged such that higher numbers indicate greater levels of the variable.

Perceived descriptive norms were measured with two questions (e.g., The majority of people I know are engaging in physical distancing) on a 0–100 scale. A composite score of perceived descriptive norms was calculated by averaging the scores of the two questions ($M = 65.46$, $SD = 24.98$, $r = .84$, $p < .01$).

Perceived injunctive norms were measured with two questions (e.g., Most people I know think it is important to engage in physical distancing) on a 0–100 scale. A composite score of perceived injunctive norms was calculated by averaging the scores of the two questions ($M = 69.18$, $SD = 26.85$, $r = .82$, $p < .01$).

Outcome expectations were measured with five questions (e.g., If I engage in physical distancing, I will be less likely to get COVID-19) on a 0–100 scale. The items address both benefits to oneself and benefits to others associated with physical distancing behavior. A composite score of outcome expectations was calculated by averaging the scores of the five questions ($M = 80.62$, $SD = 24.73$, $\alpha = .89$) with higher scores indicating more positive outcome expectations.

Group orientation was measured with five questions (e.g., I would do what would help people around me, even if I didn't like doing it.) on a 7-point Likert scale (from 1 = strongly disagree to 7 = strongly agree). A composite score of group orientation was calculated by averaging the scores of the five questions ($CFI = .93$, $SRMR = .05$, $M = 5.44$, $SD = 1.04$, $\alpha = .82$).

Physical distancing behavior was measured with seven questions (e.g., What percent of the time do you stay at least 6 feet from others) on a 0–100 scale (from 0 = 0% of the time to 100 = 100% of the time). The measurement, developed from information about physical distancing related to COVID-19 summarized in Merrill (2020), covers a diverse range of physical distancing behaviors that vary in difficulty from restricting travel to minimizing social contact. A composite score of physical distancing was calculated by averaging scores on the seven questions ($CFI = .95$, $SRMR = .04$, $M = 78.83$, $SD = 22.02$, $\alpha = .89$).

Covariates

The known predictors of physical distancing behavior were identified and included in the analysis to help isolate the relationships of interest. Previous studies have showed that physical distancing is associated with income, education, race or ethnicity, and political ideology (Gouin et al., 2021; Kavanagh et al., 2021; Pedersen & Favero, 2020; Yilmazkuday, 2020). Thus, demographic characteristics, including age, biological sex, income, education, ethnicity, and political ideology, were included as variables in the regression models. Age was measured by asking the respondents to report their year of birth. Biological sex was measured as a dichotomous variable (0 = female, 1 = male). Income was measured using an ordinal scale (from 1 = less than $10,000 to 12 = $150,000 or more). Education was measured on an ordinal scale (from 1 = less than high school degree/high

school graduate to 8 = professional degree). Political ideology was measured by asking how liberal or conservative the respondents are with an 8-point Likert scale (from 1 = extremely liberal to 8 = extremely conservative).

In addition, given the strong relationship between self-efficacy and risk reduction behaviors (Bandura, 1986; Rimal & Real, 2005), peoples' confidence in their ability to adapt COVID19-prevention behaviors was measured and included in the models. Self-efficacy was measured by averaging two questions ($r = .61$, $p < .01$) which asked about one's confidence in adopting the recommended behaviors to prevent COVID-19 (i.e., physical distancing) on a 0–100 scale (Witte et al., 1996). Finally, previous studies (Wise et al., 2020; Xie et al., 2020) found that risk perception affects physical distancing. Risk perception was operationalized as a product of perceived severity (i.e., the seriousness of the threat) and susceptibility (i.e., personal vulnerability to the threat) following previous studies (Witte et al., 1996); the two constructs were measured with two questions each with a 0–100 response scale.

Data analyses

Statistical analyses in this study were performed using SPSS version 28.0. As we were interested in testing possible moderators of the normative perception-behavior relationship, we tested multiple two-way interaction terms. There are two common approaches to testing multiple interaction terms (Jaccard & Turrisi, 2003): (1) including all the interaction terms in one model, and (2) including each interaction term in separate models to evaluate the effects separately. Some controversy exists regarding this issue (Jaccard & Turrisi, 2003). We opted to test several of the moderators suggested by the original TNSB and the proposed new moderated relationships separately because they were not part of the original TNSB model. The analysis approach involved the construction of five distinct regression models. The first model included the main predictors, descriptive norms, injunctive norms, outcome expectations and group orientation. The second model included two interaction terms based on the original TNSB: descriptive norms x injunctive norms and descriptive norms x outcome expectations. The third model introduced our proposed extension, including an interaction term between descriptive norms and group orientation. The fourth model integrated the interaction term between injunctive norms and outcome expectations from the extended TNSB. Finally, the fifth model examined the interaction term between injunctive norms and group orientation.

Each model was subjected to a series of multiple regressions[4], with reported physical distancing behavior as the criterion variable. The covariates pertinent to physical distancing, including sex, age, income, education, political ideology, risk perception, self-efficacy, and race, were controlled in the regression models. Three blocks of independent variables and covariates were entered into each regression model in a hierarchical manner. The first block included covariates pertinent to physical distancing. Subsequently, main predictors (i.e., descriptive norms, injunctive norms, group orientation, and outcome expectations) were included in the second block. Finally, in separate regressions for each model, the interaction terms were added in the

Table 2. Correlations between variables with their means and standard deviations.

		1	2	3	4	5	6	7	8	9	10	11	12
1	Physical distancing	–											
2	Descriptive norms	.38**	–										
3	Injunctive norms	.42**	.76**	–									
4	Group orientation	.31**	.15**	.18**	–								
5	Outcome Expectation	.67**	.36**	.44**	.31**	–							
6	Political ideology	−.12**	.01	−.04**	−.03*	−.15**	–						
7	Self-efficacy	.59**	.36**	.38**	.21**	.64**	−.08**	–					
8	Risk perception	.31**	.09**	.15**	.21**	.31**	−.05**	.20**	–				
9	Male	−.11**	.06**	.03**	−.06**	−.04**	.12**	−.01	.00	–			
10	Age	.12**	.23**	.16**	.01	.10**	.18**	.14**	.04**	.09**	–		
11	Income	.01	.14**	.13**	.08**	.07**	.13**	.01	.08**	.23**	.13**	–	
12	Education	.05**	.13**	.13**	.06**	.09**	.08**	.04**	.10**	.21**	.14**	.49**	–
	Min.	0	0	0	1	0	1	0	0	0	18	1	1
	Max.	100	100	100	7	100	8	100	10000	1	93	12	8
	Mean	78.83	65.46	69.18	5.44	80.62	4.69	79.75	3809.36	–	45.52	6.20	–[a]
	Standard deviation	22.02	24.98	26.85	1.04	24.73	1.97	23.60	2620.49	–[a]	17.72	3.54	–[a]

Note. *p < .05, **p < .001; Sex was dichotomized (Male = 1, Female = 0); Risk perception indicates a product of perceived severity and susceptibility.
[a]Means and standard deviations were not calculated for nominal and ordinal variables.

third block to test for the predicted moderated relationships. Hypothesis testing was done by evaluating the significance of the incremental change in explained variance. For all the interaction terms in the regression model, variables were mean centered[5] to reduce potential multicollinearity (Aiken et al., 1991; Cohen et al., 2003).[6] To minimize the potential Type I error because of the large sample size, the current study set the *a priori* significance level for each hypothesis as 0.01 using the Bonferroni correction.

Results

The results are presented with the bivariate relationships first, followed by the interactions predicted in the original TNSB

(Rimal & Real, 2005), and finally by the predicted extensions of the TNSB. First, the associations between perceived descriptive norms (H1), injunctive norms (H2), and group orientation (H6) with physical distancing behaviors were examined. As shown in Table 3, perceived descriptive norms, injunctive norms, and group orientation accounted for a significant amount of variance in physical distancing behaviors ($R2$ = .54, ΔR^2 = .13, $p < .001$). Specifically, H1 predicted that perceived descriptive norms would be positively associated with physical distancing behavior, and H2 stated that perceived injunctive norms would be positively associated with physical distancing. Consistent with our expectations, significant associations between descriptive norms and injunctive norms with behavior were evidenced; perceiving a greater prevalence of

Table 3. Regression analysis for predictors of physical distancing behavior, standardized beta coefficients, and T-statistics.

	Model 1	Model 2	Model 3	Model 4	Model 5
Sex	−.08**(−9.97)	−.08**(−10.02)	−.08**(−9.88)	−.08**(−10.29)	−.08**(−9.87)
Age	.05**(6.62)	.06**(7.38)	.06**(6.74)	.06**(7.86)	.06**(6.77)
Income	−.03*(−2.98)	−.03*(−3.08)	−.03*(−2.91)	−.03*(−2.92)	−.03*(−2.89)
Education	−.01 (−.63)	−.00(−.46)	−.01 (−.67)	−.01 (−.67)	−.01 (−.65)
Political ideology[a]	−.02*(−2.66)	−.02*(−2.78)	−.02*(−2.69)	−.02*(−2.69)	−.02*(−2.69)
Risk perception	.11**(13.82)	.10**(13.39)	.11**(13.86)	.10**(13.09)	.11**(13.84)
Self-efficacy	.24**(24.48)	.23**(23.87)	.24**(24.48)	.23**(23.96)	.24**(24.40)
Race					
Non-Hispanic White	−.05 (−1.66)	−.05 (−1.67)	−.04 (−1.57)	−.05 (−1.68)	−.05 (−1.61)
Non-Hispanic Black	.02 (.99)	.02 (.99)	.02 (1.08)	.02 (1.01)	.02 (1.05)
Asian	.02 (1.44)	.02 (1.45)	.02 (1.50)	.02 (1.51)	.02 (1.49)
Hispanic	.01 (.48)	.01 (.51)	.01 (.56)	.01 (.47)	.01 (.51)
Others	−.01 (−.91)	−.01 (−.90)	−.01 (−.97)	−.01 (−.73)	−.01 (−.94)
Descriptive norms	.10**(8.81)	.09**(8.22)	.10**(8.65)	.10**(9.16)	.10**(8.96)
Injunctive norms	.04**(2.99)	.05**(3.64)	.04*(2.09)	.02 (1.86)	.03*(2.77)
Group orientation	.09**(11.31)	.09**(11.34)	.08**(10.74)	.09**(11.41)	.08**(10.58)
Outcome expectation	.39**(38.01)	.36**(32.95)	.39**(37.45)	.34**(30.91)	.39**(37.33)
Descriptive norms x Injunctive norms		.02(2.07)			
Descriptive norms x Outcome expectation		−.09**(−10.00)			
Descriptive norms x Group orientation			−.03**(−4.35)		
Injunctive norms x Outcome expectation				−.12**(−13.28)	
Injunctive norms x Group orientation					−.04**(−4.81)
R^2	.544	.550	.545	.553	.545
F	649.56**	590.54**	613.72**	.634.04**	614.27**

Note. Standardized beta coefficients are reported here; t statistics in parentheses; *p < .05, **p < .001; Sex was dichotomized (Male = 1, Female = 0); Risk perception indicates a product of perceived severity and susceptibility; Race variables were dummy coded; All VIFs were less than 3 except for the dummy coded variables related to race.
[a]A greater political ideology score indicates that one is more politically conservative.

physical distancing and support of physical distancing among those around one resulted in greater reported physical distancing behavior *ceteris paribus* ($B_{DN} = .09$, $\beta_{DN} = .1$, $t_{DN} = 8.81$, $p < .001$; $B_{IN} = .03$, $\beta_{IN} = .04$, $t_{IN} = 2.99$, $p < .001$). There was also a significant relationship between group orientation and physical distancing as predicted in H6. People who were predominantly guided by concerns about the collective as opposed to individual goals were more likely to report physical distancing behavior ($B = 1.85$, $\beta = .09$, $t = 11.31$, $p < .001$). Thus, the data were consistent with H1, H2, and H6 (see Table 3). Notable in the regression models is the strong association of our study covariates with distancing behaviors: risk and efficacy perceptions, age, sex, and political ideology.

H3 and H4 predicted the interaction effects consistent with the original TNSB. In the model 2 (see Table 3), adding the two-way interactions between descriptive norms and the predicted moderators yielded a statistically significant amount of additional variance in physical distancing ($R2 = .55$, $\Delta R^2 = .005$, $p < .001$). H3 proposed that perceived descriptive norms and injunctive norms would interact such that when both were concordant, their strength in physical distancing behaviors would be maximized. The interaction term was not significant ($B = .001$, $\beta = .02$, $t = 2.07$, $p = .039$); thus, the data was not consistent with H3. H4 predicted that the relationship between descriptive norms and reported physical distancing behaviors would increase in magnitude as perceived outcome expectations became more positive. The data indicated that the beta coefficient corresponding to the interaction term (i.e., descriptive norms × outcome expectation) was significant ($B = -.003$, $\beta = -.093$ $t = -10.00$, $p < .001$) (Figure 1). However, the data were not consistent with the direction of the relationship predicted in H4.

H7 predicted that group orientation would moderate the relationship between descriptive norms and behavior. The two-way interaction between descriptive norms and group orientation yielded a statistically significant amount of variance in physical distancing ($R2 = .55$, $\Delta R^2 = .001$, $p < .001$). A significant interaction was observed between perceived descriptive norms and group orientation on physical distancing behavior ($B = -.024$, $\beta = -.032$, $t = -4.35$, $p < .001$) but in the opposite of the predicted direction. Thus, data were not consistent with H7.

Next, the role of outcome expectations (H5) as a potential moderator in the relationship between perceived injunctive norms and behaviors was tested. Specifically, H5 stated that perceived outcome expectations about physical distancing would moderate the magnitude of the relationship between injunctive norms and reported physical distancing. The interaction term was significantly associated with physical distancing, but in a negative direction ($B = -.003$, $\beta = -.116$, $t = -13.28$, $p < .001$). That is, outcome expectations moderated the magnitude of the association between perceived injunctive norms and reported physical distancing but, contrary to H5, the relationship between perceived injunctive norms and reported physical distancing was stronger when outcome expectations were lower, rather than higher, as illustrated in Figure 2.

Likewise, the role of group orientation (H8) as a potential moderator in the relationship between perceived injunctive norms and behaviors was tested. H8 predicted that the relationship between injunctive norms and reported physical distancing would increase in magnitude as group orientation became higher. The data indicated that group orientation significantly interacted with injunctive norms ($B = -.024$, $\beta = -.036$, $t = -4.81$, $p < .001$). However, the data were not consistent with the direction of the relationship predicted in H8.

Post hoc analysis

We probed an additional potential explanation for our findings by testing whether the different types of outcome expectations (benefits to self vs. benefits to others) changed the nature of the descriptive norm-behavior relationship. To determine whether these different kinds of outcome expectations yield different effects, we conducted a *post hoc* regression analysis. The model
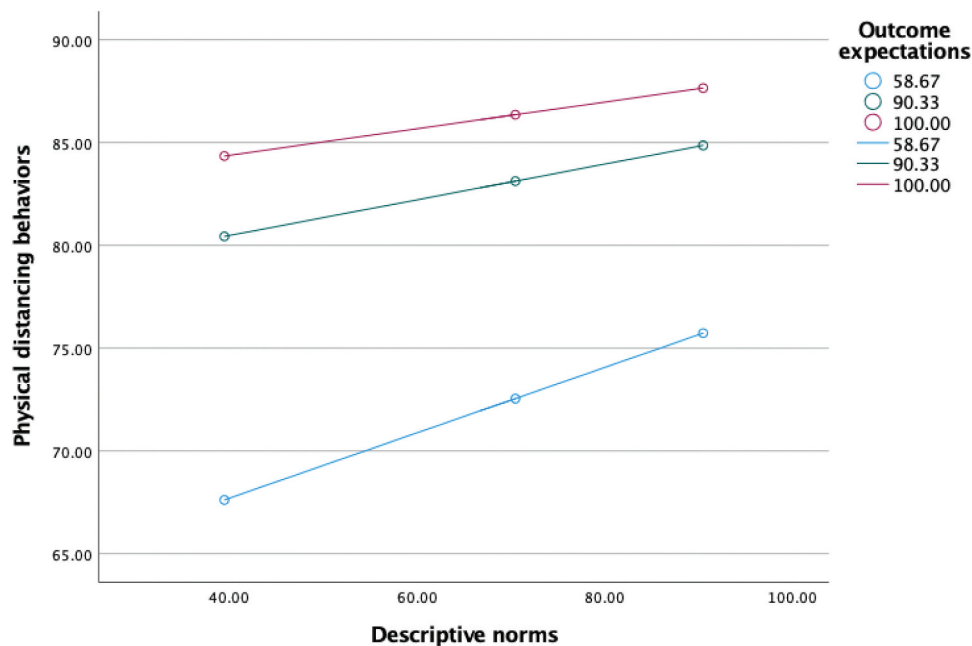

Figure 1. Interaction effects of descriptive norms and outcome expectations on physical distancing behaviors. **Note**. Outcome expectations values in the tables are 16th, 50th, and 84th percentiles.
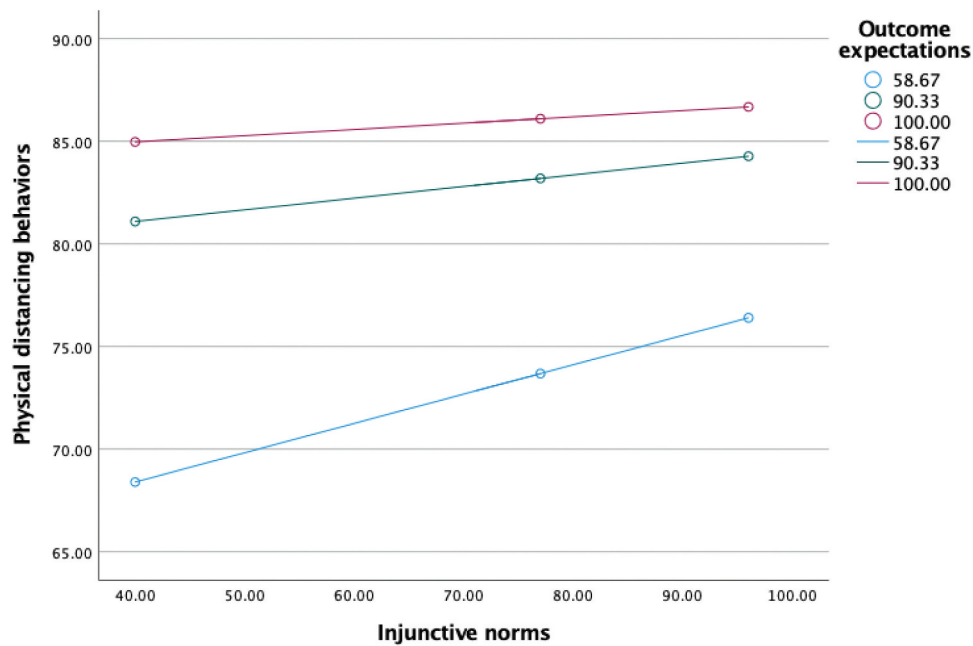
Figure 2. Interaction effects of injunctive norms and outcome expectations on physical distancing behaviors. **Note**. Outcome expectations values in the tables are 16th, 50th, and 84th percentiles.

indicated the nature of the relationship among the variables was not different for different types of outcome expectations. That is, the nature of the moderating effect of collective outcome expectations and personal outcome expectations on the descriptive norms-behavior relationship were both significant but had the same form as the combined measures reported above.

Discussion

This study examined the role of group orientation on the effects of social norms on behaviors to extend the theory of normative social behavior (TNSB) in the context of communicable disease prevention. The nature of a large national sample increases our confidence in the ability of the models we present here predict communicable disease risk reduction behaviors. Although the results largely corroborate the foundational premise of the theory – that normative influences are moderated by other variables – the observed interactions diverge from previous research (Rimal, 2008; Rimal & Real, 2005) and the effect sizes noted are modest. Our findings indicate that controlling for other known predictors, perceived injunctive and descriptive social norms, along with orientation
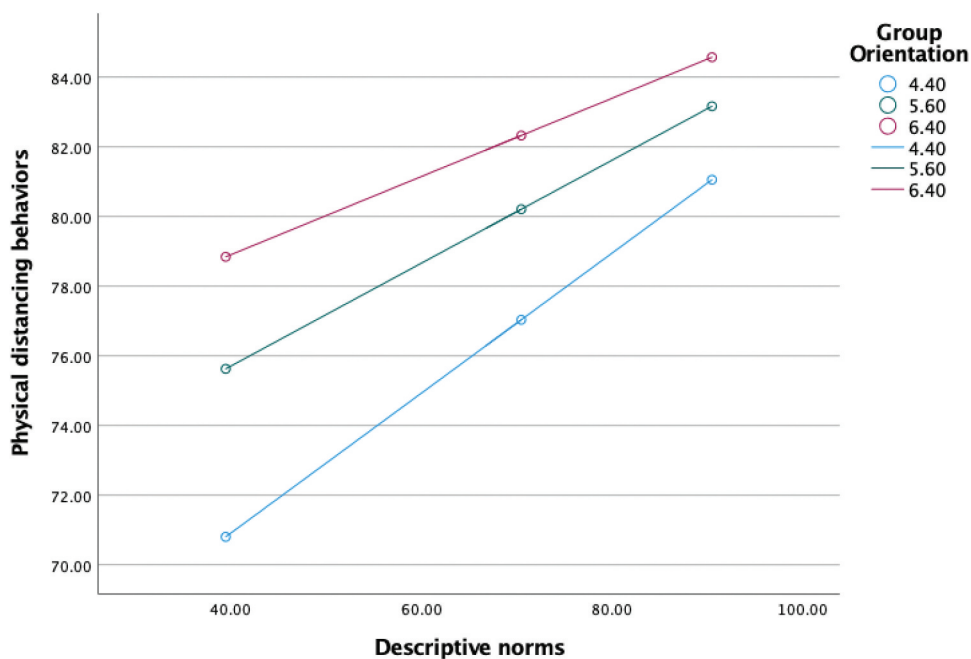

Figure 3. Interaction effects of descriptive norms and group orientation on physical distancing behaviors.. **Note**. Group orientation values in the tables are 16th, 50th, and 84th percentiles.
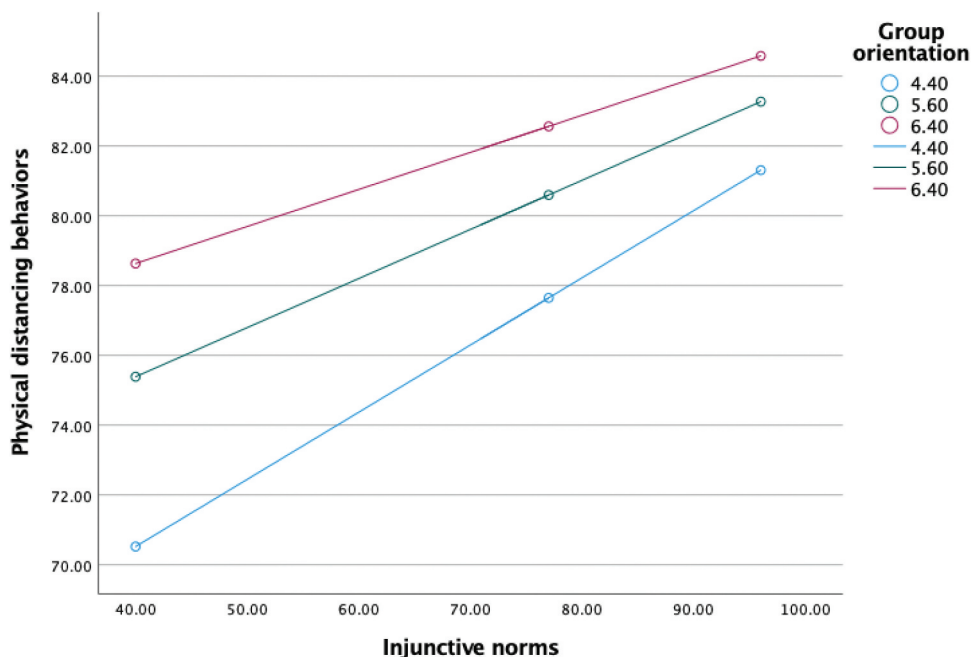
Figure 4. Interaction effects of injunctive norms and group orientation on physical distancing behaviors. **Note**. Group orientation values in the tables are 16th, 50th, and 84th percentiles.

toward groups, played an important role in shaping decisions about the uptake of physical distancing behaviors during the early months of the pandemic.

The role of normative perceptions

These data indicate positive associations of injunctive and descriptive norms with behaviors when controlling for other known predictors; people who perceive many others engage in physical distancing and believe it is the right thing to do are more likely to physically distance themselves from others to prevent the spread of disease. As such, highlighting positive descriptive and injunctive norms when they exist can be a useful communication strategy to promote disease prevention through physical distancing. Yet, consistent with the original and expanded conceptualization of the TNSB (Chung & Rimal, 2016; Rimal & Real, 2005), the associations between descriptive norms and injunctive norms with behaviors were interwoven with other moderators including outcome expectations and injunctive norms. In all cases, increasing prevalence/approval perceptions were reduced by the moderators, but the slope was different at different levels of the moderators. The relationships between norms and behavior were strongest at low levels of the moderators.

The role of outcome expectation

For outcome expectations, this indicates that when people perceive fewer benefits of engaging in a behavior, the relationship between normative perceptions and that behavior is most pronounced. This interactive relationship, which is contrary to prior studies of the TNSB about college student drinking behaviors (e.g., Rimal, 2008; Rimal & Real, 2005), might be explained by the high level of uncertainty regarding how to prevent the spread of COVID-19 and its impact on outcome expectations. Because early in the pandemic it was not clear whether engaging in physical distancing was effective or not for reducing the spread of the disease, people with lower outcome expectations might be more susceptible to normative cues. In other words, such people might engage in physical distancing primarily because most people do so (or most people approve), not because they expect positive benefits from physical distancing. Studies of the TNSB are typically centered around well-known issues such as alcohol consumption (Rimal, 2008) and handwashing (Lapinski et al., 2013), where the outcomes are fairly certain, and the norms are more well established. In at least one recent study of social norms and COVID-19 prevention, the TNSB-predicted moderations were not significant (Cheng et al., 2021); taken together with our findings it suggests a potential limitation to the scope of the TNSB-the predictions of it may not hold for behaviors where outcome expectations are uncertain and norms are fluid.

The role of group orientation

Consistent with the primary focus of the TNSB and its extensions, the findings show that the relationship between social norms and behaviors is intertwined with other factors; although, in the main, these interactive relationships only account for small changes to the explained variance in behaviors. Most germane to the current study because of its focus on extending the purview of the TNSB, these data indicate that group orientation is associated with behaviors and plays a role in moderating the perceived norm-behavior relationship. In general, more collectively oriented people reported the greatest amount of physical distancing

behaviors when descriptive and injunctive norms are higher (see Figures 3 and 4). But the nature of these interactions has differing slopes with the strongest association with descriptive and injunctive norms with behaviors occurring at low levels of group orientation.

Specifically, the results show that the slope of the relationship between descriptive norms and behavior is steeper at low levels of group orientation, indicating that descriptive norms have the strongest association with behavior when group orientation is low. Conversely, the slope becomes less steep at higher levels of group orientation, indicating that descriptive norms have a weaker relationship with behavior when group orientation is high. The interaction between injunctive norms and group orientation takes the same form. However, the effect size for both moderations was small and the findings should be interpreted with this caveat in mind.

Prior studies of the interaction between collectivism (and group orientation) and social norms show mixed results. Some show that collectivism enhances the effects of norms on behaviors (Bagozzi et al., 2000), while others show that collectively oriented people are not more influenced by descriptive norms compared to individualistically oriented people (Lapinski et al., 2007). Despite the modest size of these interactive relationships, these findings contribute some insight into the ways in how cultural dynamics are related to the relationships between social norms and behaviors, relatively uncharted territory in communication science (Shulman et al., 2017). Broadly, the findings of this study align with existing work indicating that cultural dynamics such as measured collectivism (Paek et al., 2014) or cultural tightness (Gelfand et al., 2021) can change the relationship between social norms and behaviors.

Implications

Our findings have significant theoretical implications as they challenge the boundaries of the TNSB. The TNSB has been predominantly tested and expanded in contexts where the outcomes of behaviors are clear and often linked to individuals' need to belong to their reference groups, such as alcohol consumption (Real & Rimal, 2007; Rimal, 2008) and handwashing (Lapinski et al., 2014). However, the act of physical distancing exhibits distinct characteristics compared to these behaviors, as its primary function is to protect the community, even if it necessitates personal sacrifices. The relationships we identified between group orientation and behaviors suggest that social norm theories, including the TNSB, can be extended to account for the influence of group orientation, particularly when examining pro-social or cooperative behaviors. In other words, when the focus is on behaviors aligned with group goals or reflective of collective values, incorporating group orientation can provide valuable insight.

The findings of this study also imply that communication campaigns which highlight social norms about behaviors such as physical distancing can be impactful in driving decisions. Nonetheless, it is pivotal to consider outcome expectations and group orientation of the message recipients, given their intertwined relationship with normative responses. The findings also underscore the pivotal role descriptive norms play, especially in scenarios where the outcomes of the behaviors remain uncertain. The propensity of audiences toward group orientation could modulate the influence of social normative messages. Consequently, it emerges that strategies behind social norms campaigns could be tailored or targeted in congruence with the level of group orientation or other pertinent variables.[7]

The behavior we examined in this study, physical distancing to avoid disease, was carefully chosen for its attributes as well as its public health significance. The behavior has both collective and individual benefits for the reduction of disease transmission, but the enactment is collective in nature. It is relatively complex to enact as it requires mutual coordination to uphold or adherence to policies by people to make it useful as a prevention strategy. That is, physical distancing requires large-scale consensus to be effective. This study indicates that people's perceptions of others' willingness to do this behavior and their approval of it shapes their decisions to act. The recommendation to physically distance is not unique to the COVID-19 pandemic but has implications for communicable disease more broadly as do these study findings.

Limitations

Although this study was carefully conducted, it is not without limitations; some of which are inherent in the study design. First, the results of the study indicate several factors that moderate the relationship between norms and physical distancing behavior. However, it is important to note that the effect sizes for all moderators were small, despite the large sample size. This suggests that caution is needed when interpreting the results. Second, despite the quota sampling method used in the data, the substantial sample size, and efforts to cross-check our sample demographics with existing census data, we cannot claim these findings represent the U.S. population because it is not a random sample from the population. Nonetheless, this study does contribute to the existing body of literature on social norms and on the TNSB in particular by using a large sample to test theoretically-driven predictions about the role of norms in shaping behaviors (Jang et al., 2013; Rhodes et al., 2020; Rimal & Yilma, 2021). Furthermore, because of the nature of the sample and the platform we used for data collection, we were unable to reach people who do not have access to communication technology and as such our conclusions are likely skewed toward people with higher socio-economic status. This is a problem with internet-based sampling for studies generally and one that requires the use of alternative methodologies to reach more potential responders. Finally, our study design precludes causal claims; we only provide evidence of association; however, the rolling cross-sectional method was consistent with our study goal to provide evidence for the relationships among normative variables and group orientation for a behavior that benefits the collective (physical distancing) and to provide recommendations for how this information can be used by health communicators interested in preventing disease spread.

Conclusions

In summary, this paper extends the predictions of the Theory of Normative Social Behavior (TNSB) to encompass the

association of collectivism with the relationship between social norms and physical distancing behaviors among a national sample of U.S. adults. In particular, in line with extensions to the TNSB, it offers insights into how the interplay between injunctive and descriptive norms and behaviors is shaped by various factors. However, in contrast to the TNSB, the relationship between norms and behavior was most pronounced at lower levels of positive outcome expectations. The findings suggest a possible boundary condition for the theory; the role of the moderators in enhancing the relationship between social norms and behaviors may not hold for behaviors benefiting the collective that involve new or fluid norms or cases where the outcomes of the behavior are not well-established. This study also underscores the significance of including group orientation in social norm models. Future research may take these findings into consideration when applying the TNSB and developing social norms campaigns for behaviors aligned with group goals or reflective of collective values.

Notes

1. We use the words "physical distancing" rather than "social distancing" intentionally. The former implies avoiding close or proximate physical space with other people while the later implies reducing interpersonal connectivity.
2. Participants were sampled from states using the following sampling technique to account for state-level variability in infection rates and policies. First, states were grouped into three tiers based on the level of prevalence of COVID-19 cases as of June 19, 2020; the top 10 states comprised the first-tier group with the greatest number of confirmed cases at that time, and the remaining states were divided equally between tier two and three. Five states were randomly selected from the second and third-tier respectively while retaining all 10 states in the first-tier. Second, using the national Qualtrics panel and a US Census-based quota sampling techniques that set quotas for age, sex, race, and education level, about 25 people, 18 years or older, were randomly selected from existing panels for each wave per state (about 500 people for each wave) resulting in a large, non-probability sample. Oversampling was conducted to ensure that all quotas were met.
3. For the covariate analysis we excluded participants who indicated themselves as other (.7%) as the number of people in the category was too small to allow for meaningful interpretation.
4. Prior to hypotheses testing, bivariate correlations between all variables involved in the analysis were examined. See Table 2 for the full correlation matrix and descriptive statistics. Diagnostic analysis did not identify the problem of multicollinearity. Residual and scatter plots indicated the assumptions of normality, linearity and homoscedasticity were all satisfied (Hair, 1998).
5. The authors recognize the comments of an anonymous reviewer on the issue of the debate about the role of mean-centering in the reduction of multi-colinearity and refer the reader to Hayes (2018) and Iacobucci et al. (2016, 2017). for further discussion on this issue.
6. In addition, Variance Inflation Factors (VIFs) were calculated using a model that incorporated all the interaction terms to assess multicollinearity between the independent variables and their interaction terms. All computed VIFs were found to be below 3, with the exception of the dummy-coded variables related to race.
7. Additional detail on the demographic differences in group orientation by state, gender, income, and education level is available from the first author.

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