

Abstract

Title of dissertation: NORM CONFORMITY MOTIVATIONS IN HEALTH
 PREVENTION: ADDING MOTIVATION APPEALS TO
 ENHANCE NORM-BASED MESSAGE PERSUASIVENESS

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Social norms refer to what most people do (i.e., descriptive norms) and what most people (dis)approve of doing (i.e., injunctive norms). The influence of perceived social norms and norm-based messages (i.e., messages presenting descriptive or injunctive norms) on health behaviors has long been a research focus in communication studies. However, the mechanisms that underpin social norm influence have not been fully understood. In addition, researchers have been exploring strategies to enhance the persuasiveness of norm-based messages. Based on social norm theories and the message matching theory, the dissertation focused on understanding norm conformity motivations and testing the effectiveness of norm conformity motivation appeals in changing health-related attitudes and behavioral intentions of getting a coronavirus 2019 (COVID-19) booster vaccine. By focusing on COVID-19 booster vaccine, this study aimed to extend the scope of social norm approach to crisis contexts and provide practical implications to combat the COVID-19 pandemics using norm-based message.

Through a literature review, the dissertation provided a framework that synthesized norm conformity motivations identified in the literature. The framework defined five norm conformity motivations and categorized them into motivations to conform to descriptive norms (i.e., accuracy motivation, identification with admired group motivation, and relative benefit motivation) and motivations to conform to injunctive norms (i.e., social award motivation and

social punishment motivation). Pilot study 1 developed and validated a 23-item instrument to measure the five motivations. Face validity, construct validity, and reliability were evaluated using Amazon Mechanical Turk (MTurk) samples. And content validity was evaluated by five expert judges. The instrument had adequate validity and reliability. Pilot study 2 designed norm-based messages with motivation appeals (i.e., linking norm (non)conformity with the benefits or costs related to norm conformity motivations). Based on the results of manipulation check, pilot study 2 determined which messages to be used in the main study.

The main study compared the influence of norm-based messages and norm-based messages with motivation appeals on U.S. adults' attitudes and intentions to get a Coronavirus disease 2019 (COVID-19) booster vaccine. The main study also examined the persuasiveness of matching norm conformity motivation appeals with individual characteristics, including norm conformity motivations, perceived uncertainty, need for closure, upward social comparison, fear of missing out, need for approval, and fear of negative evaluation. The results showed that adding norm conformity motivation appeals increased perceived message effectiveness, and in turn, perceived message effectiveness was positively associated with attitudes. However, the total effect of motivation appeals on attitudes and the mediation paths through perceived message relevance were not significant. In addition, matching motivation appeals with individual characteristics did not result in better persuasion outcomes.

The study contributes to the social norm literature and health communication practice by providing a conceptual framework and an instrument of norm conformity motivations. The framework helps understand the norm conformity process. And the instrument allows future studies to empirically test the psychological mechanism of norm conformity. Health communication practitioners can use the instrument to gauge recipients' norm conformity

motivations and design tailored messages. The study also contributes to social norm theories and the message matching theory by highlighting the importance of perceived message effectiveness in norm conformity and the importance of motivation salience in message matching.

**NORM CONFORMITY MOTIVATIONS IN HEALTH PREVENTION:
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PERSUASIVENESS**

by

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Chapter 1 Introduction

Social norms are “rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of laws” (Cialdini & Trost, 1998, p. 152). Social norms influence human perceptions and behaviors in various contexts, including health, commercial, environmental, and socio-cultural contexts (Ajzen, 1991; Rhodes et al., 2020). Research has focused on understanding the concept of social norms, the formation of social norms in a society, the influence of social norms on perceptions and behaviors, and the development of norm-based interventions for behavior change (Legros & Cislighi, 2020; Rhodes et al., 2020; Rimal & Lapinski, 2015). The literature suggested three topics remained to be explored in social norms research. **First**, although enormous evidence has shown that social norms affect behaviors (e.g., Corace et al., 2016), we still do not yet have a framework that clearly synthesizes the motivations that drive norm conformity. The motivational mechanism question is essential in the first place because we cannot fully understand the relationship between social norms and behaviors without understanding why social norms influence perceptions and behaviors. A framework that synthesizes norm conformity motivations proposed in previous studies will help with theorizing of the norm conformity process.

Second, although previous studies proposed several explanations for the norm conformity process, very few of these explanations have been empirically tested (Bell & Cox, 2015). To answer this call, developing an instrument to measure the motivations may help future studies empirically test the norm conformity process. **Third**, improving the persuasiveness of norm-based messages has been the subject of many recent studies about norm-based message design (e.g., Habib et al., 2021; Koh, 2019; Mollen et al., 2021). With an understanding of and an instrument to measure norm conformity motivations, this dissertation project added to the

literature by testing the effectiveness of adding motivation appeals to norm-based messages on changing attitudes and behavioral intentions of receiving a COVID-19 booster.

Therefore, **the first aim of this dissertation was to provide a conceptual framework of norm conformity motivations by synthesizing norm conformity motivations identified in previous studies from different disciplines.** There have been some reviews and empirical studies that intend to understand norm conformity motivations. However, these reviews had several limitations that obscure the explication of norm conformity motivations. First, previous reviews did not provide a comprehensive understanding of norm conformity motivations. Some review studies (Cialdini & Goldstein, 2004; Legros & Cislighi, 2020; Pool & Schwegler, 2007) missed one or more important motivations in norm conformity or focused only on one type of social norms (e.g., descriptive norms; Gelfand & Harrington, 2015). Second, some review studies did not clearly conceptualize norm conformity motivations. The conceptual definition of one motivation either overlaps with other motivations (Morris et al., 2015) or overlaps with other related concepts (Pool & Schwegler, 2007), which results in conceptual confusion. Third, some review studies did not differentiate motivations of conformity to descriptive and injunctive norms (Farrow et al., 2017; Cialdini & Goldstein, 2004). Lastly, most reviews took a perspective of a single discipline such as social psychology (e.g., Cialdini & Goldstein, 2004), cultural psychology (Morris & Liu, 2015; Gelfand & Harrington, 2015), neuroscience (Colombo, 2014; Falk & Scholz, 2018; Stallen et al., 2013), or economics (Farrow et al., 2017; Festre, 2010; Young, 2015). There is a lack of a framework that synthesizes norm conformity motivations identified by researchers from different disciplines. To fill the gap, this study developed a conceptual framework of motivations to conform to descriptive and injunctive norms by synthesizing the motivations identified in previous research from various disciplines.

The second aim of this dissertation was to develop an instrument for the identified norm conformity motivations based on the conceptual framework. There has not been a validated instrument to measure norm conformity motivations. Without such an instrument, studies cannot answer the call of testing the process of social norm influence (Bell & Cox, 2015) and comparing the strength of different social norm influence pathways (Legros & Cislighi, 2020). Also, communication practitioners cannot learn about message recipients' motivations and design tailored norm-based messages. This study filled the gap by developing and validating an instrument for norm conformity motivations.

The third aim of this dissertation was to test if adding motivation appeals to norm-based messages increased norm-based messages' persuasiveness on receiving a COVID-19 booster and examine the potential moderators and mediators in the process. The study examined if adding motivation appeals to norm-based messages resulted in more favorable attitudes and behavioral intentions. The study further tested a moderated mediation model to see if the enhanced persuasion effect was mediated by message perceptions (i.e., perceived message effectiveness and relevance) and if the improved persuasion effect was stronger when matching motivation appeals with individual characteristics. Previous studies on norm-based messages have been focused on everyday health contexts such as alcohol consumption, safe sex, and physical activity (Rhodes et al., 2020). Research seldomly examined the effect of norm-based messages or examined how to enhance the effect of norm-based messages in crisis context such as the COVID-19 pandemic. However, communicating social norms is more important in crisis context like the COVID-19 pandemic because the limited social interaction may lead to biased norm perceptions (Rimal & Storey, 2020) and discourage health behaviors. For example, a biased norm perception that few people receive a vaccine may discourage vaccine uptake

intentions. Therefore, examining norm-based messages and motivation appeals in the COVID-19 context helps extend the scope of practical application of norm-based messages to crisis contexts and inform health communication practices for pandemic situations. Overall, by achieving the three aims, the study hoped to contribute to understanding norm conformity motivations and to provide implications to norm-based message design.

Chapter 2 COVID-19 Vaccination and Persuasive Messages

The COVID-19 Pandemic and Vaccination

The COVID-19 pandemic has caused serious public health and economic outcomes in the United States. According to the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention [CDC], 2022b), the pandemic has led to more than 83 million infections and near 1 million deaths as of late May 2022. Through March 2021, the pandemic resulted in 4.7 million years of potential life lost for U.S. adults aged 25 to 64 years, which is close to 6.8 million and 5.3 million years of potential life lost respectively from cancer and cardiovascular diseases in 2019 (Reif et al., 2021). Economically, about 3 million more people were unemployed than before the pandemic in early 2022; about 15 million people reported themselves behind on rent in January 2021; and about 63 million adults reported difficulties to cover usual expenses such as food and medical expenses in the past seven days in late 2021 (Center on Budget and Policy Priorities, 2022).

Vaccination is effective in reducing the risk of severe illness and death caused by COVID-19 (CDC, 2021b) and is essential to help economic recovery (International Monetary Fund, 2021). The CDC has recommended that everyone aged 18 and older should get a booster shot when eligible because boosters can further enhance or restore the protection that weakens after the initial vaccination (CDC, 2022c). As of late May 2022, 76.5% of U.S. adults were fully vaccinated (CDC, 2022d). However, only 50.1% of the fully vaccinated adults have received their first booster (CDC, 2022d). To alleviate the public health and economic burdens brought by the pandemic, there is an urgent need to increase both initial vaccinations and boosters uptake rate.

Persuasion Messages about COVID-19 Vaccination

Since the COVID-19 vaccines were approved and made available to the U.S. public in December 2020 (U.S. Food and Drug Administration, 2021b), there has been a great amount of research dedicated to designing persuasion messages to improve individuals' attitudes and intentions to receive the vaccination. These studies have investigated the effectiveness of different persuasive messaging strategies including leveraging social norm influence, emphasizing economic and health benefits and costs, appealing to group identification, and inducing emotions. Research efforts have also been devoted to improving vaccination intentions by resolving negative influences from the uncertainty, misinformation, and conflicting arguments about the pandemic and vaccination.

The first line of research examined persuasion messages that addressed the benefits brought by vaccination and/or the risks brought by the pandemic. Researchers have looked at messages that emphasized vaccine effectiveness (Davis et al., 2021; Dai et al., 2021; Kerr et al., 2021; Merkley & Loewen, 2021; Sinclair & Agerström, 2021) and messages that emphasized the economic benefits and costs (Argote Tironi et al., 2021; Diamet et al., 2022; Motta et al., 2021). This group of studies also explored whether different ways of communicating benefits and risks led to different persuasion impacts. They compared messages that used gain versus loss framing (Borah et al., 2021; Chen et al., 2021; Gursoy et al., 2022; Hong & Hashimoto, 2021; Huang & Liu, 2021; Reinhardt & Rossmann, 2021; Sasaki et al., 2022; Ye et al., 2021); messages that emphasized collective versus personal benefits or risks (Argote Tironi et al., 2021; Ashworth et al., 2021; Courtney et al., 2021; Freeman et al., 2021; Hong & Hashimoto, 2021; Han et al., 2021; James et al., 2021; Motta et al., 2021; Rabb et al., 2021; Yousaf et al., 2022; Yuan & Chu, 2022); and messages that emphasized the health benefits and risks of minority groups versus the general public (Fox & Choi, 2021; Lee et al., 2022b).

The second line of research tested whether communicating social norms increased vaccination intentions. These studies investigated the persuasiveness of social norm information communicated in various ways, including plain text or a message card embedded in survey that informed vaccine acceptance rates (Argote Tironi et al., 2021; Moehring et al. , 2021; Sinclair & Agerström, 2021; Sasaki et al., 2022), emails about the number of Americans who were vaccinated (Santos et al., 2021), news stories that featured others' willingness to get vaccinated (Palm et al., 2021), public health department webpages that showed available vaccination appointment slots (Ryoo & Kim, 2021), and pro-vaccine social media comments and emojis (Lu & Sun, 2022).

The third line of research explored improving vaccination attitudes and intentions through inducing positive or negative emotions. These studies looked at the persuasiveness of messages that induced positive emotions, including hope (Han et al., 2021), love (Gursoy et al., 2022), and anticipated pride in receiving vaccination (Capasso et al., 2021) and messages that induced negative emotions of anticipated regret for resisting vaccination (Capasso et al., 2021).

The fourth line of research explored promoting vaccination attitudes and intentions through appealing to group identification. These studies examined the persuasiveness of messages that included religious identity cues (Chu et al, 2021) and messages that used endorsement from Democratic and Republican leaders (Argote Tironi et al., 2021; Diamet et al., 2022; Larsen et al., 2022; Pink et al., 2021; Robertson et al., 2021).

In addition, because the pandemic and the promotion of vaccination come along with uncertainty (Han et al., 2021), misinformation (Vivion et al., 2022), and inconsistent information (Noar & Austin, 2020), a number of studies investigated how messages addressing uncertainty and conflicting arguments around the pandemic and vaccination influenced vaccination attitudes

and intentions. Researchers have studied messages that communicated uncertainty (Chen et al., 2021; Huang & Liu, 2021; Han et al., 2021; Kelp et al., 2021; Thorpe et al., 2022; Yousaf et al., 2022), messages that used the inoculation strategy to combat misinformation (Motta et al., 2021; Vivion et al., 2022), and messages that emphasized conflicting arguments about the pandemic (Yousaf et al., 2022).

Encourage COVID-19 Vaccination with Norm-based Messages

Among the persuasion strategies mentioned above, leveraging social norm influence to increase COVID-19 vaccination intentions is likely to be successful given the evidence that perceived norms predicted COVID-19 vaccination behavior. Empirical studies showed that perceived descriptive and injunctive norms predicted beliefs, intentions, and behaviors of COVID-19 vaccination. It was found that perceived descriptive norms were positively associated with COVID-19 vaccine confidence (Wismans et al., 2021) and intentions to get vaccinated (Agranov et al., 2021; Bogart et al., 2022; Chu & Liu, 2021; Mo et al., 2021; Thaker & Ganchoudhuri, 2021; Wismans et al., 2021). Perceived injunctive norms were positively associated with intentions to get a COVID-19 vaccine (Bogart et al., 2022; Knobel et al., 2021; Thaker & Ganchoudhuri, 2021) and actual vaccination behaviors (Latkin et al., 2022). When combined, perceived descriptive and injunctive norms predicted perceived vaccination necessity (Rogers et al., 2021), vaccine trust (Latkin et al., 2021b), and intentions to get a COVID-19 vaccine (Latkin et al., 2021a; Rogers et al., 2021). Social norm perceptions also influence COVID-19 booster uptake. Hagger and Hamilton (2022) found that perceived descriptive and injunctive norms, when combined, were positively associated with COVID-19 booster intentions among fully vaccinated U.S. residents. Based on these findings, researchers recommended improving COVID-19 vaccination through communicating social norms in health campaigns

(Chevallier et al., 2021; French et al., 2020; Hagger & Hamilton, 2022; Ittefaq et al., 2021; Latkin et al., 2021b; Mo et al., 2021).

Moreover, communicating social norms may be particularly important given the unique nature of the pandemic and the vaccination behavior. The formulation of social norm perceptions of COVID-19 vaccination may be different from other health behaviors. Individuals form social norm perceptions through direct interactions with others, vicarious media exposure, and personal imagination (Rimal & Storey, 2020). Because of restrictions on social contact during the pandemic and the private (vs. public) nature of vaccination behavior, individuals may not have had direct interaction with others to form norm perceptions of vaccination. Instead, norm perceptions may have been formulated mostly through media exposure and personal imagination. However, perceived norms formulated in either manner may be biased. As social media environment is increasingly personalized, individuals may perceive norms only from similar others and are influenced mainly by in-group norms (Rimal & Storey, 2020). Also, perceived norms formed through personal imagination may be biased because they are not based on any direct or vicarious evidence (Rimal & Storey, 2020). Because individuals may hold biased social norm perceptions of COVID-19 vaccination, communicating accurate norms may increase vaccination intention when the norms are pro-vaccination.

Studies have evidenced that communicating descriptive norms increased COVID-19 vaccination intentions. Moehring et al. (2021) found that participants who received a message that conveyed a high vaccine acceptance rate showed higher vaccination acceptance than those who did not receive the information. The effect was stronger among those who were unsure about receiving a vaccine. Compared to no message control, receiving emails communicating that a large number of Americans had received a vaccine led to more vaccination registrations

(Santos et al., 2021). Also, a news story about others' willingness to get vaccinated increased vaccination intentions compared to the no message control (Palm et al., 2021). In addition to explicitly stating the number or the percentage of people who received a vaccine, social norms may also be communicated through social media comments and information about available vaccination appointment slots. Lu and Sun (2022) found that COVID-19 vaccine promotion posts accompanied by pro-vaccine (vs. anti-vaccine) comments led to less reactance in audiences through the mediating effects of bandwagon perception. The effect was stronger when the pro-vaccine comments were accompanied by agreement (vs. rejection) emojis. In two studies, Ryoo and Kim (2021) found that when a public health department webpage communicated descriptive norms by showing a low (vs. high) percentage of available vaccination appointment slots, participants were less likely to delay, skip, or reject vaccines (Study 2). The effect was stronger when audiences paid more attention to others' behaviors (Study 2). In addition, Ryoo and Kim found that adding injunctive norms decreased the vaccine hesitancy of participants who were exposed to low descriptive norm information (Study 3).

However, several studies showed that norm-based messages did not affect vaccination intentions. Sinclair and Agerström (2022) found that conveying a high descriptive norm of vaccination did not change vaccination intentions compared to no message control among young adults in the United Kingdom. Also, adding national vaccine uptake rate to messages that communicated vaccine effectiveness and the vaccination rate necessary for herd immunity did not increase vaccination intentions among Latin American participants (Argote Tironi et al., 2021). Sasaki et al. (2022), with a Japanese sample, found that communicating a high descriptive norm of vaccination increased vaccination intentions of older adults but the message did not change the intentions of young adults.

The researchers' explanation for the lack of social norm influence alluded to the idea that motivations underlying norm conformity may determine whether individuals comply with social norms after exposure to norm information. First, evaluation of health risks may motivate norm conformity. Sasaki et al. (2022) and Sinclair and Agerström (2022) found the influence of social norm information on older adults, but not on young adults. They explained that young adults might face lower risk for severe illness from COVID-19 compared to older adults. Young adults, therefore, were less successfully persuaded to receive a vaccine because they were less motivated to avoid severe health risks. In additional analysis, Sasaki et al. (2022) found that young adults with high perceived risk of severe disease had higher vaccination intentions after exposure to descriptive norm information, which supported the explanation. Second, the expected social award may motivate norm conformity. Argote Tironi et al. (2021) found that vaccination intentions increased when participants were informed that the national vaccine acceptance rate exceeded the herd immunity requirement or that they would be respected by people in their community if they got vaccinated. That is, encouraging individuals to believe that vaccination would make them part of a successful collective effort or earn the social approval of others increased vaccination intentions (Argote Tironi et al., 2021).

These research findings and explanations may imply that, although communicating social norms effectively increases COVID-19 vaccination intention in most cases, appealing to the motivations underlying norm conformity may enhance the persuasiveness of norm-based messages. Perhaps as suggested by French et al. (2020), persuasion efforts should focus on appealing to motivations to encourage vaccination behavior, rather than focusing on factual or probabilistic messaging. Following this line of thinking, this study aimed to understand norm

conformity motivations and design persuasive messages that appeal to such motivations to increase COVID-19 booster uptake.

Chapter 3 Social Norms and Norm Conformity Motivations

Defining Social Norms

Research on normative influence on behaviors starts from the social psychology area (Asch, 1951; Pepitone, 1976; Sherif, 1936). The notion of social norms was then developed and integrated into behavioral change theories by social psychologists (e.g., Cialdini et al., 1990, Fishbein & Ajzen, 1975), communication scholars (e.g., Lapinski & Rimal, 2005; Rimal & Lapinski, 2015), and economists (e.g., Young, 2015). In the meantime, social norms were adopted by the public health field to guide health behavior change (e.g., Berkowitz, 2004; Perkins, 2003). The conceptualization of social norms overlaps in these fields (Chung & Rimal, 2016).

Researchers from the social psychology field made the initial attempt to conceptualize social norms. Sherif (1936), in his classic work on normative influence, defined social norms as a social frame of judgment. Sherif found that when it was unclear what judgment was correct, people formed a shared judgment and perception as a group, and each of them adjusted their judgment and perception to the social frame. Asch's (1951) experiment further found that individuals felt compelled to yield to a seemingly incorrect majority judgment. The two studies revealed two forces underlying the influence of social norms: individuals yield to the majority either because the majority's choice implies what choice may be correct in an uncertain situation or because the majority makes individuals feel the pressure to comply. Deutsch and Gerard (1955) then defined the two types of social influence as informative social influence, which refers to the tendency to see others' judgment as evidence of reality, and normative influence, which refers to the pressure to conform with the expectation of others. The former is descriptive and the latter is prescriptive (Shaffer, 1983). Cialdini et al. (1990) named the two distinctive

types of social influence *descriptive norms*, which refer to what behaviors are prevalent, typical, or normal, and *injunctive norms*, which refer to what behaviors are expected and approved by others.

Building upon the conceptualization of descriptive and injunctive norms, communication scholars further differentiated perceived and collective norms. Social norms exist at the societal level (i.e., collective norms) and the individual level (i.e., perceived norms; Lapinski & Rimal, 2005; Rimal & Lapinski, 2015). *Collective norms* are “prevailing codes of conduct that either prescribe or proscribe behaviors that members of a group can enact” (Lapinski & Rimal, 2005, p. 129). In other words, collective norms represent what behaviors or beliefs actually prevail (i.e., collective descriptive norms) or are (dis)approved (i.e., collective injunctive norms) in a group, community, or society. *Perceived norms* refer to one’s perception of what prevails (i.e., perceived descriptive norms) or are (dis)approved (i.e., perceived injunctive norms) in a group, community, or society (Lapinski & Rimal, 2005).

Social Norm Influence on Health Behavior and the Social Norm Approach

Both the theory of planned behavior (TPB; Ajzen, 1991) and the theory of normative social behavior (TNSB; Rimal & Real, 2005) predict the influence of perceived norms on behavioral intentions. TPB (Ajzen, 1991) posits that subjective norms, attitudes and perceived behavioral control predict behavioral intentions. Many meta-analyses consistently showed that perceived norms were positively related to behavioral intentions (e.g., Manning, 2009; Rivas & Sheeran, 2003; Rich et al., 2015; Topa & Moriano, 2010; Xiao & Wong, 2020). Most of the studies included in the meta-analyses were about health behaviors, including vaccination (Xiao & Wong, 2020).

In addition, TNSB (Rimal & Real, 2005) posits that perceived descriptive norms are the primary driver of normative influence. And perceived injunctive norms exert influence by enhancing the effect of perceived descriptive norms on behavioral intentions. Many studies that tested TNSB found the positive effect of perceived descriptive norms on behavioral intentions in various health contexts (Basaran et al., 2019; Chung & Lapinski, 2019; Carter et al., 2021; Geber et al., 2019; Jain et al., 2018; Jain & Humienny, 2020; Lee et al., 2021; Rimal & Yilma, 2021; Villalobos et al., 2021). Although these studies hypothesized and tested perceived injunctive norms as a moderator in the relationship between perceived descriptive norms and behavioral intentions, many of them also found significant positive relationships between perceived injunctive norms and behavioral intentions (Cheng et al., 2021; Carter et al., 2021; Geber et al., 2019; Jain et al., 2018; Lee et al., 2021; Varava, 2019; Villalobos et al., 2021).

The influence of perceived norms on behavioral intention and the discrepancy between perceived and collective norms form the basis of the social norm approach to health behavior change (Berkowitz, 2004; Perkins & Berkowitz, 1983). Because perceived norms are based on individuals' subjective perceptions, they may or may not correctly reflect collective norms (Berkowitz, 2004; Lapinski & Rimal, 2005). When perceived norms of health behaviors are lower than collective norms or when perceived norms of unhealthy behaviors are higher than collective norms, conveying collective norms through messages can modify perceived norms and, in turn, change behavioral intentions (Berkowitz, 2004; Perkins & Berkowitz, 1983). The social norm approach has been widely adopted in the health communication area. A meta-analysis showed that messages manipulating descriptive norms effectively changed health attitudes and behavioral intentions, and messages manipulating injunctive norms effectively changed actual health behaviors (Rhodes et al., 2020). The summary in Chapter 2 also showed

that the social norm approach effectively increased the intentions of COVID-19 vaccination. These findings provided evidence of the influence of social norms on individuals' health behavior decisions.

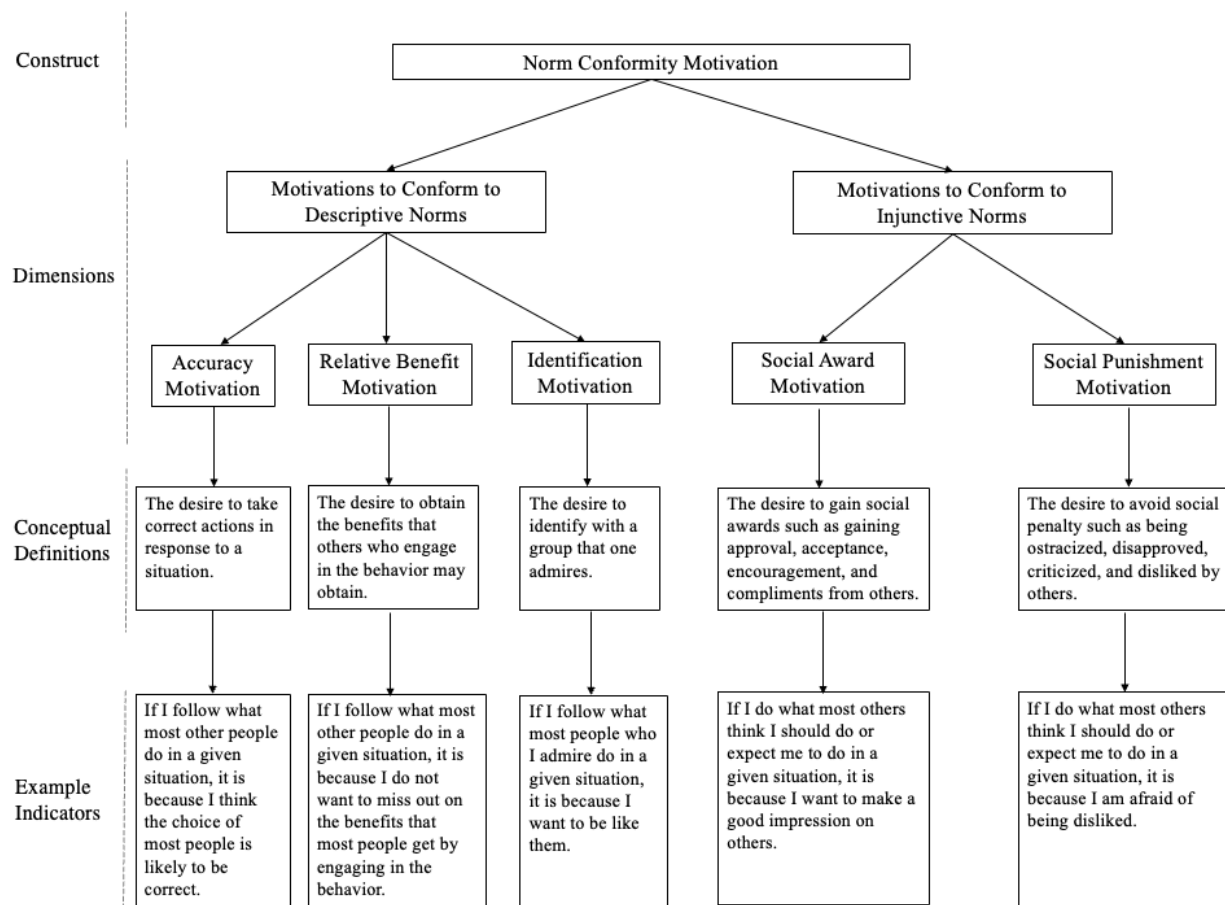
Concept Explication of Norm Conformity Motivation

Conformity to social norms (i.e., the act of changing one's behavior to be consistent with others' behaviors or opinions; Cialdini & Goldstein, 2004) is motivated by the desire to obtain (avoid) expected material and psychological benefits (cost) of norm (non)conformity behaviors (Farrow et al. 2017; Falk & Scholz, 2018; Gavrillets, 2020; Stallen et al., 2013; Young, 2015). The motivational force of anticipated benefits and costs on normative influence received support from neuroscience, social psychology, and behavioral economics. Neuroscience evidence has shown that the processing of material and reputational rewards and costs in human neural systems played an important role in norm conformity (Buckholtz, 2015; Colombo, 2014; Falk & Scholz, 2018; Stallen et al., 2013). In the social psychology area, Melnyk et al. (2019) conducted a meta-analysis of social norms influence on consumer decision making. The result showed that studies that specified (vs. not specified) the costs of norm nonconformity in the measure of perceived descriptive and injunctive norms found a stronger effect of perceived norms on behaviors. Also, a number of studies and theories in behavioral economics also posited that individuals make decisions on norm conformity based on the cost-benefit evaluation (see Farrow et al., 2017; Young, 2015). The costs and benefits can be material (e.g., losing the monetary benefits that most other people obtain) or psychological (e.g., being accepted by others who support the norm; Farrow et al. 2017). Therefore, *norm conformity motivations* in this study refer to the desire to obtain (avoid) expected material and psychological benefits (costs) of (non)conformity to social norms.

Multiple norm conformity motivations underly the process of social norm influence on behaviors. The literature suggested that different motivations drive conformity to descriptive and injunctive norms (Figure 1). Based on a review of the literature, this study identified three motivations that drive conformity to descriptive norms, namely accuracy motivation, identification with admired group motivation, and relative benefit motivation, and two motivations that drive conformity to injunctive norms, namely social award motivation and social punishment motivation.

Figure 1

An Illustration of the Dimensions and Example Indicators of Norm Conformity Motivations



Accuracy Motivation

Accuracy motivation refers to the desire to take correct actions in response to a situation (Deutsch & Gerard, 1955). When motivated by accuracy reasons, people often look to descriptive norms to accurately understand the social situation and respond effectively (Cialdini, 2001; Pool & Schwegler, 2007). This is because descriptive norms serve “an epistemic function” (Gelfand & Harrington, 2015, p. 1274). The fact that most other people choose to take a behavior provides information on what is the best course of action in the given situation (Anderson & Dunning, 2014; Deutsch & Gerard, 1955; Lapinski & Rimal, 2005; Mahmoud et al., 2014; Morris et al., 2015; Reid et al., 2010). When individuals follow the norm because they believe that what most other people do is likely to be most adaptive, appropriate, and successful, the accuracy motivation drives their norm conformity behaviors (Pool & Schwegler, 2007). The gate-way belief model (GBM), supported by many empirical studies (van der Linden, 2021), is also based on the idea that accuracy motivation drives descriptive norm conformity. GBM posits that, for individuals who misperceive the scientific consensus (e.g., perceiving that most scientists do not agree with human-caused climate change), messages conveying the actual percentage of scientists supporting a scientific position make salient the gap between actual scientific consensus and individuals’ misperceived scientific consensus. The gap elicits an accuracy motivation which drives individuals to update their beliefs about scientific consensus and agreement with scientists (van der Linden, 2021).

Although not directly tested, empirical evidence implied that accuracy motivation might drive conformity with descriptive norms. Zikmund-Fisher et al. (2011) found that cancer patients are likely to follow peer patients’ choices when making decisions on cancer treatment. They

explained that cancer patients were often unsure about the optimal cancer treatment option and had a strong need to make a correct decision because the decision was associated with various implications for survival and quality of life. In such a situation, following the descriptive norms of peer patients helped reduce uncertainty and fulfill the need for accuracy (Zikmund-Fisher et al., 2011).

Also, Lee (2015) found that binge drinkers with low (vs. high) value involvement were more influenced by social norm cues in anti-binge drinking Facebook posts, such that a large number of likes (vs. no likes) reduced intentions to engage in binge drinking. Lee explained that unlike binge drinkers with high issue involvement, binge drinkers with low issue involvement did not have a strong favorable attitude toward binge drinking and were more likely to be open-minded and seek out an accurate understanding of binge drinking behavior. The social norm cues in the anti-binge drinking Facebook post implied that binge drinking was likely to be an incorrect behavior. By following the norm, the motivation to reach an accurate attitude toward binge drinking was fulfilled (Lee, 2015).

In addition, Jain and Humienny (2020) and Huber et al. (2022) found that the effect of perceived descriptive norms on intentions to use prescription drugs without medical necessity was mediated by perceived outcome expectations for self. That is, individuals who had a high perceived descriptive norm of misusing prescription drugs thought that using prescription drugs for nonmedical purposes were more likely to bring a positive outcome to themselves (e.g., improves attention and performance) and less likely to bring negative outcomes to themselves (e.g., causes irregular heartbeat). And the beliefs about the benefits and costs increased their intentions to use prescription drugs without medical necessity. The findings reflected the role of

accuracy motivation such that descriptive norms motivated norm-consistent behaviors by implying that the behavior likely benefited individuals who engage in it.

Identification with Admired Group Motivation

Identification with admired group motivation (hereafter referred to as identification motivation) is the desire to identify with a group that one admires. Identification motivation shares the notion with self-related motivation proposed by Pool and Schwegler (2007) and the concept of aspiration in TNSB (Rimal & Real, 2005). Pool and Schwegler posited that self-related motivation encourages conformity to social norms because conforming to the norms of an admired group brings about a positive evaluation of oneself and makes one feel good. Similarly, TNSB posits that aspirational group identity moderates the effect of descriptive norms on behavioral intentions. That is, individuals are more influenced by the descriptive norms of the group they aspire to become (Rimal & Real, 2005). Therefore, individuals with stronger motivations to identify with the admirable referent group are more likely to follow the group norms.

This motivational process is also supported by social identity theory (Turner & Oakes, 1986). Social identity theory posits that self-concept partly derives from perceived membership in a social group (Turner & Oakes, 1986). Affiliation with an upward group increases self-esteem and enhances a positive self-concept (van den Borne et al., 1987; Taylor & Lobel, 1989). Because the boundary of a social group is defined by its distinctive group norms, identification with a social group is thus expressed through engaging in behaviors that are consistent with the group norms (Hogg, 2016; Morris et al., 2015). Therefore, by conforming to admired groups' norms, individuals can achieve the goal of affiliating with the group they admire and, therefore, maintaining a positive self-concept (Cialdini & Goldstein, 2004).

In addition to enhancing a positive self-concept, identification with an admired group by conforming to the group norms also brings social-cultural awards. Cross-cultural psychologists (Morris & Liu, 2015; Stephens & Townsend, 2015) posited that people would adhere to aspirational norms (i.e., the norm of the group that one aspires to be like) because emulating the successful group can bring about success, higher status in the eyes of others, and higher power in the society (Morris & Liu, 2015). Conformity to the norms of the aspirational group is a strategy that increases the mobility of individuals' social status (Morris & Liu, 2015).

Empirical evidence supported the driving force of identification with admired groups. In a focus group study, Groshong et al. (2017) found that celebrities, which is a group that participants admired, were identified as influential norm referents by participants that motivated them to use parks and engage in physical activities. It was also found that exposure to a descriptive social norm message had a stronger effect on intentions to eat vegetables and reduce junk food intake for individuals who reported that identification with the norm referent group was important to their self-concept (Higgs et al., 2019). Hoffman et al. (2016) found that wishful identification, which refers to “an individual’s desire to emulate mediated portrayals of individuals and reference groups” (p. 865), predicted alcohol consumption intentions.

Testing the moderation hypothesis in TNSB, it was also found that aspirations to identify with the referent group moderated the relationship between perceived descriptive norms and behavioral intentions such that individuals with a stronger aspiration were more influenced by perceived descriptive norms (Carcioppolo et al., 2017; Rimal & Real, 2005; Rimal, 2008). Experimental studies also supported the moderation hypothesis. Ji (2022) found that descriptive norm messages were more effective in changing intentions to drink alcohol for individuals who had stronger aspirations to identify with the norm referent group. Identification motivation may

drive conformity to the referent groups portrayed in media. In addition, Zhang (2017) found that a news article associating healthy eating behavior with an aspirational group (vs. a non-aspirational group) led to a higher likelihood of sharing the news article on Facebook, recommending the news article to family and friends, and ordering a vegetarian meal for the next lunch or dinner.

Relative Benefit Motivation

Relative benefit motivation refers to the desire to obtain the benefits that others who engage in the behavior may obtain. TNSB posits that perceived benefits to others enhance the influence of descriptive norms on behaviors; as individuals perceive that most other people obtain benefits by engaging in a behavior (i.e., descriptive norms of taking the behavior), they are more likely to follow the descriptive norms because they are afraid of missing the opportunity to gain the benefits that most others who engage in the behavior would obtain. In this sense, benefits to others motivate norm conformity by indicating the potential loss of not enacting the behavior (Rimal & Real, 2005; Carcioppolo et al., 2016).

Empirical evidence showed that the positive relationship between descriptive norms of drinking and intentions to drink was strengthened when perceived benefits to others increased (Padon et al., 2016). The interaction pattern showed that individuals were likely to drink the most alcohol when they believed that most others drank a lot of alcohol and that most others obtained benefits from drinking. According to TNSB, the explanation of the finding is that individuals are afraid of losing the benefits that most others obtain from drinking (Rimal & Real, 2005). In addition, Li et al. (2021) found that perceived norms of phubbing increased fear of missing out (i.e., the fear that others may have rewarding experiences from which one is absent) and, in turn, led to phubbing behaviors. Similarly, Riordan et al. (2015; 2021) found that during a college

orientation week, a time period associated with prevalent and excessive alcohol use, students with higher fear of missing out were more likely to report higher alcohol use. In the context of the COVID-19 pandemic, Yuen et al. (2022) found that perceived norms of product stockpiling were positively associated with the perceived scarcity of products, which in turn led to panic buying behaviors. These findings suggested that individuals conform to what most other people do, possibly because they do not want to miss the benefits that others obtain.

Social Award and Social Punishment Motivation

Injunctive norms motivate norm conformity behaviors by indicating social awards and social punishment (Cialdini & Goldstein, 2004; Deutsch & Gerard, 1955; Morris et al., 2015; Sugden, 2000). *Social award motivation* refers to the desire to gain social awards such as approval, acceptance, encouragement, and compliments from others (Cialdini & Goldstein, 2004; Legros & Cislighi, 2020). Similarly, *social punishment motivation* refers to the desire to avoid social penalties such as being ostracized, disapproved, criticized, and disliked by others. The two motivations were noted by both economists (e.g., Brennan & Pettit, 2000; Sugden, 2000; Young, 2014) and social scientists (e.g., Cialdini & Goldstein, 2004; Deutsch & Gerard, 1955). From the perspective of behavioral economists, norm conformity is driven by evaluating the costs and benefits of norm conformity behaviors (Young, 2015). The anticipation of awards and punishment is part of individuals' evaluation of the costs and benefits of norm conformity behavior (Hsu & Chang, 2017; Legros & Cislighi, 2020). Because individuals tend to move towards gaining awards and avoiding punishment, norm conformity behaviors are motivated when there are social awards associated with conformity and social punishment associated with nonconformity (Hsu & Chang, 2017).

Social awards and punishment of norm conformity are often immaterial and anticipated. They are often reputational and social rather than monetary (Bénabou & Tirole, 2011; Brennan & Pettit, 2000). The awards can be esteem, respect, approval, and acceptance to a social group, and the punishment can be withdrawal of the rewards (Brennan & Pettit, 2000) or social disapproval, resentment from others, ostracism, loss of status, and other forms of social punishment (Sugden, 2000; Young, 2015). Also, because individuals cannot experience social awards or punishment before they undertake or reject to undertake norm conformity behaviors, it is often individuals' anticipation of social awards and punishment that motivates norm conformity behaviors (Farrow et al., 2017; Legros & Cislighi, 2020; Young, 2015).

Many empirical studies supported the motivational forces of social awards and punishment. For social award motivation, Read et al. (2003) and Wahesh et al. (2015) found that social reinforcement drinking motives (i.e., drinking for social awards) partially mediated the positive relationship between perceived norms and alcohol consumption in a sample of undergraduates. Also, Lee et al. (2007) found that injunctive norms increased actual alcohol consumption to a stronger extent for people who were high (vs. low) in social motives of drinking. Similarly, for social punishment motivation, Choi et al. (2016) found that injunctive norms motivated drinking frequency to a stronger extent for people who drank for conformity motives (i.e., drinking to avoid social rejection) than those who did not drink for conformity motives. Similarly, the positive effect of injunctive norms on intentions to exercise was significant only for people who were more fearful of negative evaluation (Latimer & Martin Ginis, 2005). There was also abundant empirical evidence in economics that supported the existence of the social disapproval motive of norm conformity (Festre, 2010).

Developing an Instrument for Norm Conformity Motivations

Although there are research efforts on understanding the motivations underlying norm conformity, there has not been a validated instrument to measure norm conformity motivations. The conformity dimension in the Drinking Motives Questionnaire (Cooper, 1994) touched on the social award motivation. The items stated that individuals choose to drink because they want to be liked, fit in the group, and avoid being left out. However, Cooper (1994) designed the instrument only for motivations to engage in drinking behaviors and only covered the social award dimension. Pool and Schwegler (2007) also attempted to develop an instrument for norm conformity motivations. However, the instrument had low validity and did not cover all the motivations identified in previous literature. Pool and Schwegler (2007) developed measures for accuracy motive, self-related motive, and other-related motive, which were conceptually the same as the above-discussed accuracy motivation, identification motivation, and social award and punishment motivation. The relative benefit motivation, however, was missing in the instrument. In addition, Pool and Schwegler (2007) measured the other-related motive with the items adapted from the TPB measure of subjective norms (Ajzen, 1991). The items (e.g., most people who are important to me think I should [the behavior]) reflected perceived injunctive norms rather than the social award and punishment motivations. Also, the validity of the instrument was not formally evaluated.

Developing an instrument for norm conformity motivations is necessary for social norms research and norm-based health communication practice. First, researchers can empirically and quantitatively examine the mechanism through which social norms influence behaviors with a measurement tool. Second, a measurement tool allows researchers to probe if and how individual differences in norm conformity motivations would lead to differential normative influence on behaviors. Lastly, health communication practitioners can use the measurement tool to

understand targeted audiences' norm conformity motivations and tailor norm-based messages to enhance health-related persuasion outcomes. Pilot study 1 of the dissertation project was dedicated to developing and validating such an instrument.

Chapter 4 Appeal to Norm Conformity Motivations in Norm-based Persuasion Messages

Adding Motivation Appeals to Norm-based Messages

Current norm-based messages often include a sentence stating the descriptive or injunctive norms of a behavior. For example, a norm-based message advocating for COVID-19 vaccination may present descriptive norms with “Recent data indicates that 80% of people in your country currently say they would get vaccinated against COVID-19.” (Argote Tironi et al., 2021) or may present injunctive norms with “Recent data indicates that 80% of people in your country say they think everyone should get vaccinated against COVID-19.” Social norm approach campaigns utilizing these messages directly affect message recipients’ perceived norms (Berkowitz, 2004; Mabry & Mackert, 2014; Perkins & Berkowitz, 1983). However, these messages do not provide reasons why individuals should follow the norms. In other words, they do not clearly specify the aforementioned psychological or material benefits or costs that motivate norm conformity. This study brought up and tested the proposition: appealing to norm conformity motivations by linking norm (non)conformity with the benefits or costs related to norm conformity motivations (e.g., presenting that conformity to injunctive norms will bring social award and reduce social punishment) increases the persuasiveness of norm-based messages. That is, norm-based messages with motivation appeals are more persuasive than norm-based messages without motivation appeals. Hereafter, *norm-based messages* refer to messages that present only social norm information. *Norm-based messages with motivation appeals* refer to messages that present both social norm information and norm conformity motivation appeals.

Researchers emphasized that evaluating the benefits and costs of norm (non)conformity determines norm conformity decisions. Miller and Prentice (2015) argued that the success of

norm-based messages relies on establishing a link between an accepted value and the behavior. Without the basis that taking the behavior brings values one or others care about, norm-based messages will not be persuasive because message recipients will not attach any significance to the majority behaviors or opinions (Miller & Prentice, 2015). For example, suppose individuals do not link drinking bottled water with an environmental cost. In that case, they are unlikely to be persuaded by messages presenting the descriptive norms of refusing bottled water because they do not see any value attached to the prevalent behavior (Miller & Prentice, 2015; van der Linder, 2015).

Similarly, Folk and Scholz (2018) argued that although persuasive message recipients may engage in various thought processes about the message and the focal behavior, the process of valuation, which involves weighing perceived costs and benefits, acts as a common pathway that determines whether individuals are influenced by the persuasion message or not. Neural evidence has shown that the valuation process plays a key role in conformity to social norms. When making a behavioral decision of conforming to norms or not, people tend to maximize the value they expect from their actions (Buckholtz, 2015; Colombo, 2014; Folk & Scholz, 2018). In this sense, including information about the benefits and costs of norm conformity in norm-based messages will increase the evaluation of benefits of norm conformity and the evaluation of the costs of norm nonconformity and, in turn, encourage norm-consistent behaviors.

Several studies showed that adding arguments about the benefits or costs of norm conformity behaviors increased the persuasiveness of norm-based messages. Koh (2019) found that descriptive norm messages stating the anticipated social award (i.e., including the text “Your family will be proud of you if you recycle” and relevant visual cues) led to stronger behavioral intentions of recycling compared to messages that only conveyed descriptive norms. Do et al.

(2021) coined the persuasion strategy “normative framing” which refers to adding gain or loss-framed information to norm-based messages. They found that, compared to messages that presented only descriptive norms, messages that presented both descriptive norms and environmental benefits of reusing towels had a stronger effect on intentions to reuse towels. In addition, van der Linden (2015) found that combining peer descriptive norms and arguments about the environmental costs of bottled water decreased students’ intentions to consume bottled water. Neither descriptive norm information nor arguments about the costs by themselves significantly changed intentions to consume bottled water (van der Linden, 2015). Similarly, a study on saving behavior found that messages presenting both descriptive norms and the benefits of saving led to more favorable attitudes toward saving behavior compared to messages that presented only descriptive norms or only benefits of saving (Yoon et al., 2016).

The findings suggested that norm-based messages were more persuasive if they presented that norm conformity behaviors brought social award (i.e., other people would be proud of you; Koh, 2019) or that norm conformity behaviors were correct and beneficial (i.e., the behavior brought environmental or monetary benefits; Do et al., 2021; van der Linden, 2015; Yoon et al., 2016). These benefits are relevant to social award motivation and accuracy motivation defined in this study. Although these studies did not test messages that addressed the benefits and costs related to other norm conformity motivations identified in this study, it is likely that presenting the benefits or costs relevant to other norm conformity motivations (i.e., not missing the benefits that other people obtain, being able to identify with an admired group, and getting social punishment) also increases the persuasiveness of norm-based messages.

It could be argued that benefits and costs are already implied in norm-based messages and that norm-based messages influence behaviors without presenting the benefits and costs.

However, because norm conformity is ultimately driven by the evaluation of the benefits and costs of norm (non)conformity behaviors (Farrow et al., 2017; Stallen et al., 2013; Young, 2015), the influence of norm-based messages on behaviors largely relies on message recipients inferring norm (non)conformity outcomes when the outcomes are not stated in norm-based messages. In other words, based on the social norm information provided by the message and message recipients' prior knowledge, message recipients need to infer that norm (non)conformity brings benefits or costs. And then, the evaluation of the inferred costs and benefits motivate norm conformity behaviors (Farrow et al., 2017; Stallen et al., 2013; Young, 2015). However, the inferring process needs cognitive deliberation, which may not always occur when individuals are exposed to norm-based messages.

Cognitive deliberation may be necessary for social norms to influence attitudes and behaviors because deliberation increases the salience of the reasons to conform to social norms and therefore increases favorable attitudes (Chaiken et al., 1989; Melnyk et al., 2011). Melnyk et al. (2011) found that the influence of descriptive norm information on attitudes and intentions toward purchasing a product was higher when consumers were asked to deliberate on the message or when consumers were not given any instructions that might influence their cognitive deliberation level compared to when they were under cognitive load. The influence was mediated by fewer negative thoughts about the purchasing behavior (Melnyk et al., 2011).

Injunctive norm messages may need more deliberation than descriptive norm messages because they involve considerations about others' expectations, social desirability, and reputation (Cialdini, 2003; Hong, 2021; Manning, 2009; Morris et al., 2015). In the same study, Melnyk et al. (2011) found that consumers who were not given any instructions that might influence their cognitive deliberation level had more favorable attitudes toward the product and higher purchase

intentions than those under cognitive load. The influence was mediated by more positive thoughts about the purchasing behavior (Melnik et al., 2011). In addition, DeBono et al. (2011) found that individuals depleted of self-control, which led to limited cognitive resources (Pohl et al., 2013), were more likely to cheat and behave rudely than those whose self-control was not depleted. Similarly, Boonmanunt et al. (2020) found that presenting injunctive norm information effectively reduced cheating only for people who were not financially constrained. It was because financial constraints limited individuals' cognitive resources to digest the social norm information and react to it. A meta-analysis of neuroscience evidence also showed that deliberation and cognitive control played an important role in conforming to the norms of fairness (Feng et al., 2015). In sum, studies suggest that social norm influence on attitudes and behavioral intentions requires message recipients to engage in deliberation and may also need to generate positive/negative thoughts about norm conformity behaviors during the deliberation.

However, due to individuals' limited information processing capacity (Lang, 2000), message recipients may not always have the cognitive resources to deliberate on norm-based messages and infer the benefits and costs of norm conformity behaviors. It is especially the case when it comes to using social media and mobile phones to obtain health information during the COVID-19 pandemic. Studies showed that users tended to scroll through content quickly and spent less time on the content when viewing social media news on mobile phones (Keib, 2021; Molyneux, 2018). In addition, the ambiguity, complexity, and inconsistency of health information during the COVID-19 pandemic might lead to information overload, which was associated with the tendency toward greater heuristic processing and less systematic processing of information encountered (Hong & Kim, 2020). Therefore, it is unlikely to assume that all individuals always deliberate on COVID-19 related norm-based messages encountered on social

media and infer the benefits and costs associated with norm (un)conformity. With this in mind, stating the benefits and costs of norm (non)conformity in norm-based messages about COVID-19 vaccination ensures that the reasons for conformity are clearly communicated and considered in message recipients' valuation process and therefore increase message persuasiveness.

This proposition echoes recent researchers' reflections on designing norm-based messages to encourage healthy and prosocial behaviors. Gavrillets (2020) argued that decisions of (non)conforming to injunctive norms are based on the number of material benefits of (non)conformity (e.g., time saved by crossing against the red light) and the product of the reputational costs of (non)conformity and the number of people who disapprove. Gavrillets (2020) suggested that providing information that influences the anticipated material benefits, the anticipated reputational costs, or the number of people who disapprove should increase injunctive norm conformity. In other words, injunctive norm messages that highlight the reputational benefits or costs of (non)conformity and the number of people who disapprove should increase norm conformity behaviors. White et al. (2019), in their SHIFT framework of encouraging consumers' sustainable behaviors, also proposed that messages communicating the prevalence of sustainable actions may be more persuasive if the messages also stated the effectiveness of the collective action.

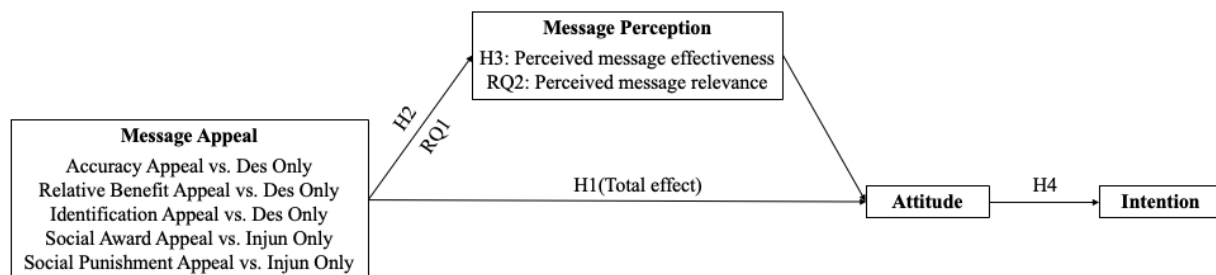
Similarly, based on TNSB (Rimal & Real, 2005), Mabry and Mackert (2014) proposed that mass-mediated message effect on behaviors through normative influence occurs through two pathways. On the one hand, messages influence perceived descriptive norms and therefore change behaviors. On the other hand, messages enhance norm conformity by influencing the cognitive moderators in the relationship between descriptive norms and behavioral intentions proposed in TNSB. These moderators, including the perceived benefits to oneself and others,

anticipated social award of the behavior, and similarity and aspirational identification with the referent group (Rimal & Real, 2005), are closely related to the norm conformity motivations mentioned in Chapter 3. French et al. (2020) also pointed out that persuasion efforts should appeal to the motivations behind the norm conformity behaviors rather than focusing on communicating only factual or probabilistic information. Based on these theoretical arguments, this study tested the idea that appealing to norm conformity motivations by presenting the benefits or costs of norm (non)conformity may enhance the persuasiveness of norm-based messages. Therefore, this study tested the following hypothesis (see Figure 2 for the full model):

H1: Compared to norm-based messages that present only social norm information of COVID-19 boosters, norm-based messages with motivation appeals (i.e., accuracy appeal [H1a], relative benefit appeal [H1b], identification appeal [H1c], social award appeal [H1d], and social punishment appeal [H1e]) will lead to more favorable attitudes toward getting a COVID-19 booster.

Figure 2

Proposed Mediation Model



Perceived Message Effectiveness as a Mediator

Perceived message effectiveness refers to the extent to which a message recipient believes that the message will affect them in ways that align with the message objectives (Yzer et al., 2015). Studies showed that messages communicating the benefits or costs of a behavior led to higher perceived message effectiveness. Yoon et al. (2016) found that messages presenting both descriptive norms and benefits of saving led to higher perceived effectiveness and more favorable attitudes towards the ad compared to messages that presented only descriptive norms or the benefits information. Food labels with warnings of nutrient concerns received higher perceived message effectiveness ratings compared to labels without the warnings (Taillie et al., 2020). In another study about healthy eating, Grummon et al. (2019) found that messages communicating the negative health effect of added sugar were rated as more effective than messages that did not include any health effect statements. Studies on smoking cessation also yielded similar findings. Tripp et al. (2021) found that messages communicating the gain or loss of health outcomes related to smoking received higher perceived message effectiveness ratings compared to the control message (i.e., a message about television use). Noar et al. (2018) found that messages that included information on the health effects of smoking received higher effectiveness ratings than messages that communicated only the constituents of cigarettes. Similarly, Grummon et al. (2022) found that messages stating the harms of smoking had higher scores on perceived message effectiveness than messages that presented generic descriptions about cigarette and e-cigarette products. Based on these findings, it is likely that adding statements about the benefits or costs related to norm conformity motivations should also increase perceived message effectiveness.

Many studies supported the association between perceived message effectiveness and actual persuasion outcomes (e.g., Alvaro et al., 2013; Dillard et al., 2007; Davis et al., 2016;

Noar et al., 2020; Zhao et al., 2022). For example, Dillard et al. (2007a), with five experiments testing fear appeal campaign messages and public service announcements (PSAs) about various topics, found that perceived message effectiveness was an antecedent of actual message effectiveness, including attitudes and behavioral intentions. In a meta-analysis of 40 studies, Dillard et al. (2007b) found a significant positive correlation between perceived message effectiveness and attitudes. In addition, a recent meta-analysis of six longitudinal studies about anti-smoking campaigns also found that perceived message effectiveness predicted intentions and behaviors of smoking cessation (Noar et al., 2020).

These findings suggested that messages presenting (vs. not presenting) the benefits or costs of norm conformity behaviors increased perceived message effectiveness. The perceived message effectiveness is positively related to message persuasion outcomes such as attitudes. Therefore, this study tested the following hypotheses:

H2: Compared to norm-based messages, norm-based messages with motivation appeals (i.e., accuracy appeal [H2-1], relative benefit appeal [H2-2], identification appeal [H2-3], social award appeal [H2-4], and social punishment appeal [H2-5]) will be perceived more effective in promoting a COVID-19 booster.

H3: The effect of motivation appeals on attitudes will be mediated by perceived message effectiveness. Specifically, motivation appeals will increase perceived message effectiveness, and in turn, perceived message effectiveness will be positively associated with attitudes.

Perceived Message Relevance as a Mediator

Perceived message relevance refers to the extent to which message recipients think the message content is relevant to their cognitive and affective needs (Varnali, 2014). Previous studies found that perceived message relevance was associated with actual persuasion outcomes,

including attitudes and behavioral intentions. In the health context, perceived message relevance was found positively related to higher self-determined motivation to quit smoking (Altendorf et al., 2020), engagement with the subsequent Web-based smoking cessation program (Streicher et al., 2008), and intentions to screen for Colorectal cancer (Neil et al., 2022) and breast cancer (Jensen et al., 2012). Hullet (2002) and Keating (2020) also found that perceived message relevance was positively related to attitudes toward water conservation through increasing perceived message quality. Studies in advertising also found that people who perceived ads as more relevant to themselves had a more positive attitude toward the brand and were more likely to buy the products (Rettie et al., 2005; O'Reilly et al., 2016; Varnali, 2014).

However, it is unclear whether or not presenting the benefits or costs of a behavior increases perceived message relevance. Roser (1990) argued that individuals pay more attention to messages with more personal importance, and the increased attention may relate to higher perceived message relevance. It was found that messages describing short-term (vs. long-term) health effects of smoking were perceived as more relevant to message recipients because short-term effect had more psychological value and was weighed more in behavioral decision making (Zhao & Peterson, 2016). Including motivation appeals in norm-based messages may also increase the personal importance of the behavior and lead to higher perceived message relevance because the message explains what benefits or costs one would get from norm (non)conformity behaviors. However, this hypothesis was not widely tested in previous studies. Therefore, this study asked the research questions:

RQ1: Compared to norm-based messages, will norm-based messages with motivation appeals (i.e., accuracy appeal [RQ1-1], relative benefit appeal [RQ1-2], identification appeal

[RQ1-3], social award appeal [RQ1-4], and social punishment appeal [RQ1-5]) be perceived more relevant to message recipients?

RQ2: Will perceived message relevance mediate the effect of motivation appeals on attitudes?

Attitude as an Antecedent of Behavioral Intention

TPB posits that attitude is one of the antecedents of behavioral intention (Ajzen, 1991). The relationship has been supported by numerous empirical studies about vaccination, especially in the COVID-19 context (e.g., Chu & Liu, 2021; Drażkowski & Trepanowski, 2021; Husain et al., 2021; Knobel et al., 2021; Thaker & Ganchoudhuri, 2021). Therefore, the theoretical model predicted a positive relationship between attitudes and behavioral intentions of getting a COVID-19 booster.

H4: Attitudes toward getting a COVID-19 booster will be positively related to behavioral intentions of getting a COVID-19 booster.

Matching Motivational Appeal with Individual Factors

Message Matching Enhances Persuasion Effect

Personalized message matching refers to matching some aspects of the communication, such as content and source, with some aspects of the recipients, such as goals, motivational orientations, attitude functions, and personality (Teeny et al., 2021). Matching (vs. nonmatching) enhances the effect of a persuasive appeal (Teeny et al., 2021). An underlying assumption regarding matching effects is that a targeted message recipient's characteristic reflects a motivational tendency (Rothman et al., 2020). Individuals vary in their motivational tendency such that they vary in the degree to which they feel motivated to pursue or avoid an outcome (Rothman et al., 2020). Therefore, a match between content and recipients' characteristics is

created when the message presents outcomes that the recipients are motivated to pursue or avoid. O'Keefe (2013) also posited a similar idea: consequence-based arguments are more persuasive when message recipients find the presented consequences of the advocated behavior more desirable.

For example, matching message content and goals and motivational orientations yielded better persuasion outcomes because the messages emphasize the desired endpoints individuals value most (Teeny et al., 2021). In a study that examined the persuasion effect of matching advertisement content and recipients' shopping goals, Klein and Melnyk (2016) found that individuals who usually shop for utilitarian (vs. hedonic) goals were more persuaded by an advertisement that emphasized the utilitarian (vs. hedonic) benefits of the product. Also, in the many studies that examined the persuasion effect of matching message framing and recipients' regulatory focus (e.g., Cesario et al., 2013; Kim, 2006; Lee & Aaker, 2004), messages that presented the gain of taking a behavior were most persuasive for promotion-focused individuals and messages that presented the loss of taking a behavior were most persuasive for prevention-focused individuals. It is because promotion-focused individuals were concerned more with advancing their growth, and prevention-focused individuals were concerned more with safety and security needs (Higgins, 2000).

Similarly, matching message content with attitude functions yielded better persuasion outcomes because the matched messages presented that engaging in the behavior fulfills the needs underlying one's attitude (Teeny et al., 2021). The functional approach of attitude posits that attitudes have different motivation basis, including social-adjustive, ego defense, value expression, and knowledge (Katz, 1960). For example, the motivation basis of a positive attitude toward volunteering may be to gain prestige in a group (i.e., social-adjustive function) or to learn

new knowledge (i.e., knowledge function; Clary et al., 1994). Many studies found that matching message content with attitude functions by presenting that engaging in the behavior fulfills the needs underlying one's attitude led to more favorable message perceptions, attitudes, and message-consistent behaviors (e.g., Carpenter, 2012; Lavine & Snyder, 1996; Lienemann & Siegel, 2018; Prentice, 1987; Snyder & Debono, 1985; Lavine & Snyder, 2000). For example, for individuals who were concerned with the object-appraisal attitude function (i.e., attitudes help maximize rewards and minimize cost), public service announcements focusing on how seeking help for depression could help achieve personal goals led to more favorable attitudes and intentions to seek for help compared to control messages (Lienemann & Siegel, 2018). In addition, for individuals concerned with the social-adjustive attitude function (i.e., attitudes help maintain one's relationship), public service announcements focusing on how seeking help for depression could help maintain social relationships were more persuasive (Lienemann & Siegel, 2018).

The idea also applies to the cases when message content is matched with individual personalities related to a motivational tendency. For example, DeBono and Packer (1991) found that high self-monitoring individuals (i.e., people who care about the self-image they project to others) gave a higher rating to the quality of products after reading ads that emphasized the image benefits of the product (e.g., playing the music makes one popular at a party) compared to ads that emphasized the utility benefits of the product (e.g., the music is good). For another example, Hirsh et al. (2012) matched the content of a cell phone ad with recipients' personality: for extraversion-dominant recipients, the ad emphasized the phone's ability to "be where the excitement is"; for neuroticism-dominant recipients, the ad emphasized the phone's ability to

help them “stay safe and secure” (p. 579). They found that recipients who read the matched (vs. nonmatched) ads reported greater intentions to purchase the phone.

Message Perceptions Mediate the Effect of Message Matching

The persuasion effect of matching outcomes presented in the message and the outcomes that message recipients desire may be mediated by perceived message effectiveness and message relevance. Lavine and Snyder (1996, 2000) proposed that message matching influences attitudes through biasing message perceptions, which makes the matched message to be perceived as more persuasive than nonmatched messages. Several studies found that message matching influenced perceived message effectiveness or persuasiveness. Hirsh et al. (2012) found that ads matching (vs. not matching) product attributes with message recipients’ personality were rated more effective. Clary et al. (1994) found that individuals who read messages informing how volunteering could satisfy their self-relevant motivations judged the messages more persuasive. Specifically, individuals who indicated that gaining prestige at school is an important reason for volunteering rated messages presenting that volunteering would bring about prestige more persuasive. Lee et al. (2022a) found that individuals’ lesbian, bisexual, or queer (LBQ) identity affirmation was positively related to the perceived effectiveness of messages that discouraged e-cigarette use. The positive relationship was stronger for messages that linked resisting e-cigarettes with the LBQ group's pride than messages that emphasized the health risks of e-cigarettes. In addition, Jacks and Lancaster (2014) found that videos about exercise delivered with eager nonverbal cues were perceived as more effective by men (a more promotion-focused group). In contrast, videos delivered with vigilant nonverbal cues were perceived as more effective by women (a more prevention-focused group).

Another route that message matching enhances persuasion is by inducing the perceived relevance of the matched messages (Teeny et al., 2021). DeBono and Packer (1991) found that individuals perceived ads that matched their self-image concern or product utility concern as more relevant to themselves than nonmatched ads. Hullet (2002) found that messages that match (vs. not match) the content with the value that individuals cared about for the focal issue led to higher perceived message relevance. Specifically, the study found that students' attitudes toward having comprehensive exams were related to wealth and was unrelated to conformity value. In the subsequent experiment, Hullet (2002) found that the message reporting that students in universities with comprehensive exams tended to earn more money when they graduate received higher perceived relevance ratings than the message reporting that students in universities with comprehensive exams tended to have more camaraderie and got along with each other. In addition, Yoon and Ferle (2018) found that matching (vs. not matching) advertisement orientation (i.e., benefits for self vs. family) with individuals' cultural orientation (i.e., individualistic vs. collectivistic) led to higher perceived message relevance.

These studies suggest that the persuasion effect of matching message content (i.e., outcomes of a behavior) and message recipients' characteristics (i.e., motivational tendencies that indicate what outcomes message recipients desire) is mediated by perceived message effectiveness and relevance. The matching effect (i.e., a message is more persuasive when the outcomes of a behavior presented in the message match the outcomes that individuals value or desire) can also be applied to norm-based messages. The motivational appeal should be more persuasive when the benefits or costs presented in the message match the benefits or costs that the message recipients value or desire. Along this line of thinking, this study tested if matching norm-based message content (i.e., benefits or costs of norm (non)conformity behaviors) and

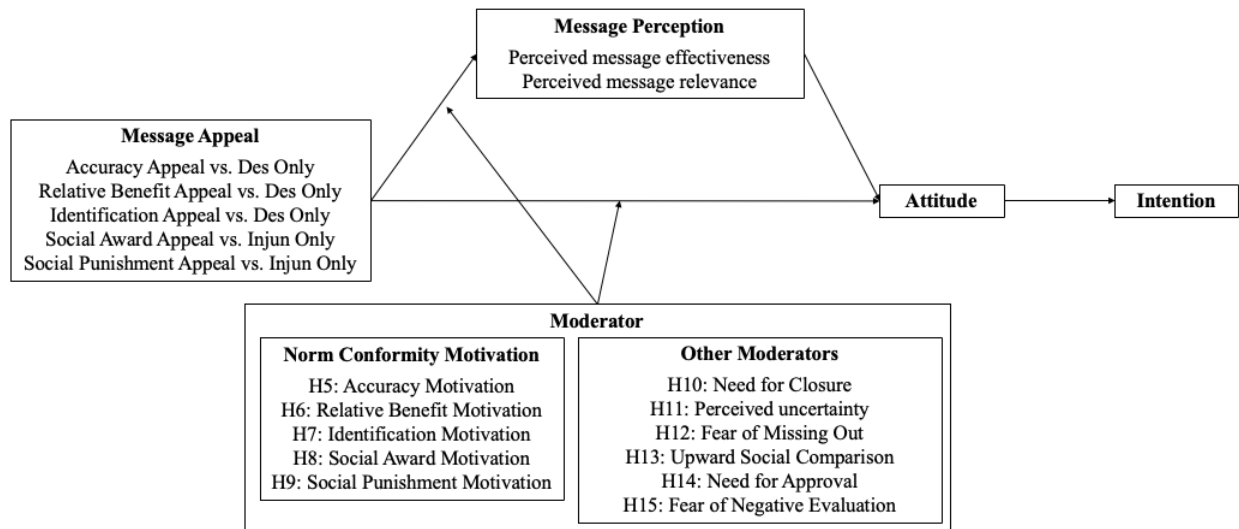
message recipients' characteristics (i.e., norm conformity motivations and personality traits) would enhance the persuasion effect through changing perceived message effectiveness and relevance.

Recipient Characteristics as Matching Factors

Norm Conformity Motivations. Different levels of norm conformity motivations, as defined in Chapter 2 as the desire to obtain or avoid expected material and psychological benefits or costs of norm (non)conformity behaviors, reflect the degree to which individuals value or desire certain benefits or costs. Therefore, the persuasiveness of messages presenting certain benefits or costs of norm (non)conformity will vary depending on the degree to which individuals are driven by the relevant motivations. For example, because individuals who are more driven by social award motivations have a higher desire to gain the social award, they will be more persuaded by social award motivation appeal messages (i.e., messages presenting that conformity to social norms brings about social awards) than individuals who are low in social award motivation. Considering that the persuasiveness of message matching is mediated by perceived message effectiveness and relevance, this study tested the following hypotheses (Figure 3).

Figure 3

Proposed Moderated Mediation Model



H5: Accuracy motivation will moderate the effect of accuracy motivation appeal on attitude (H5a), perceived message effectiveness (H5b), and perceived message relevance (H5c). The positive effect of accuracy motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for people with higher accuracy motivation.

H6: Identification motivation will moderate the effect of identification motivation appeal on attitude (H6a), perceived message effectiveness (H6b), and perceived message relevance (H6c). The positive effect of identification motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for people with higher identification motivation.

H7: Relative benefit motivation will moderate the effect of relative benefit motivation appeal on attitude (H7a), perceived message effectiveness (H7b), and perceived message relevance (H7c). The positive effect of relative benefit motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for people with higher relative benefit motivation.

H8: Social award motivation will moderate the effect of social award motivation appeal on attitude (H8a), perceived message effectiveness (H8b), and perceived message relevance (H8c). The positive effect of social award motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for people with higher social award motivation.

H9: Social punishment motivation will moderate the effect of social punishment motivation appeal on attitude (H9a), perceived message effectiveness (H9b), and perceived message relevance (H9c). The positive effect of social punishment motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for people with higher social punishment motivation.

Need for Closure and Perceived Uncertainty of Behavioral Choice. This study also tested if matching accuracy motivation appeal with individuals' need for closure and perceived uncertainty of behavioral choice would enhance the persuasion effect. *Need for closure* is defined as the desire to reduce ambiguity and arrive at a definite knowledge of an issue (Gelfand & Harrington, 2015; Kruglanski et al., 1993). Individuals with a high need for closure tend to arrive at a definite and correct decision with the least amount of information processing (Kruglanski & Webster, 1996). *Perceived uncertainty* refers to the self-perception of one's inability to decide on behavioral choice due to incomplete knowledge about the situation (Brashers, 2001; Han, 2013). When people are uncertain about what behaviors are most adaptive and efficient, the motivation to arrive at an accurate decision is more likely to be instigated (Pool & Schwegler, 2007).

Researchers proposed that need for closure and perceived uncertainty drive conformity to descriptive norms. Individuals in high need for closure are more likely to engage in descriptive

norm-consistent behaviors because descriptive norms serve the epistemic function of guiding behaviors and fulfill the need to arrive at a correct and definite decision (Gelfand & Harrington, 2015; Kruglanski et al., 2006). The hypothesis received support from empirical studies (Chao et al., 2010; Fu et al., 2007; Livi et al., 2015; Kruglanski et al., 2006). For example, Chao et al. (2010) found that individuals with higher need for closure were more likely to conform to the dominant group norms. Also, descriptive norms are more likely to exert influence on behaviors when uncertainty is high because individuals need to make a correct decision (Bell & Cox, 2015; Cialdini, 2001; Gelfand & Harrington, 2015; Raven & Rubin, 1976; Smith & Louis, 2010). Empirical studies supported the hypothesis (e.g., Kim et al., 2015; Smith et al., 2007). For example, Kim et al. (2015) found that the relationship between descriptive norms and intentions to follow the recommended behavior was stronger when the recommended behavior was more scientifically uncertain.

The motivation basis of need for closure and perceived uncertainty that drives descriptive norm conformity is similar to the accuracy motivation defined in this study. Similar to accuracy motivation, individuals with a higher need for closure and perceived uncertainty are more likely to conform to descriptive norms because they want to make a definite and correct behavioral decision. In line with message matching (Teeny et al., 2021), messages that appeal to accuracy motivation by presenting that norm conformity behavior is correct will be more persuasive for individuals with a higher need for closure and perceived uncertainty. Therefore, this study tested the hypotheses:

H10: Need for closure will moderate the effect of accuracy motivation appeal on attitude (H10a), perceived message effectiveness (H10b), and perceived message relevance (H10c). The

positive effect of accuracy motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for individuals with a higher need for closure.

H11: Perceived uncertainty of behavioral choice will moderate the effect of accuracy motivation appeal on attitude (H11a), perceived message effectiveness (H11b), and perceived message relevance (H11c). The positive effect of accuracy motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for individuals with higher perceived uncertainty of behavioral choice.

Upward Social Comparison. This study also tested if matching identification motivation appeal with upward social comparison would enhance the persuasion effect. *Upward social comparison* is defined as the tendency to compare themselves to someone they perceive to be superior (Butzer & Kuiper, 2006). Conformity to norms of an aspirational group is a process of behavior change with upward orientation (Morris & Liu, 2015). Research suggests that upward social comparison may enhance the influence of norms on behaviors because it induces the motivation to affiliate with the superior social group (i.e., identification motivation). Upward social comparison triggers feelings of envy and admiration (van de Ven et al., 2011; van de Ven, 2017). And both feelings led to motivations to affiliate with the upward group (van de Ven et al., 2011) and to adopt the behaviors of the admired group (Schindler et al., 2013).

Empirical studies showed that upward social comparison leads to behaviors consistent with the admired group norms. Maheno (2020) found that upward comparison with work norms was positively related to intentions to increase work input. Also, upward social comparison with others who were wealthier and had more possessions was related to stronger purchase intentions (Chan, 2008; Ogden & Venkat, 2001; Hu & Liu, 2020; Zheng et al., 2020). In the health context, Rheu et al. (2021) found that parents who engage in upward social comparison (i.e., see other

children with better eating and exercising practices on social media) perceived their children as more similar to the upward group and had higher intentions to engage in healthy parenting practices in the future. Upward social comparison with others who have better fitness performance was related to more favorable physical activity attitudes and more physical activity engagement (Kim, 2022). Similarly, for individuals who prefer upward social comparison, presenting that their friends had a higher average number of steps than themselves increased the individual's average number of steps over time. These findings show that upward social comparison enhanced the conformity with the norms of a superior group.

In this sense, individuals who are higher in upward social comparison are more likely to be motivated by identification motivation and see affiliation with the admired group as a more valuable outcome. Therefore, messages that appeal to identification motivation should be more persuasive for individuals who are high in upward social comparison.

H12: Upward social comparison will moderate the effect of identification motivation appeal on attitude (H12a), perceived message effectiveness (H12b), and perceived message relevance (H12c). The positive effect of identification motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for individuals with higher upward comparison.

Fear of Missing Out. This study also tested if matching relative benefit motivation appeal with fear of missing out would enhance the persuasion effect. *Fear of missing out* is “a pervasive apprehension that others might be having rewarding experiences from which one is absent” (Przybylski et al., 2013, p.1841). Fear of missing out is related to the tendency to stay continuously connected with others to see what others are doing because they do not want to miss out on rewarding experiences (Przybylski et al., 2013). A large portion of the research on

fear of missing out showed that fear of missing out was related to more social media and smartphone use and addiction and worse subjective well-being (e.g., Alt, 2015; Elhai et al., 2016; Fioravanti et al., 2021; Stead & Bibby, 2017). In the context of health behaviors, given the prevalence of college drinking, higher fear of missing out was associated with a larger quantity of alcohol consumption and experiencing more negative alcohol-related consequences among college students (Riordan et al., 2015; 2021). In the context of marketing, studies found that fear of missing out was positively related to herd consumption behaviors (i.e., following others' behaviors when buying a product; Kang et al., 2020), intentions to watch sports event that is popular among others (i.e., Kim et al., 2020), and bandwagon consumption of medical products during the COVID-19 pandemic (Zhang et al., 2021). These findings showed that individuals with higher fear of missing out are more likely to follow the behaviors that are prevalent in the population (i.e., descriptive norms).

Furthermore, marketing researchers proposed appealing to fear of missing out in persuasion messages: fear of missing out-laden appeal (i.e., mention the prevalence of a behavior and emphasize that one will miss out on the opportunity if they do not follow others' behaviors) will increase purchasing behaviors (Good & Hyman, 2020; Hodgkinson, 2019). Empirical studies showed that fear of missing out-laden appeals increased purchase intentions through emotional reactions such as anticipated regret and envy (Good & Hyman, 2020; Good & Hyman, 2021; Munawar et al., 2021).

In general, the literature on fear of missing out suggests that individuals with high fear of missing out are more sensitive to missing out on the benefits that most others obtain from a behavior. Therefore, they tend to follow what most others do to prevent the loss. Thus, people who are higher in fear of missing out will be more likely to be persuaded by relative benefit

motivation appeal messages that present the potential of losing the benefits that most others obtain.

H13: Fear of missing out will moderate the effect of relative benefit motivation appeal on attitude (H13a), perceived message effectiveness (H13b), and perceived message relevance (H13c). The positive effect of relative benefit motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for individuals with higher fear of missing out.

Need for Approval. The study examined if matching social award motivation appeal with need for approval would enhance the persuasion effect. *Need for approval* refers to the desire to obtain approval from others (Cramer, 2014). Though not directly tested, studies implied that individuals with a higher need for approval were more likely to follow what is generally approved by others. Studies found that individuals with a high need for approval were more likely to engage in helping behaviors when there was the presence of others (Denis et al., 2020; Satow, 1975), when situational cues implied the presence of others (van Rompay et al., 2009), and when social award was expected (Deutsch & Lamberti, 1986). In addition, Rudolph and Bohn (2013) found that need for approval was positively associated with engaging in prosocial behaviors and behaviors that peers accepted.

Because social award motivation appeal messages present that norm conformity brings about social awards such as compliments and respect, individuals with a higher need for approval will find social award argument more appealing, more relevant to their needs, and will be more likely to be persuaded by the argument.

H14: Need for approval will moderate the effect of social award motivation appeal on attitude (H14a), perceived message effectiveness (H14b), and perceived message relevance

(H14c). The positive effect of social award motivation appeal on attitude, perceived message effectiveness, and perceived message relevance will be stronger for individuals with a higher need for approval.

Fear of Negative Evaluation. The study also examined if matching social punishment motivation appeal with fear of negative evaluation would enhance the persuasion effect. Fear of negative evaluation is defined as the degree to which people are fearful of the possibility of being evaluated negatively (Leary, 1983). For individuals with higher fear of negative evaluation, injunctive norms had a greater influence on intentions of drinking alcohol (Schroeder & Prentice, 1998), exercising (Latinmer & Martin Ginis, 2008), and consuming fast food (Dunn et al., 2011). Injunctive norms also had a greater influence on intentions of alcohol and tobacco use among females high in social anxiety, a construct that includes fear of negative evaluation and social avoidance/distress (Zehe et al., 2013). Also, given that drinking alcohol was generally approved among college students (a high injunctive norm), Corcoran and Segrist (1993) found that fear of negative evaluation predicted choosing an alcoholic beverage (vs. a nonalcoholic one) when individuals believed that others would be aware of their choice.

Because negative social evaluation is an outcome that is more unpleasant for individuals with higher fear of negative evaluation, social punishment motivation appeal messages presenting that norm nonconformity will lead to negative social evaluation should be more persuasive for people with higher fear of negative evaluation.

H15: Fear of negative evaluation will moderate the effect of social punishment motivation appeal on attitude (H15a), perceived message effectiveness (H15b), and perceived message relevance (H15c). The positive effect of social punishment motivation appeal on attitude, perceived

message effectiveness, and perceived message relevance will be stronger for individuals with higher fear of negative evaluation.

Chapter 5 Pilot Study 1: Developing and Validating a Norm Conformity Motivation

Instrument

Pilot study 1 developed and assessed the validity and reliability of a norm conformity motivation instrument. The pilot study evaluated the reliability and three types of validity: Face validity refers to the degree to which the instrument on its face is relevant to the construct that it intends to measure and less so to other constructs; content validity refers to the degree to which the instrument covers the full meaning of the construct that it intends to measure; and construct validity includes convergent validity (i.e., the extent to which indicators of the same construct have high correlation) and discriminant validity (i.e., the extent to which two different constructs have low correlation; Allen, 2017).

Method

The researcher of this study developed five items for each motivation based on the conceptualization of norm conformity motivations and relevant items used in previous literature (Pool & Schwegler, 2007). The initial draft was submitted to the procedures described below to evaluate its validity.

Face Validity

Procedures. Participants read definitions and examples of each norm conformity motivation. They then examined the items developed for each motivation and evaluated if the items matched the corresponding motivation on a scale from 0% = not matching at all to 100% = a perfect match (Wang et al., 2012). After that, they wrote down suggestions for improving the writing clarity and relevance of the items to the corresponding motivations (Zickar, 2020).

Participants. To be eligible, participants must have been at least 18 years old and did not participate in any other studies of the dissertation project. Twenty participants from MTurk

completed the survey and received 2 dollars compensation. The sample size was larger than the sample size obtained in similar studies, for example, $N = 7$ in Ledbetter (2009). Two of the participants did not pass the attention check question. The final sample size was 18. The average age was 40.61 ($SD = 12.42$). In the sample, 94.4% were fully vaccinated against COVID-19, and 66.7% had got a booster shot. Table 1 shows other sample demographics.

Table 1

Demographics of Participants in Pilot Study 2 Face Validity Evaluation

	<i>N</i>	Percentage
Gender		
Women	11	61.1
Men	7	38.9
Race		
White	8	44.4
Asian	8	44.4
American Indian or Alaska American	2	11.1
Income		
Under \$49,999	11	61.1
\$50,000 to \$100,000	7	38.9
Marital Status		
Married	15	83.3
Widowed	1	5.6
Never married	1	5.6
Separated	1	5.6
Education		
College graduate	15	83.3
Postgraduate	3	16.7

Content Validity

Procedure. Content validity is often evaluated by consulting experts and conducting a thorough review of the literature to cover all properties and meanings of the concept (Allen, 2017). This study followed the procedure suggested by Almanasreh et al. (2019) to evaluate content validity. In this step, five expert judges who were PhD in communication were consulted

to assess content validity of the instrument. They rated each item on two statements using a scale ranged 1 (*not at all*) to 5 (*extremely*). The two items were “This item is relevant with [the name of the norm conformity motivation]” and “This item is representative of [the name of the norm conformity motivation]” (Almanasreh et al., 2019). The average score of the two item ratings was used as the indicator of item relevance/representativeness. Items with an average score higher than 3 are considered content valid (Almanasreh et al., 2019). The third item was related to the clarity of the item (i.e., “The meaning of the item is clear”). In addition, the expert judges provided suggestions on revising, deleting, or adding items. The items were revised based on the suggestions of the expert judges. The revised items were then used in the survey for construct validity evaluation.

Construct Validity and Reliability

Participants and Procedure. The number of participants was determined based on the number of items submitted to Confirmatory Factor Analysis (CFA, Nunnally & Bernstein, 1967). A widely accepted N:p ratio (i.e., the ratio of sample size to the number of measured indicators) is 10 cases per indicator (Nunnally & Bernstein, 1967, as cited in Kyriazos, 2018). The model included 23 measured items with 3–6 items for each motivation. The required sample size was $23 \times 10 = 230$. To be eligible, participants must be at least 18 years old and did not participate in any other studies of the dissertation project. A total of 269 participants from MTurk completed the survey and received 1.5 dollars compensation. The average age was 39.41 ($SD = 11.86$). In the sample, 84.4% were fully vaccinated against COVID-19, and 52.4% had got a booster shot. In the sample, 44.6% identified as women, 59.9% were White, and 69.5% were married. Table 2 shows other detailed sample demographics. After obtaining consent, participants answered a survey including the revised measurement of norm conformity motivations and demographics.

Table 2*Demographics of Participants in Pilot Study 2 Construct Validity Evaluation*

	<i>N</i>	Percentage
Gender		
Women	120	44.6
Men	148	55.0
Nonbinary	1	1.9
Race		
White	161	59.9
Black or African American	10	3.7
Asian	79	29.4
American Indian or Alaska American	5	1.9
Hispanic or Latinx	6	2.2
Multiple	8	3.0
Income		
Under \$49,999	162	60.2
\$50,000 to \$100,000	93	34.6
Above \$100,000	14	5.2
Marital Status		
Married	187	69.5
Widowed	2	0.7
Never married	58	21.6
Separated	4	1.5
Divorced	18	6.7
Education		
Less than 8 years	1	0.4
8 through 11 years	9	3.3
12 years or completed high school	18	6.7
Post high school training other than college	6	2.2
Some college	42	15.6
College graduate	159	59.1
Postgraduate	34	12.6

Result*Face Validity*

The results (Table 3) shows that the items received an average score between 74.7% and 84.5% on a scale from 0% (*not matching at all*) to 100% (*a perfect match of the question*). Items with a matching score lower than 80% were revised (Wang et al., 2012).

Table 3

Item Face Validity

Items	Item Match Score <i>M (SD)</i> in %
Accuracy Motivation	
Item 1: I will follow what most other people do because it is likely to be correct to do so if most people do it.	79.89(13.67)
Item 2: I will follow what most other people do because it is likely to be beneficial to do so if most people do it.	75.28(16.13)
Item 3: I will follow what most other people do because it is likely to be a wise choice if most people do it.	77.22(13.30)
Item 4: I will follow what most other people do because it is unlikely to be a bad thing if most people do it.	74.67(15.28)
Item 5: I will follow what most other people do because I want to make a correct decision on it.	76.17(14.96)
Relative Benefit Motivation	
Item 1: I will follow what most other people do because most people get benefits from doing so.	82.00(12.47)
Item 2: I will follow what most other people do because I do not want to miss the benefits that most people get.	82.41(14.21)
Item 3: I will follow what most other people do because I do not want to be the one who is denied the benefit that most people get.	84.53(12.17)
Item 4: I will follow what most other people do because I want to get the benefits that most people get.	80.67(16.48)
Item 5: I will follow what most other people do because I will lose the benefit that most others get if I do not do so.	74.22(17.36)
Identification Motivation	
Item 1: I will follow the choice of people who I admire because I want to be among them.	80.33(16.74)
Item 2: I will follow the choice of people I admire because I feel good to be among the ones I admire.	79.56(12.78)
Item 3: I will follow the choice of people I admire because it will make me feel that I am a member of those I admire.	80.39(12.18)

Item 4: I will follow the choice of people who I admire because it will make me feel good about myself.	79.39(11.24)
Item 5: I will follow the choice of people I admire because I want to be like those I admire.	84.39(12.26)
Social Award Motivation	
Item 1: I will do what most others expect me to do because I want to make a good impression on others.	79.11(11.55)
Item 2: I will do what most others expect me to do because I want others to think of me positively.	76.50(17.00)
Item 3: I will do what most others expect me to do because I want to get compliments from others.	80.06(13.03)
Item 4: I will do what most others expect me to do because I want to be liked.	80.78(10.35)
Item 5: I will do what most others expect me to do because I want to get along with others.	82.50(13.32)
Social Punishment Motivation	
Item 1: I will do what most others expect me to do because I am afraid of being disliked by others.	82.28(15.12)
Item 2: I will do what most others expect me to do because I do not want to be disapproved by others.	83.50(12.49)
Item 3: I will do what most others expect me to do because I am worried about making an unfavorable impression on others.	81.76(13.20)
Item 4: I will do what most others expect me to do because I am concerned with being judged by others.	79.17(16.69)
Item 5: I will do what most others expect me to do because I feel uncomfortable if people think about me negatively.	83.72(14.34)

Content Validity

The content validity index was calculated based on Almanasreh et al. (2019) and Polit and Beck (2006). Scale content validity index (*S-CVI*) indicates the content validity of an overall instrument (Polit & Beck, 2006). *S-CVI* was calculated for each motivation dimension and the whole instrument. An *S-CVI* of .80 or higher is acceptable (Polit & Beck, 2006). The result (see Table 4) showed that each motivation dimension and the whole instrument had good content validity.

Item content validity index (*I-CVI*) indicates the content validity index of a single item (Almanasreh et al., 2019; Polit & Beck, 2006). An item has an appropriate level of content

validity if the *I-CVI* is higher than .79; an item needs revision if the *I-CVI* is between .70 and .79; an item should be dropped if the *I-CVI* is less than 0.70 (Zamanzadeh et al., 2015). The result (see Table 4) showed that accuracy motivation items 2 and 4, identification item 4, and social award motivation item 5 should be dropped. Other items had an appropriate level of content validity.

The remaining items were revised based on suggestions from the expert judges. In addition, expert judges suggested two additional items, one for social award motivation and the other for social punishment motivation. The two items were added to the instrument and tested in the next stage of evaluating construct validity.

Table 4

Expert Judge Ratings on Content Validity

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number of agreements	<i>I-CVI</i> ¹
Accuracy Motivation							
Item 1	5	3.5	4.5	5	4	5	1
Item 2	4.75	1	2	5	4	3	.6
Item 3	5	3	4	5	4.5	4	.8
Item 4	5	1	2	5	4	3	.6
Item 5	5	5	5	5	5	5	1
Dimension <i>S-CVI</i> ² =							.80
Relative Benefit Motivation							
Item 1	5	5	5	5	5	5	1
Item 2	5	5	5	5	5	5	1
Item 3	5	3	3.5	5	5	4	.8
Item 4	5	5	5	5	5	5	1
Item 5	5	3	4	5	5	4	.8
Dimension <i>S-CVI</i> ² =							.92
Identification Motivation							
Item 1	4	5	5	5	5	5	1
Item 2	4	5	5	5	5	5	1
Item 3	4	5	5	5	5	5	1
Item 4	5	2.5	2	4	5	3	.6
Item 5	5	5	5	5	5	5	1
Dimension <i>S-CVI</i> ² =							.92
Social Award Motivation							
Item 1	5	5	5	5	5	5	1
Item 2	5	5	5	5	5	5	1
Item 3	5	5	5	5	5	5	1
Item 4	5	4	5	5	5	5	1
Item 5	5	2.5	2	5	5	3	.6
Dimension <i>S-CVI</i> ² =							.92

Social Punishment Motivation							
Item 1	5	5	5	5	5	5	1
Item 2	5	5	5	5	5	5	1
Item 3	5	3.5	5	5	5	5	1
Item 4	5	3.5	3.5	4	5	5	1
Item 5	5	5	4	5	5	5	1
Dimension $S-CVI^2 =$							1.00

Note. $I-CVI$ = Number of experts rating the item higher than 3/total number of experts, $S-CVI$ = Sum of the $I-CVIs$ /total number of items.

Construct Validity

Because maximum likelihood (ML) estimation method commonly used in CFA is based on the assumption of multivariate normality of the observed variables, assumptions were checked before fitting the model. Univariate skewness and kurtosis values should be less than |2.0| and |7.0| (Bandalos & Finney, 2019). As shown in Table 5, the univariate normality assumption was met. To check multivariate normality, a Shapiro-Wilk Test was performed using the mvnrmtest package in R. The result showed that the multivariate normality assumption was not met ($W = 0.85, p < .001$). Therefore, the robust Maximum Likelihood (MLM) estimation method was used (Brown, 2015).

Z-score was used to identify univariate outliers. Based on the threshold of ± 3 standard deviation from the mean (Bandalos & Finney, 2019), 11 univariate outliers were identified. Mahalanobis's Distance was used to identify multivariate outliers (Bandalos & Finney, 2019). A chi-square value at $p = .01$ should be the cut-off for reliable outlier detection (Leys et al., 2018). A total of 23 multivariate outliers were identified. Model estimates should be obtained for data with and without outliers; if results are similar, the outliers should not be deleted (Bandalos & Finney, 2019).

Table 5

Distribution of Item Scores

	Skewness	Kurtosis	z-score range
Accuracy Motivation			
Item 1	-1.10	4.02	[-3.29, 1.36]
Item 3	-0.81	3.52	[-3.06, 1.40]
Item 5	-0.86	3.69	[-3.16, 1.32]
Relative Benefit Motivation			
Item 1	-0.91	3.88	[-3.29, 1.48]
Item 2	-0.66	2.80	[-2.86, 1.50]

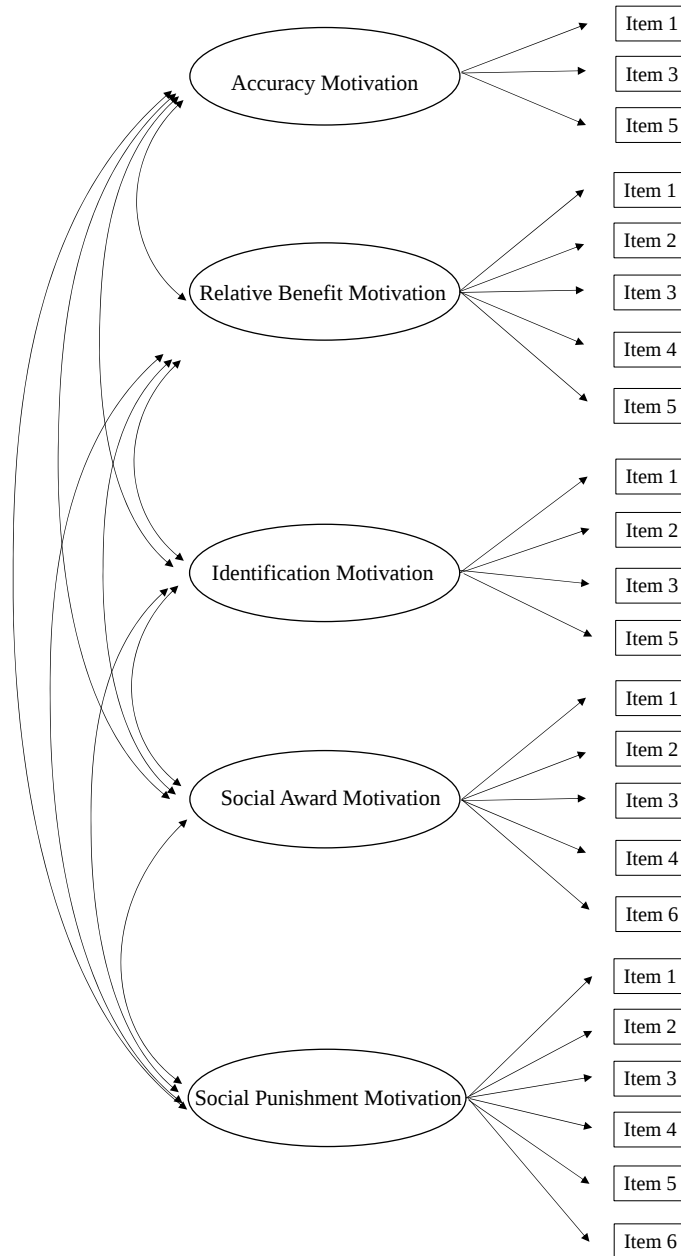
Item 3	-0.82	3.58	[-3.04, 1.44]
Item 4	-0.84	3.44	[-3.20, 1.49]
Item 5	-0.49	2.49	[-2.41, 1.59]
Identification Motivation			
Item 1	-0.46	2.18	[-2.02, 1.53]
Item 2	-0.59	2.74	[-2.40, 1.46]
Item 3	-0.45	2.24	[-2.03, 1.43]
Item 5	-0.62	2.33	[-2.15, 1.44]
Social Award Motivation			
Item 1	-0.74	3.02	[-2.66, 1.50]
Item 2	-0.77	3.13	[-2.77, 1.34]
Item 3	-0.03	1.95	[-1.88, 1.62]
Item 4	-0.51	2.37	[-2.34, 1.43]
Item 6	-0.73	3.04	[-2.65, 1.35]
Social Punishment Motivation			
Item 1	-0.15	1.93	[-1.79, 1.55]
Item 2	-0.35	2.12	[-2.11, 1.48]
Item 3	-0.51	2.40	[-2.19, 1.46]
Item 4	-0.52	2.28	[-2.10, 1.33]
Item 5	-0.42	2.19	[-2.06, 1.42]
Item 6	-0.37	2.07	[-1.98, 1.47]
Shapiro -Wilk Test	W = 0.85	p<0.001	

A CFA model (Figure 4) was fitted using the lavaan package in R. In the model, each motivation was considered an independent scale. In other words, the motivations were not considered first-order factors that collectively reflect a second-order factor of norm conformity motivation. Unless there is second-order unidimensionality, different dimensions should be associated with empirically distinct constructs (Levine, 2005). A second-order construct was often proposed when the first-order constructs are components of an overarching second-order construct (Levine, 2005). For example, opportunities to disclose concerns, physician's empathy, confidence in physician's abilities, and general satisfaction were first-order constructs loaded on the second-order construct—patient satisfaction with physician communication (Grayson-Sneed et al., 2016). In the case of norm conformity motivations, there is no second-order descriptive norm conformity motivation nor injunctive norm conformity motivation because the dimensions

are parallel and distinct norm conformity motivations. The different norm conformity motivations cannot be summed up to reflect the extent of one's overall norm conformity motivation. Therefore, the CFA model did not include a second-order factor structure. The CFA model had a good model fit (see Table 6) based on the cut-off suggested by Bandalos and Finney (2019). The model fit and factor loadings were similar between the full dataset and the dataset without outliers (see Table 6 and Table 7). All unstandardized path coefficients were significant at $p < .001$.

Figure 4

CFA Model

**Table 6**

CFA Model Fit for Full Dataset (N = 269) and Non-outlier Dataset (N = 240)

Model Fit Indices	Full Dataset	Non-outlier Dataset
Chi-square (<i>df</i>)	250.138(220)***	400.251(220)***
CFI	.957	.942
SRMR	.057	.060

RMSEA [90% CI]	.047[.039, .055]	.058[.050, .067]
----------------	------------------	------------------

Note. *** $p < .001$. CFI = Comparative Fit Index, SRMR = Standardized Root Mean Square

Residual, RMSEA = Root Mean Square Error of Approximation

Table 7

Unstandardized and Standardized Factor Loadings for Full Dataset (N = 269) and Non-outlier Dataset (N = 240)

	Full Dataset		Non-outlier Dataset	
	Unstandardized (SE)	Standardized	Unstandardized (SE)	Standardized
Accuracy Motivation				
Item 1: If I follow what most other people do in a given situation, it is because I think the choice of most people is likely to be correct.	1.00(–)	.77	1.00(–)	.75
Item 3: If I follow what most other people do in a given situation, it is because I think the choice of most people is likely to be wise.	1.09(0.10)	.80	1.08(0.11)	.79
Item 5: If I follow what most other people do in a given situation, it is because I want to make a correct decision.	0.88(0.09)	.65	0.82(0.11)	.58
Relative Benefit Motivation				
Item 1: If I follow what most other people do in a given situation, it is because I think people benefit from engaging in the behavior.	1.00(–)	.61	1.00(–)	.57
Item 2: If I follow what most other people do in a given situation, it is because I do not want to miss out on the benefits that most people get by engaging in the behavior.	1.34(0.17)	.74	1.53(0.19)	.76
Item 3: If I follow what most other people do in a given situation, it is because I do not want to be denied the benefit that most people get by engaging in the behavior.	1.36(0.17)	.78	1.43(0.17)	.79
Item 4: If I follow what most other people do in a given situation, it is because I want to get the benefits that most people get by engaging in the behavior.	1.25(0.15)	.75	1.33(0.15)	.74

Item 5: If I follow what most other people do in a given situation, it is because I fear losing the benefit that most others get if I do not follow their choice.	1.27(0.20)	.65	1.49(0.22)	.68
Identification Motivation				
Item 1: If I follow what most people who I admire do in a given situation, it is because I want to be like them.	1.00(–)	.81	1.00(–)	.80
Item 2: If I follow what most people who I admire do in a given situation, it is because I feel good to be one of them.	0.96(0.05)	.84	0.94(0.06)	.82
Item 3: If I follow what most people who I admire do in a given situation, it is because it makes me feel that I become more like a person I admire.	1.04(0.06)	.82	1.04(0.07)	.80
Item 5: If I follow what most people who I admire do in a given situation, it is because I want to be like the ones that I admire.	1.09(0.06)	.89	1.14(0.06)	.92
Social Award Motivation				
Item 1: If I do what most others think I should do or expect me to do in a given situation, it is because I want to make a good impression on others.	1.00(–)	.82	1.00(–)	.81
Item 2: If I do what most others think I should do or expect me to do in a given situation, it is because I want others to think of me positively.	1.04(0.05)	.85	1.03(0.05)	.82
Item 3: If I do what most others think I should do or expect me to do in a given situation, it is because I want others to compliment me.	1.06(0.07)	.73	1.07(0.08)	.71

Item 4: If I do what most others think I should do or expect me to do in a given situation, it is because I want to be liked.	1.15(0.07)	.86	1.20(0.07)	.87
Item 6: If I do what most others think I should do or expect me to do in a given situation, it is because I want to fit in with others.	1.00(0.07)	.79	1.07(0.07)	.82
Social Punishment Motivation				
Item 1: If I do what most others think I should do or expect me to do in a given situation, it is because I am afraid of being disliked.	1.00(–)	.82	1.00(–)	.84
Item 2: If I do what most others think I should do or expect me to do in a given situation, it is because I do not want them to disapprove of me.	0.93(0.04)	.82	0.89(0.05)	.82
Item 3: If I do what most others think I should do or expect me to do in a given situation, it is because I am worried about making a bad impression on others.	0.97(0.05)	.87	0.95(0.05)	.88
Item 4: If I do what most others think I should do or expect me to do in a given situation, it is because I am concerned with being judged negatively by others.	1.06(0.04)	.89	1.03(0.04)	.89
Item 5: If I do what most others think I should do or expect me to do in a given situation, it is because I feel uncomfortable when people think about me negatively.	0.94(0.05)	.80	0.90(0.05)	.80
Item 6: If I do what most others think I should do or expect me to do, it is because I am concerned with being excluded by others.	0.99(0.04)	.84	0.94(0.05)	.84

In addition to factor loadings and model fit indices, Bandalos and Finney (2019) suggested reporting the correlation among factors, the correlation between a factor and its observed indicators, and the communality of each item. To make a meaningful interpretation of the factors, there should be a strong relationship between a factor and its indicators; for each factor, a majority of the indicators should have a communality larger than .5 (Bandalos & Finney, 2019). The results (Table 8) showed that the communalities of most indicators were larger than .5.

Table 8

Item-Factor Correlation

	ACC	BEN	IDEN	AWA	PUN	Communality
ACC Item 1	.74	.47	.27	.34	.24	.54
ACC Item 3	.87	.40	.26	.31	.22	.76
ACC Item 5	.61	.50	.32	.31	.28	.37
BEN Item 1	.53	.58	.22	.35	.22	.34
BEN Item 2	.49	.74	.32	.40	.39	.55
BEN Item 3	.44	.78	.37	.49	.43	.62
BEN Item 4	.44	.77	.32	.42	.31	.60
BEN Item 5	.27	.63	.45	.49	.52	.39
IDEN Item 1	.26	.34	.82	.60	.57	.66
IDEN Item 2	.37	.44	.83	.70	.63	.69
IDEN Item 3	.39	.47	.80	.66	.59	.65
IDEN Item 5	.28	.36	.91	.65	.62	.83
AWA Item 1	.38	.45	.63	.82	.69	.68
AWA Item 2	.41	.51	.62	.86	.68	.74
AWA Item 3	.32	.53	.63	.70	.68	.48
AWA Item 4	.36	.50	.67	.87	.72	.76
AWA Item 6	.30	.47	.59	.78	.68	.61
PUN Item 1	.23	.38	.62	.67	.82	.68
PUN Item 2	.27	.43	.57	.72	.82	.68
PUN Item 3	.26	.47	.58	.72	.87	.75
PUN Item 4	.34	.51	.62	.76	.89	.79
PUN Item 5	.31	.45	.56	.69	.80	.65
PUN Item 6	.26	.46	.68	.74	.83	.69

Note. ACC = Accuracy Motivation, BEN = Relative benefit motivation, IDEN = Identification motivation, AWA = Social award motivation, PUN = Social punishment motivation.

Table 9

Coefficient H, Average Variance Extracted, and Correlations Between Factors.

	Coefficient <i>H</i>	AVE	ACC	BEN	IDEN	AWA	PUN
ACC	.80	.55	-				
BEN	.84	.51	.62	-			
IDEN	.91	.71	.39	.48	-		
AWA	.91	.66	.44	.61	.78	-	
PUN	.94	.72	.33	.53	.72	.86	-

Note. AVE = Average Variance Extracted, ACC = Accuracy Motivation, BEN = Relative benefit motivation, IDEN = Identification motivation, AWA = Social award motivation, PUN = Social punishment motivation.

Convergent and discriminant validity was evaluated using average variance extracted (AVE; Fornell & Larcker, 1981) and correlations between factors (Kline, 2011). AVE shows the amount of variance in observed indicators captured by the factor in relation to the amount of variance due to measurement error; an AVE value larger than .5 represents adequate convergent validity (Fornell & Larcker, 1981). Table 9 shows that the AVEs ranged from .51 to .72, indicating that the measurement has adequate convergent validity. Discriminant validity is evidenced when the correlations between factors are smaller than .90 (Kline, 2011). As shown in Table 9, the correlation between factors ranged from .33 to .86. This indicates that the measurement had adequate discriminant validity.

Reliability

The internal consistency of the measurement was assessed by calculating Coefficient H (Hancock & Mueller, 2001). Coefficient H was used as the estimate of reliability instead of Cronbach's α because Cronbach's α assumes tau equivalence (i.e., equal factor loadings of all items) which is not met given the factor loading result (Hayes & Coutts, 2020). Scales with a Coefficient H larger than .7 should be considered high reliability (Hancock & Mueller, 2001). All the five motivation scales had a Coefficient H larger than .7 (Table 9), showing that the scales had good reliability.

Chapter 6 Pilot Study 2: Constructing Motivation Appeal Messages and Checking Manipulations

Pilot study 2 constructed messages that appeal to norm conformity motivations, checked if the messages appeal to the motivations intended to be appealed to, and gathered feedback on improving message comprehensibility.

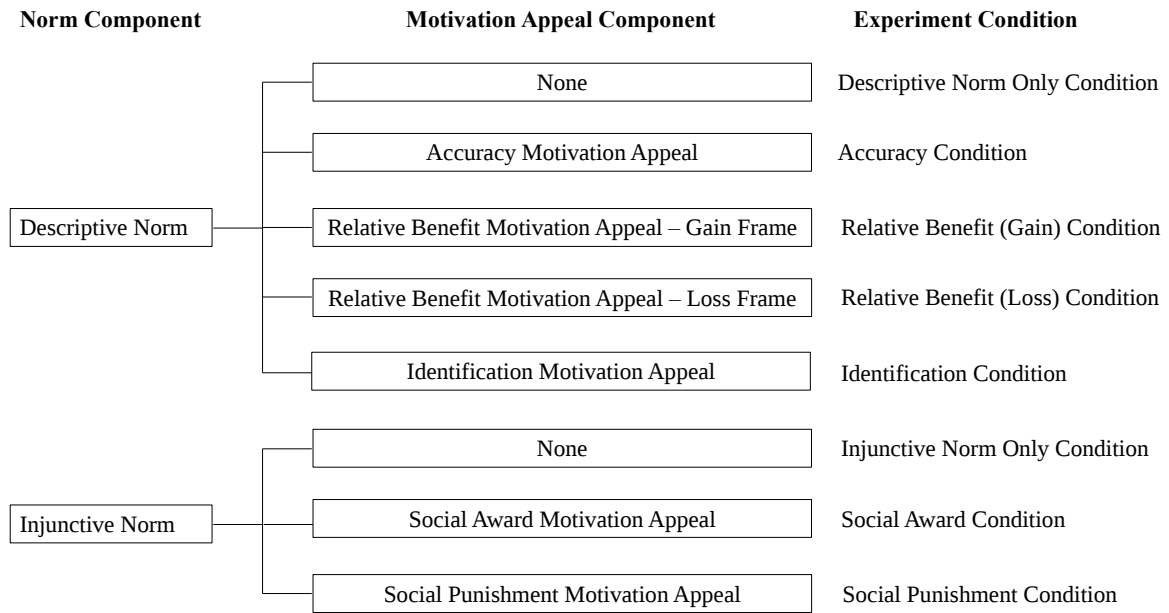
Method

Message Construction

In pilot study 2 there were eight message conditions (Figure 5), including five descriptive norm conditions (one message presenting only descriptive norms and four messages presenting descriptive norms and appealing to one of the descriptive norm conformity motivations) and three injunctive norm conditions (one message presenting only injunctive norms and two messages presenting injunctive norms and appealing to one of the injunctive norm conformity motivations). Based on the conceptualization of the relative benefit motivation, the relative benefit appeal message can be framed in either a gain frame or a loss frame. Therefore, there were two message conditions (i.e., gain frame and loss frame) for relative benefit motivation appeal. The norm-based message (i.e., messages presenting only descriptive norms or injunctive norms) conditions were control conditions. The norm-based messages with motivation appeal conditions were treatment conditions.

Figure 5

Message Stimulus in Each Experiment Condition



The message stimuli were designed as Facebook posts published by Immunization Action Coalition (IAC). IAC aims to increase immunization and prevent diseases by providing educational materials about vaccine-preventable diseases and vaccines to the public and health professionals through their websites (<https://vaccineinformation.org/>) and Facebook posts (Immunization Action Coalition, n.d.). IAC was chosen as the source of the message stimuli in this study for two reasons. First, based on the organization's aim, it is reasonable for IAC to post Facebook messages encouraging the public to get COVID-19 booster shots. Second, public trust toward federal health organizations such as the Centers for Disease Control decreased during the pandemic (Pollard & Davis, n.d.). Using non-government and non-profit organizations such as IAC as the source may reduce the influence of source credibility on experiment results. However, it should also be acknowledged that message recipients may not trust a source that they are not familiar with.

Two message options were developed for each message condition based on the conceptualization of social norms and norm conformity motivations (see Appendix A for all 16 message options). One of the two message options was selected to be used in the main study based on manipulation check results. To make sure that the messages presented accurate vaccine information and looked like real-world Facebook posts by health organizations, the message language was adopted and modified from reports published by health research institutes (Hamei et al., 2021) and websites and social media posts published by government health organizations (Baltimore City Health Department, 2021; CDC, 2021a; Immunization Action Coalition, 2019; Pennsylvania Department of Health, 2021; U.S. Food and Drug Administration, 2021a; Washington County Government - Maryland, 2021). For some motivation appeals, no existing health organization Facebook posts were found using language that was relevant to the motivation appeals. In these cases, the researcher of this study wrote the motivation appeal messages based on the conceptualization of the norm conformity motivations.

The messages were then evaluated and edited by four communication experts from academia and government health organizations. All the communication experts were native English speakers. The communication experts provided feedback on 1) if the messages appealed to the corresponding norm conformity motivation, 2) if there were any awkward, confusing, or incorrect expressions, and 3) if any edits were needed to make the messages look more like real-world Facebook posts by health organizations.

To rule out the influence of message length on persuasion outcomes. The number of words was carefully controlled during message design. The lengths of descriptive norm messages ranged from 49 to 54 words. The lengths of injunctive norm messages ranged from 81 to 85 words.

To increase the generalizability of message design, three different pictures (see Figure 6–8) were used in the Facebook posts. Participants randomly saw one of the three pictures along with the text. When choosing the pictures, two criteria were taken into consideration. First, to match the message content, the pictures should show the vaccination behaviors or the protection effect of vaccination. Second, the pictures should not too explicitly show vaccine injection so that they did not induce negative feelings about vaccination. Therefore, the three selected pictures implicitly showed vaccination behaviors with bandages on arms and showed the protection effect of vaccination with a shield. In Appendix A, one of the three pictures was used as an example to illustrate the 16 messages.

Figure 6

Picture 1 Used in Message Stimuli



Figure 7

Picture 2 Used in Message Stimuli



Figure 8

Picture 3 Used in Message Stimuli



Manipulation Check

Procedure. First, participants read definitions and examples of each norm conformity motivation. After that, participants were randomly assigned to read the 16 messages and rated each message on how well it appealed to each norm conformity motivation on a scale from 1 (*not appeal to the motivation at all*) to 10 (*appeal to the motivation very well*). Next, participants rated message comprehensibility. Perceived comprehensibility was measured with five 7-point

semantic differential items (e.g., easy and hard, effortless and demanding) based on Carpenter and Boster (2013). Participants were also asked to give suggestions on improving message comprehensibility and the messages' relevance to the corresponding motivation. Appendix B shows the survey questions.

Participants. The messages were empirically tested by administering a survey on MTurk. Assuming an effect size Cohen's d of .76 (based on Jiang & Doodoo, 2021), α of .05, and power of .8, the required sample size for each paired-sample t-test is 12 based on the power analysis using G Power. Because the stimuli messages were about social norms of COVID-19 booster shot in the United States, only U.S. residents were eligible for participation. A total of 47 participants completed the survey and received 2.5 dollars compensation. Ten of them were excluded because they were not U.S. residents. The final sample size was 37, which met the sample size required for an appropriate power. The average age was 37.3 ($SD = 10.46$). Within the sample, 94.6% were fully vaccinated against COVID-19, 59.5% had obtained a booster shot, 43.2% were women, 94.6% were White, and 91.9% were married. Table 10 shows detailed demographic characteristics of the sample.

Table 10

Demographics of Participants in Pilot Study 2

	<i>N</i>	Percentage
Gender		
Women	16	43.2
Men	21	56.8
Race		
White	35	94.6
Black or African American	1	2.7
Hispanic or Latino	1	2.7
Income		
Under \$49,999	19	51.4

\$50,000 to \$100,000	17	45.9
Above \$100,000	1	2.7
Marital Status		
Married	34	91.9
Divorced	1	2.7
Never married	1	2.7
Education		
8–11 years	1	2.7
12 years or complete high school	3	8.1
Some college	7	18.9
College graduate	16	43.2
Postgraduate	10	27.0

Analysis. Paired-sample t-tests were conducted to examine whether a message was more appealing to the corresponding motivation than the control message. For example, if the paired-sample t-test showed that the accuracy motivation message received a higher score on the question “How well does the message you just read appeal to accuracy motivation? (1 = not appeal to the motivation at all to 10 = appeals to the motivation very well)” than descriptive norm only messages, then the message passed manipulation check.

Result

Motivational Appeal Manipulation

Table 11–16 show the results of manipulation check. Descriptive norm only option 2 had a significantly lower score than accuracy message option 1 on the question asking how well the messages appeal to accuracy motivation ($t_{36} = -2.73, p = .010$). Descriptive norm only option 2 had a significantly lower score than relative benefit (gain) message option 1 and marginally significantly lower score than relative benefit (loss) message option 2 on the question asking about how well the messages appealed to relative benefit motivation ($t_{36} = -2.21, p = .034$; $t_{36} = -1.95, p = .059$). In addition, descriptive norm only option 2 had a marginally significantly lower score than identification message option 2 on the question asking how well the messages

appealed to identification motivation ($t_{36} = -1.78, p = .085$). Other comparisons between descriptive norm only messages and motivation appeal messages were not significant.

Injunctive norm only option 1 had a significantly lower score than social award message option 1 ($t_{36} = -2.05, p = .048$) and marginally significantly lower score than social award message option 2 ($t_{36} = -1.71, p = .096$) on the question asking about how well the messages appealed to social award motivation. Injunctive norm only option 2 had a marginally significantly lower score than social award message option 1 ($t_{36} = -1.89, p = .067$) on the question asking how well the messages appealed to social award motivation. Injunctive norm only option 1 had a significantly lower score than social punishment message option 1 ($t_{36} = -2.58, p = .014$) and marginally significantly lower score than social punishment message option 2 ($t_{36} = -1.76, p = .086$) on the question asking about how well the messages appealed to social punishment motivation. Injunctive norm only option 2 had a significantly lower score than social award message option 1 ($t_{36} = -2.20, p = .034$) on the question asking how well the messages appealed to social punishment motivation.

Based on the manipulation check result, descriptive norm only message option 2, accuracy message option 1, relative benefit (gain) message option 1, relative benefit (loss) message option 2, identification message option 2, injunctive norm only message option 1, social award message option 1, and social punishment message option 1 were selected to be used in the main study.

Table 11

Paired-sample T-test of Accuracy Motivational Appeal between Accuracy Messages and Descriptive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Descriptive norm only – Option 1	8.19(1.65)			
Accuracy – Option 1	8.57(1.50)	-1.36	.181	[-0.94, 0.19]
Accuracy – Option 2	7.76(1.66)	1.31	.198	[-0.24, 1.10]
Descriptive norm only – Option 2	7.54(2.42)			
Accuracy – Option 1	8.57(1.50)	-2.73	.010*	[-1.79, -0.26]
Accuracy – Option 2	7.76(1.66)	-0.60	.551	[-0.95, 0.51]

Note. ⁺ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 12

Paired-sample T-test of Relative Benefit (Gain) Motivational Appeal between Relative Benefit (Gain) Messages and Descriptive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Descriptive norm only – Option 1	8.11(2.00)			
Relative benefit (Gain) – Option 1	8.35(1.64)	-0.74	.466	[-0.91, 0.43]
Relative benefit (Gain) – Option 2	8.05(2.04)	0.15	.881	[-0.67, 0.78]
Descriptive norm only – Option 2	7.43(2.60)			
Relative benefit (Gain) – Option 1	8.35(1.64)	-2.21	.034*	[-1.76, -0.08]
Relative benefit (Gain) – Option 2	8.05(2.04)	-1.39	.172	[-1.53, 0.28]

Note. ⁺ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 13

Paired-sample T-test of Relative Benefit (Loss) Motivational Appeal between Relative Benefit (Loss) Messages and Descriptive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Descriptive norm only – Option 1	7.68(2.89)			
Relative benefit (Loss) – Option 1	7.89(2.27)	-0.37	.714	[-1.40, 0.97]
Relative benefit (Loss) – Option 2	8.00(2.30)	-0.60	.556	[-1.43, 0.78]
Descriptive norm only – Option 2	7.16(2.79)			
Relative benefit (Loss) – Option 1	7.89(2.27)	-1.50	.142	[-1.72, 0.26]
Relative benefit (Loss) – Option 2	8.00(2.30)	-1.95	.059 ⁺	[-1.71, 0.03]

Note. ⁺ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 14

Paired-sample T-test of Identification Motivational Appeal between Identification Messages and Descriptive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Descriptive norm only – Option 1	7.76(2.18)			
Identification – Option 1	7.35(2.47)	0.86	.395	[-0.55, 1.36]
Identification – Option 2	8.24(2.17)	-1.24	.223	[-1.28, 0.31]
Descriptive norm only – Option 2	7.46(2.58)			
Identification – Option 1	7.35(2.47)	0.22	.824	[-0.87, 1.09]
Identification – Option 2	8.24(2.17)	-1.78	.085 ⁺	[-1.68, 0.11]

Note. ⁺p < .1, *p < .05, **p < .01, ***p < .001.

Table 15

Paired-sample T-test of Social Award Motivational Appeal between Social Award Messages and Injunctive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Injunctive norm only – Option 1	7.14(2.56)			
Social Award – Option 1	8.00(2.17)	-2.05	.048*	[-1.72, -0.01]
Social Award – Option 2	7.86(2.16)	-1.71	.096 ⁺	[-1.60, 0.14]
Injunctive norm only – Option 2	7.27(2.45)			
Social Award – Option 1	8.00(2.17)	-1.89	.067 ⁺	[-1.51, 0.06]
Social Award – Option 2	7.86(2.16)	-1.48	.148	[-1.41, 0.22]

Note. ⁺p < .1, *p < .05, **p < .01, ***p < .001.

Table 16

Paired-sample T-test of Social Punishment Motivational Appeal between Social Punishment Messages and Injunctive Norm Only Messages (N=37)

Message Options	Mean (SD)	t(df=36)	p	95% CI
Injunctive norm only – Option 1	6.65(2.97)			
Social Punishment – Option 1	7.97(2.19)	-2.58	.014*	[-2.37, -0.28]
Social Punishment – Option 2	7.70(2.36)	-1.76	.086 ⁺	[-2.27, 0.16]
Injunctive norm only – Option 2	7.14(2.53)			
Social Punishment – Option 1	7.97(2.19)	-2.20	.034*	[-1.61, -0.07]
Social Punishment – Option 2	7.70(2.36)	-1.15	.260	[-1.57, 0.44]

Note. ⁺p < .1, *p < .05, **p < .01, ***p < .001.

Message Comprehensibility

As shown in Table 17, the two message options in each condition were not significantly different in perceived comprehensibility except for the injunctive norm only condition. For injunctive norm only condition, message option 2 was perceived as easier to understand than option 1 ($t_{36} = -2.74, p = .01$). The injunctive norm only message option 1 was selected for the main study even if it was less comprehensible than the injunctive norm only message option 2 because the injunctive norm only message option 1 was significantly different from the social award and social punishment motivation appeal messages (see Table 16). The messages selected for the main study had perceived comprehensibility scores ranged from 3.15 to 3.40. On a scale of 1 to 7 where 1 represented hard, difficult, demanding, confusing, and incomprehensible and 7 represented easy, simple, effortless, clear, and understandable, a score between 3.15 and 3.40 represented moderate to low comprehensibility.

Table 17

Paired-sample T-test of Perceived Comprehensibility between Message Options (N=37)

Message Condition	Mean	SD	$t(df=36)$	p
Descriptive norm only – Option 1	3.43	1.87	0.19	.853
Descriptive norm only – Option 2*	3.40	1.87		
Accuracy – Option 1*	3.15	1.85	-1.30	.202
Accuracy – Option 2	3.32	1.92		
Relative benefit (Gain) – Option 1*	3.30	1.80	0.07	.944
Relative benefit (Gain) – Option 2	3.29	1.86		
Relative benefit (Loss) – Option 1	3.48	1.87	1.60	.119
Relative benefit (Loss) – Option 2*	3.24	1.93		
Identification – Option 1	3.37	1.86	0.05	.958
Identification – Option 2*	3.36	1.78		
Injunctive norm only – Option 1*	3.15	1.73	-2.74	.010
Injunctive norm only – Option 2	3.46	1.76		
Social award – Option 1*	3.36	1.85	0.86	.398

Social award – Option 2	3.21	1.92		
Social punishment – Option 1*	3.22	1.91	0.42	.679
Social punishment – Option 2	3.15	1.87		

Note. * Denotes message options selected for the main study based on manipulation check.

Chapter 7 Main Study

Method

Experiment Design

The main study aimed at testing the theoretical model. The study included two experiments (see Table 18). In Experiment 1, the descriptive norm only condition was the control condition and the conditions appealing to each descriptive norm conformity motivation were the treatment conditions. In Experiment 2, the injunctive norm only condition was the control condition and the conditions appealing to each injunctive norm conformity motivation were the treatment conditions. Control and treatment messages developed in Pilot Study 2 were used in the main study.

Table 18

Experiment Conditions

Experiment 1	
Control Condition	Descriptive Norm Only Condition
Treatment 1	Accuracy Condition
Treatment 2	Relative Benefit (Gain) Condition
Treatment 3	Relative Benefit (Loss) Condition
Treatment 4	Identification Condition
Experiment 2	
Control condition	Injunctive Norm Only Condition
Treatment 1	Social Award Condition
Treatment 2	Social Punishment Condition

Procedure

The experiments included two-wave surveys. In Survey 1, after indicating informed consent, participants answered questions about demographics, norm conformity motivations and other moderators in the theoretical model. One week later, participants were invited to complete

Survey 2. In Survey 2, they were randomly assigned to one of the eight conditions. In each condition, they first read a Facebook post and then answered questions about perceived message effectiveness, perceived message relevance, and attitude and intention of getting a booster shot. The Survey 1 and Survey 2 questionnaires are included in Appendix C and D.

Participants

Because there was not an existing method to estimate the a priori power for the proposed model, power analysis was conducted for the main effect of message treatment on dependent variables (i.e., attitude and intention of getting a booster shot). The power analysis was done using an R simulation with a Cohen's d effect size of 0.2 (based on Hull, 2012; the study examined the persuasiveness of gain- and loss- framing messages (vs. no message control) on the behavioral intention of HIV testing), R^2 of 0.6, α of 0.05, and power of 0.8. The required sample size was 775 for Experiment 1 and 475 for Experiment 2. To be eligible for participation, participants must be above 18; had been fully vaccinated against COVID-19; be eligible for and had not got a booster shot; and had not been part of any of the pilot studies.

The data collection for Survey 1 started from January 19, 2022 and ended on March 30, 2022. The data collection for Survey 2 started from January 26, 2022 and ended on April 10, 2022. Because the booster uptake rate kept increasing during the data collection period, the number of MTurk participants who were eligible for the study kept decreasing. To speed up the data collection, the MTurk Human Intelligence Task Approval Rate requirement and the compensation for Survey 1 was changed several times as shown in Table 19. Participants who completed Survey 1 before the compensation change were bonused to match the increased amount of compensation. The compensation for completing Survey 2 (\$2) was the same across time. Appendix E shows the comparison of demographics between the samples recruited before

and after February 8. The two samples were significantly different on age, marital status, and education. They were not different on gender, race, and income.

Table 19

Survey 1 Requirement and Compensation Change

Data Collection Period	Number of HIT ¹ Approved	HIT Approval Rate	Compensation ²	Number of Participants
Jan 19–24	>100	98%	\$0.1	24
Jan 24–28	>50	98%	\$0.1	48
Jan 28–Feb 1	>50	95%	\$0.1	37
Feb 1–Feb 3	no requirement	50%	\$0.1	39
Feb 3–Feb 7	no requirement	50%	\$0.5	76
Feb 8–Mar 30	no requirement	50%	\$1	956

Note. 1. HIT = MTurk Human Intelligence Task

2. Compensation received once completing Survey 1. The compensation for completing Survey 2 (\$2) was the same across time.

A total of 1173 participants from MTurk completed Survey 1. Of these participants, 866 completed Survey 2. The response rate was 73.83%. A total of 73 participants did not pass the attention check questions in Survey 1 and 2. Thus, the final sample size was 793. The average age was 35.65 ($SD = 11.18$). In the sample, there were 57% women, 79.2% White, 70.1% who were married, and 73.2% who completed college. Detailed sample demographics are shown in Table 20. About half of the participants got a booster shot between Survey 1 and 2. Because these participants had already taken the booster, these participants were excluded in the analysis that included the behavioral intention variable. The model without behavioral intention was tested with the full sample. In the analysis with the full sample, attitude was used as the persuasion outcome because of both theoretical and practical reasons. Theoretically, attitude is

one of the most proximal antecedents of behavioral intentions (Ajzen, 1991). If a message strategy is found effective in changing attitudes, it is very likely to influence behavioral intentions as well. Also, examining whether a message strategy influences the attitude of individuals who have taken a booster has practical implications. Individuals might get a booster shot because it was required by their school or employer. They might not have a favorable attitude toward boosters. If a message strategy increases their favorable attitudes, then it may increase their intentions for future boosters.

Table 20

Demographics of Participants in Main Study

	<i>N</i>	Percentage
Booster		
Boosted between Survey 1 and 2	401	50.6
Not boosted between Survey 1 and 2	392	49.4
Gender		
Women	452	57.0
Men	339	42.8
Nonbinary	2	0.3
Race		
White	628	79.2
Black or African American	39	4.9
Asian	84	10.6
American Indian or Alaska American	16	2.0
Hispanic or Latinx	4	0.5
Multiple	22	2.8
Income		
Under \$49,999	372	46.9
\$50,000 to \$100,000	330	41.6
Above \$100,000	91	11.5
Marital Status		
Married	556	70.1
Widowed	6	0.8
Never married	192	24.2
Separated	11	1.4
Divorced	28	3.5
Education		

Less than 8 years	2	2.5
8 through 11 years	9	1.1
12 years or completed high school	45	5.7
Post high school training other than college	20	2.5
Some college	136	17.2
College graduate	426	53.7
Postgraduate	155	19.5

Measures

Mediators. Mediators included perceived message effectiveness and perceived message relevance.

Perceived Message Effectiveness. The measure of perceived message effectiveness was adapted from the three-item UNC Perceived Message Effectiveness Scale (Baig et al., 2019). This measure was selected because it focused on capturing the perceived message effects on health behavior change (Baig et al., 2019). Because the measure was developed for anti-smoking messages, Baig et al. (2019) recommended rephrasing the items to a positive frame when evaluating perceived effectiveness of messages about healthy behaviors. Therefore, the three original items (i.e., This message discourages me from wanting to smoke; This message makes me concerned about the health effects of smoking; This message makes smoking seem unpleasant to me.) were rephrased into “The Facebook post encourages me to get a COVID-19 booster shot”; “The Facebook post makes me think about the positive outcomes of getting a COVID-19 booster shot”; and “The Facebook post makes getting a COVID-19 booster shot seem pleasant to me”. Because the relative benefit motivation appeal – loss frame message and social punishment motivation appeal message addressed the negative outcome of not getting a booster, a negative frame item (i.e., The Facebook post makes me think about the negative outcomes of not getting a COVID-19 booster shot) was also included. The response scale was changed from a 5-point to a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly*

agree) to better capture variance among participants.

With the sample of this study, the measure had a Cronbach's α reliability of .62, which was below an acceptable value of .7 (Tavakol & Dennick, 2011). Also, the measure did not reach a Cronbach's α of .7 after dropping any one or two of the items. Therefore, a single item was used to represent perceived message effectiveness. Because messages in accuracy condition, relative benefit (gain) condition, identification condition, and social award condition addressed the positive outcomes of getting a booster shot, the positive frame item (i.e., "The Facebook post makes me think about the positive outcomes of getting a COVID-19 booster shot"; $M = 4.48$, $SD = 1.77$) was used in the analysis including these conditions. Because messages in relative benefit (loss) condition and social punishment condition addressed the negative outcomes of not getting a booster shot, the negative frame item (i.e., "The Facebook post makes me think about the negative outcomes of not getting a COVID-19 booster shot"; $M = 5.53$, $SD = 1.25$) was used in the analysis including these conditions. The first item (i.e., The Facebook post encourages me to get a COVID-19 booster shot) was not used because the meaning of the item is vague. It is likely that the participants may misunderstood the item as describing the persuasive effect that the Facebook post tried to achieve rather than what the Facebook post achieved. For example, participants who do not feel that they were encouraged to get a booster might give a high score on the item because they thought the Facebook post intended to encourage them to get a booster though the persuasion was not successful. The third item (i.e., The Facebook post makes getting a COVID-19 booster shot seem pleasant to me) was not used because the word "pleasant" may not be suitable to describe vaccination behavior. The limitation of using single-item measure is acknowledged in the discussion section.

Perceived Message Relevance. The measure of perceived message relevance was

adapted from Zhao and Peterson (2017). The measure was used because their study focused on messages about health behavior change (i.e., smoking). The measure had a high reliability in both Zhao and Peterson (Cronbach's $\alpha = .86$) and this study (Cronbach's $\alpha = .83$). The three items were "The Facebook post is relevant to my life/grasped my attention/said something important to me." The measure used a 7-point Likert scale ranging 1 (*strongly disagree*) to 7 (*strongly agree*) with $M = 5.37$ and $SD = 1.16$.

Moderators. Moderators included the five norm conformity motivations, need for closure, perceived uncertainty, fear of missing out, upward social comparison, need for approval, and fear of negative evaluation.

Norm Conformity Motivations. Accuracy motivation (Cronbach's $\alpha = .73$, $M = 5.12$, $SD = 1.13$), relative benefit motivation (Cronbach's $\alpha = .83$, $M = 4.93$, $SD = 1.10$), identification motivation (Cronbach's $\alpha = .90$, $M = 4.66$, $SD = 1.47$), social award motivation (Cronbach's $\alpha = 0.89$, $M = 4.80$, $SD = 1.30$), and social punishment motivation (Cronbach's $\alpha = .92$, $M = 4.5$, $SD = 1.39$) were measured using the measurement developed in Pilot Study 1

Need for Closure. Need for closure were measured using the brief 15-item version of the Need for Closure Scale (Roets & Van Hiel, 2011). It is the most recently validated and widely used scale for need for closure. Example items include "I don't like situations that are uncertain" and "I dislike questions which could be answered in many different ways". Again, the response scale was changed from a 5-point to a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) with Cronbach's $\alpha = .87$, $M = 4.92$, and $SD = 0.87$.

Perceived Uncertainty. The measure of perceived uncertainty was adapted from Fung et al. (2018). An alternative measure of perceived uncertainty is the short version of Mishel Uncertainty in Illness Scale (SF-MUIS) developed by Hagen et al. (2015). The SF-MUIS was

not used because the items are more relevant to clinical settings and do not apply to the context of this study (e.g., The doctors say things to me that can have many meanings). Fung et al. (2018) measured uncertainty of health risks by asking participants how much uncertainty they felt when they thought about the health risks on a scale from 0 (*no of this feeling*) to 10 (*a lot of this feeling*). In this study, accuracy motivation appeal was hypothesized to be more persuasive when individuals are uncertain about what behaviors are correct and adaptive. Thus, perceived uncertainty in this study refers to individuals' feeling of uncertainty about the correctness of their behavioral choice (i.e., whether to get a booster or not). Therefore, the item was revised to "When you think about whether your decision of getting a COVID-19 booster shot is correct or not, how do you feel?" To enhance the reliability of the measurement, the researcher checked the synonyms of the word "uncertain" and "uncertainty" in Merriam-Webster (n.d.) and created a 7-point semantic differential scale including three items (i.e., uncertain/certain, unsure/sure, unconfident/confident). A lower score indicated more uncertainty about the correctness of their decision on getting a COVID-19 booster. The measure had a Cronbach's $\alpha = .91$, $M = 5.79$, and $SD = 1.28$.

Fear of Missing Out. Przybylski et al. (2013) developed the 10-item Fear of Missing Out scale (FoMos). The scale had a reliability over .87 in three different samples including working adults and college students (Przybylski et al., 2013). Example items were "I fear others have more rewarding experiences than me" and "Sometimes, I wonder if I spend too much time keeping up with what is going on." Participants indicated the extent to which the statements were true for them on a scale ranging 1 (*strongly disagree*) to 7 (*strongly agree*). The measure had a Cronbach's $\alpha = .86$, $M = 3.62$, and $SD = 0.64$.

Upward Social Comparison. Upward social comparison was measured using the 6-item upward comparison subscale in the Iowa-Netherlands Comparison Orientation Scale developed by Gibbons and Buunk (1999). It is the only validated scale that measures upward social comparison. Example items were “When it comes to my personal life, I sometimes compare myself with others who have it better than I do” and “When things are going poorly, I think of others who have it better than I do”. Again, the response scale was changed from a 5-point to a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) to better capture the variance among participants. The measure had a Cronbach’s $\alpha = .89$, $M = 4.83$, and $SD = 1.24$.

Need for Approval. The measure of need for approval was adapted from Martin-Larsen Approval Motivation (MLAM) Scale (Martin, 1984). MLAM was selected over other measurements because it has an appropriate length (i.e., 10 items) and the items well represent the meaning of need for approval concept in this study. Alternative measurements of need for approval or social desirability represent more of the “irrational or dysfunctional belief of need for approval” (Cramer, 2014, p. 4289). Example items were “I change my opinion (or the way that I do things) in order to please someone else” and “In order to get along and be liked, I tend to be what people expect me to be.” The response scale was changed from a 5-point to a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The measure had a Cronbach’s $\alpha = .76$, $M = 3.79$, and $SD = 0.69$.

Fear of Negative Evaluation. Fear of negative evaluation were measured by the Brief Fear of Negative Evaluation Scale (BFNE) developed by Leary (1983). The original scale (Watson & Friend, 1969) had 30 items, which was too long for the survey. The brief scale included 12 items with a response scale ranging 1 (*not at all characteristic of me*) to 7 (*extremely characteristic of me*). Example items were “I worry about what other people will think of me

even when I know it doesn't make any difference” and “I am frequently afraid of other people noticing my shortcomings.” The measure had a Cronbach’s $\alpha = .86$, $M = 3.62$, and $SD = 0.64$.

Dependent Variables. Dependent variables included attitude and behavioral intention of getting a COVID-19 booster shot.

Attitude. A 7-point bipolar adjective scale was used to measure attitude (Rhodes & Courneya, 2003). The measure included both affective and instrumental aspect of attitude. Only the instrumental attitude aspect of the measure was used because the items for the affective attitude aspect (i.e., interesting–boring, enjoyable–unenjoyable, relaxing–stressful) did not apply to the context of vaccination. The instrumental attitude measure was also used in previous studies about attitudes toward vaccination (e.g., flu vaccination; Lee & Liu, 2021). Participants were asked to answer the question “Which of the following best describes getting a COVID-19 booster shot?” on three items including 1 (*harmful*) to 7 (*beneficial*), 1 (*useless*) to 7 (*useful*), and 1 (*foolish*) to 7 (*wise*). The measure had a Cronbach’s $\alpha = .88$, $M = 5.98$, and $SD = 1.10$.

Behavioral Intention. Behavioral intention was measured based on recommendation by Ajzen (n.d.). The measure was widely used by studies involving behavioral intention. The items were “I will/plan to/intend to get a COVID-19 booster shot when it is recommended by health professionals.” Participants indicated their agreement with the statements on a scale ranging 1 (*strongly disagree*) to 7 (*strongly agree*). The measure had a Cronbach’s $\alpha = .92$, $M = 5.40$, and $SD = 1.32$.

Control Variables. Perceived descriptive and injunctive norms were measured based on Ajzen (n.d.). The perceived descriptive norm items were “Most Americans/Most people in the U.S./ Most people at my age/Most people who are similar to me/Most people whom I discuss important matters with will get a COVID-19 booster shot.” The perceived injunctive norm items

were “Most Americans/Most people in the U.S./ Most people at my age/Most people who are similar to me/Most people whom I discuss important matters with would approve of me getting a COVID-19 booster shot.” Participants indicated their agreement with the item on scale ranging 1 (*strongly disagree*) to 7 (*strongly agree*). The perceived descriptive norm measure had a Cronbach’s $\alpha = .84$, $M = 5.20$, and $SD = 1.03$. The perceived injunctive norm measure had a Cronbach’s $\alpha = .82$, $M = 5.42$, and $SD = 0.91$.

Data Analysis

Of the 793 participants who completed both Survey 1 and Survey 2 and passed attention check, more than 50% got a booster shot between Survey 1 and Survey 2. Therefore, whether a participant got a booster or not was added as a covariate in the analysis and the behavioral intention of getting a booster shot was dropped from the model. The model with behavioral intention of getting a booster shot was tested with data from participants who did not get a booster shot ($N = 392$) because the behavioral intention items (e.g., I will get a COVID-19 booster shot when it is recommended by health professionals) did not make sense to participants who had got a booster shot. The model with behavioral intention was tested as an exploratory analysis, due to lack of an adequate power (Preacher et al., 2007). The results are summarized in Appendix F.

The model was tested using PROCESS macro version 4.1 for R (Hayes, 2022). The customized model included 2 mediators in parallel and 1 moderator that moderated both the independent variable-mediator path and the independent variable-dependent variable path. The analysis used a bootstrap of 1,000 times and mean centered the moderators. Demographic variables were not included as covariates because there was no significant difference in demographics between the treatment and control conditions. Perceived norms may be a

confounding variable in the relationship between message perceptions and attitudes because participants who had a higher perceived descriptive (injunctive) norm of getting a COVID-19 booster shot might have a more positive attitude toward getting a booster shot and might consider the norm-based messages more effective and relevant to their situation. Therefore, perceived descriptive (injunctive) norm of getting a COVID-19 booster shot was included as a covariate when evaluating the mediator-dependent variable path for comparisons including the descriptive (injunctive) norm only message.

Because PROCESS analysis is based on OLS regression, the assumptions for OLS regression (i.e., linearity, normality, homoscedasticity, and independence) and the assumption of a normal sampling distribution of the indirect effect should be considered. As suggested by Hayes (2018) and Preacher et al. (2007), when bootstrapping is used, the only assumptions are linearity of the relationships and independence of the observations. Linearity assumption was checked using scatterplots. Independence assumption was assumed to be met because the study sample did not have any nested structure.

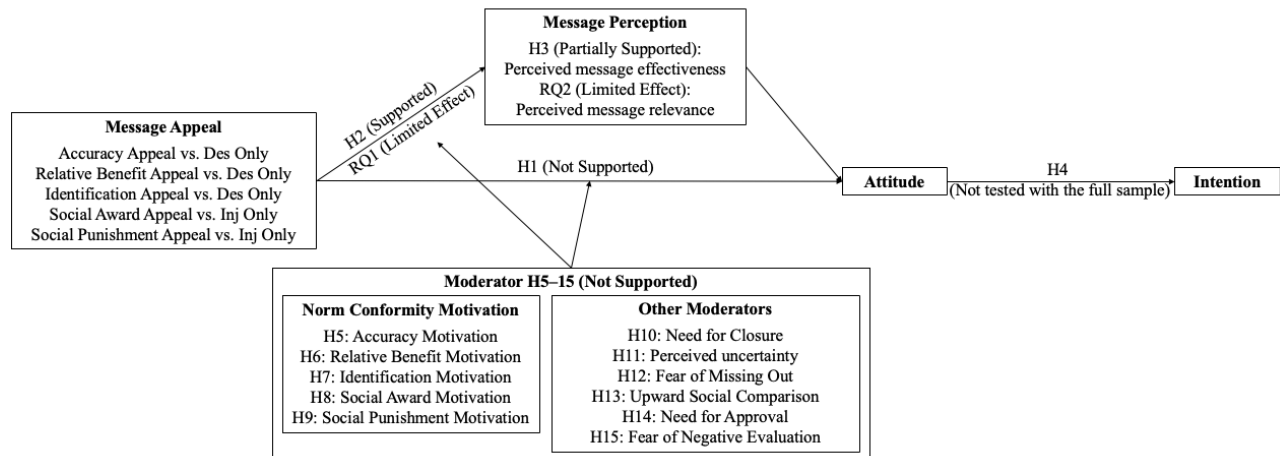
Result

A summary of the results is shown in Table 21 and Figure 9. In general, there was no total effect of motivation appeal on attitudes. H1 was not supported. The hypotheses about the mediation through perceived message effectiveness (H2&3) were supported for the models involving accuracy motivation, identification, relative benefit (gain), and social award conditions. It was not supported for the models involving relative benefit (loss) and social punishment conditions. The hypothesis about the main effect of motivation appeals, the research questions about the mediator role of perceived message relevance (RQ1&2), and the hypotheses about the moderator role of individual characteristics (H5–H15) were not supported.

Table 21*Table Result Summary*

Hypotheses and Research Questions	Result
H1: Motivation appeal → Attitude	Not supported
H2: Motivation appeal → Perceived message effectiveness	Supported
H3: Motivation appeal → Perceived message effectiveness → Attitude	Partially supported
RQ1: Motivation appeal → Perceived message relevance	Limited effect
RQ2: Motivation appeal → Perceived message relevance → Attitude	Limited effect
H5–15: Moderation effect	Not supported

Note. H3 (mediation effects of perceived message effectiveness) were supported for accuracy, relative benefit (gain), identification, and social award conditions, but were not supported for relative benefit (loss) and social punishment conditions.

Figure 9*Figure Result Summary*

Note. H3 (mediation effects of perceived message effectiveness) were supported for accuracy, relative benefit (gain), identification, and social award conditions, but were not supported for relative benefit (loss) and social punishment conditions.

Accuracy Condition vs. Descriptive Norm Only Condition

The mediation model (Table 22, Table 23, and Figure 10) showed that the accuracy motivation appeal message (vs. descriptive norm only message) did not have a total effect on attitudes (Effect = -0.01, bootstrap SE = 0.13, 95% bootstrap CI [-0.26, 0.24]). Accuracy motivation appeal message (vs. descriptive norm only message) significantly increased perceived message effectiveness (B = 0.52, p = .003, bootstrap SE = 0.18, 95% bootstrap CI [0.17, 0.85]) but did not affect perceived message relevance (B = -0.11, p = .427, bootstrap SE = 0.14, 95% bootstrap CI [-0.41, 0.16]). Both perceived message effectiveness (B = 0.18, p = 0.000, bootstrap SE = 0.06, 95% bootstrap CI [0.07, 0.29]) and perceived message relevance (B = 0.16, p = .000, bootstrap SE = 0.03, 95% bootstrap CI [0.09, 0.22]) were positively associated with attitude. The indirect effect of accuracy motivation appeal on attitude through perceived message effectiveness was significant (effect = 0.10, bootstrap SE = 0.04, 95% bootstrap CI [0.03, 0.18]). The direct effect of accuracy motivation appeal on attitude (effect = -0.09, bootstrap SE = 0.12, 95% bootstrap CI [-0.31, 0.16]) and the indirect effect through perceived message relevance (effect = -0.02, bootstrap SE = 0.02, 95% bootstrap CI [-0.07, 0.03]) were not significant.

Figure 10

Mediation Model of Accuracy Motivation Appeal

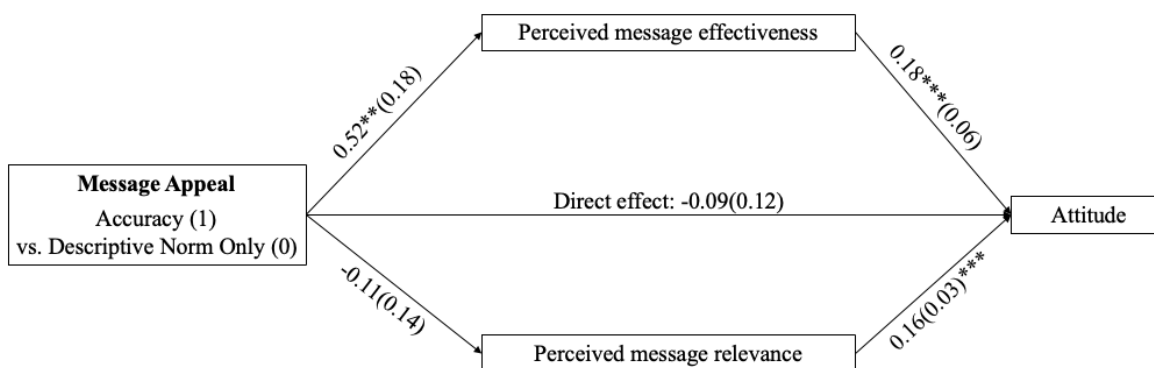


Table 22*Mediation Model of Accuracy Motivation Appeal (N = 204)*

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.28***	0.36	[3.59, 5.02]
Booster (Taken = 1, Not taken = 0)	0.24	0.17	[-0.08, 0.57]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.52**	0.18	[0.17, 0.85]
$R^2 = .05^{**}$, $F(2, 201) = 5.43$, $p = .005$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.99***	0.30	[4.39, 5.61]
Booster (Taken = 1, Not taken = 0)	0.40**	0.15	[0.10, 0.70]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.11	0.14	[-0.41, 0.16]
$R^2 = .04^{*}$, $F(2, 201) = 4.03$, $p = .019$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.88***	0.41	[2.06, 3.69]
Booster (Taken = 1, Not taken = 0)	-0.12	0.11	[-0.31, 0.16]
PDN	0.03*	0.02	[-0.00, 0.07]
PME	0.18***	0.06	[0.07, 0.29]
PMR	0.16***	0.03	[0.09, 0.22]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.09	0.12	[-0.31, 0.16]
$R^2 = .43^{***}$, $F(5, 198) = 29.56$, $p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive

Norm.

Table 23*Total, Indirect and Direct Effects of Accuracy Motivation Appeal (N = 204)*

	Effect	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Total Effect	-0.01	0.13	[-0.26, 0.24]

Condition —> PME —> ATT	0.10*	0.04	[0.03, 0.18]
Condition —> PMR —> ATT	-0.02	0.02	[-0.07, 0.03]
Condition —> ATT	-0.09	0.12	[-0.31, 0.16]

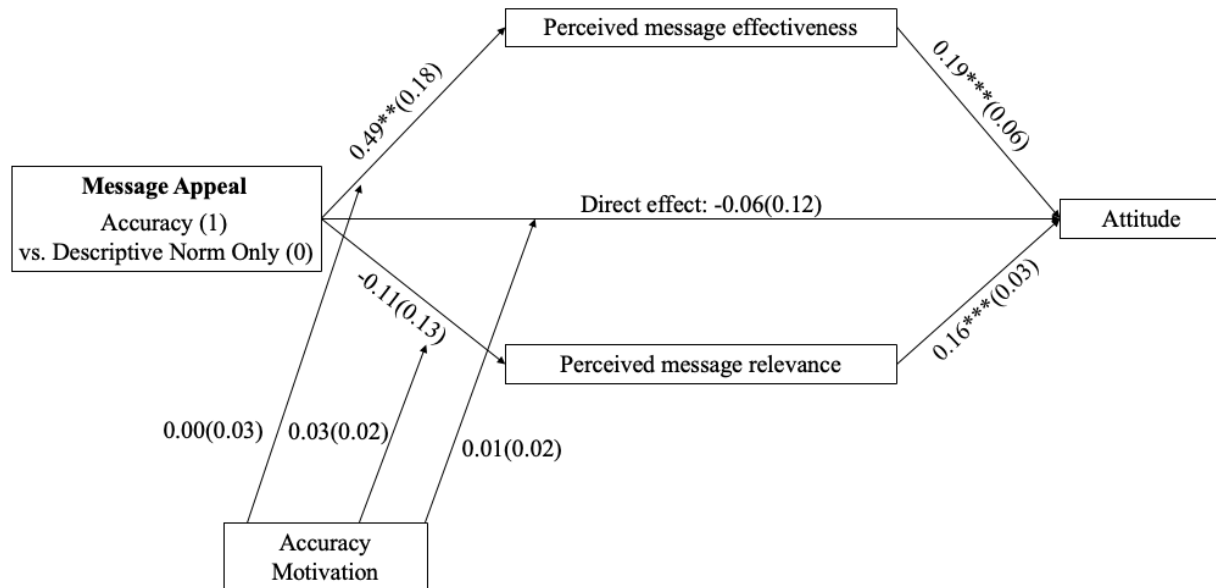
Note. * denotes significance based on 95% bootstrap *CI*. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 24–26 and Figure 11–13) showed that accuracy motivation, need for closure, and perceived uncertainty did not moderate the effect of accuracy motivation appeal message (vs. descriptive norm only message) on message perceptions and attitude. In addition, accuracy motivation was positively associated with perceived message effectiveness ($B = 0.05$, $p = 0.028$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.01, 0.08]$) and perceived message relevance ($B = 0.04$, $p = .032$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.00, 0.07]$). Perceived uncertainty was positively associated with perceived message relevance ($B = 0.06$, $p = .000$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.03, 0.09]$).

Figure 11

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Accuracy Motivation)

**Table 24**

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Accuracy Motivation; N = 204)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.85***	0.47	[3.89, 4.75]
Booster (Taken = 1, Not taken = 0)	0.23	0.17	[-0.10, 0.58]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.49**	0.18	[0.16, 0.83]
ACC	0.05*	0.02	[0.01, 0.08]
ACC*Condition	0.00	0.03	[-0.06, 0.07]
$R^2 = .10^{***}, F(4, 199) = 5.26, p = .001$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.31***	0.35	[3.59, 4.95]
Booster (Taken = 1, Not taken = 0)	0.40**	0.14	[0.12, 0.70]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.11	0.13	[-0.38, 0.15]
ACC	0.04*	0.02	[0.00, 0.07]
ACC*Condition	0.03	0.02	[-0.02, 0.08]
$R^2 = .12^{***}, F(4, 199) = 6.57, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)

Constant	2.80***	0.45	[1.91, 3.68]
Booster (Taken = 1, Not taken = 0)	-0.13	0.11	[-0.35, 0.09]
PDN	0.04**	0.02	[-0.00, 0.08]
PME	0.19***	0.06	[0.09, 0.31]
PMR	0.16***	0.03	[0.10, 0.22]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.06	0.12	[-0.29, 0.17]
ACC	-0.02	0.01	[-0.05, -0.00]
ACC*Condition	0.01	0.02	[-0.03, 0.06]
$R^2 = .44***, F(7, 196) = 21.63, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, ACC = Accuracy Motivation.

Figure 12

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Need for Closure)

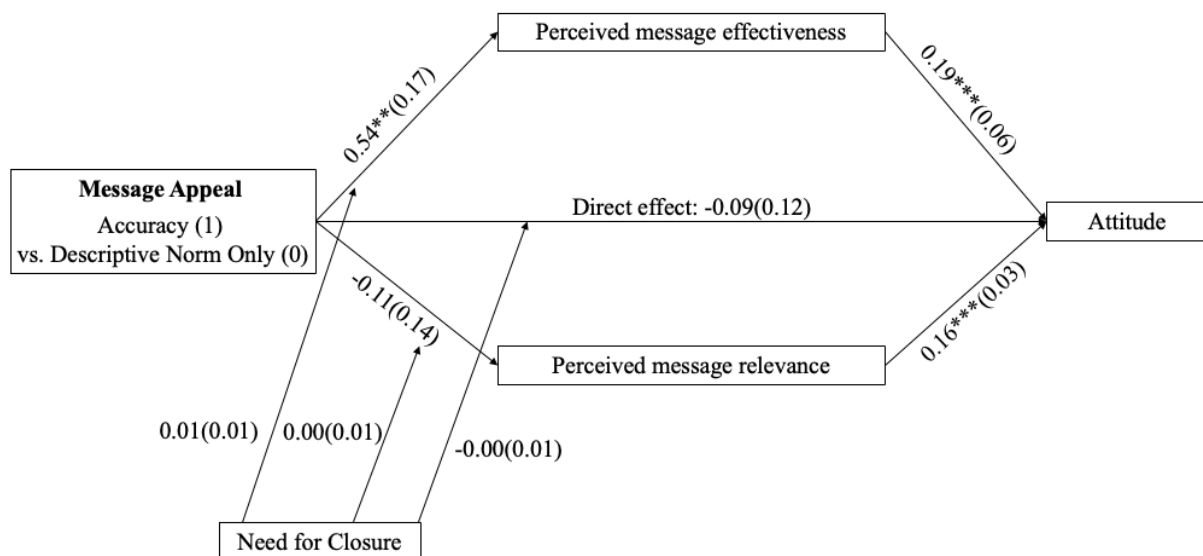


Table 25

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Need for Closure; N = 204)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.84***	0.41	[3.03, 4.67]
Booster (Taken = 1, Not taken = 0)	0.24	0.17	[-0.10, 0.57]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.54**	0.17	[0.20, 0.87]
NFC	0.00	0.01	[-0.01, 0.02]
NFC *Condition	0.01	0.01	[-0.01, 0.04]
$R^2 = .07^{**}, F(4, 199) = 3.73, p = .006$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.68***	0.39	[3.87, 5.42]
Booster (Taken = 1, Not taken = 0)	0.38**	0.15	[0.10, 0.70]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.11	0.14	[-0.40, 0.14]
NFC	0.01	0.01	[-0.00, 0.02]
NFC *Condition	0.00	0.01	[-0.02, 0.03]
$R^2 = .07^{**}, F(4, 199) = 3.46, p = .009$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.98***	0.47	[2.07, 3.96]
Booster (Taken = 1, Not taken = 0)	-0.13	0.11	[-0.34, 0.09]
PDN	0.04**	0.02	[-0.00, 0.08]
PME	0.19***	0.06	[0.08, 0.30]
PMR	0.16***	0.03	[0.10, 0.22]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.09	0.12	[-0.33, 0.14]
NFC	-0.00	0.00	[-0.01, 0.00]
NFC*Condition	-0.00	0.01	[-0.02, 0.01]
$R^2 = .43^{***}, F(7, 196) = 21.49, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive

Norm, NFC = Need for Closure.

Figure 13

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Perceived Uncertainty)

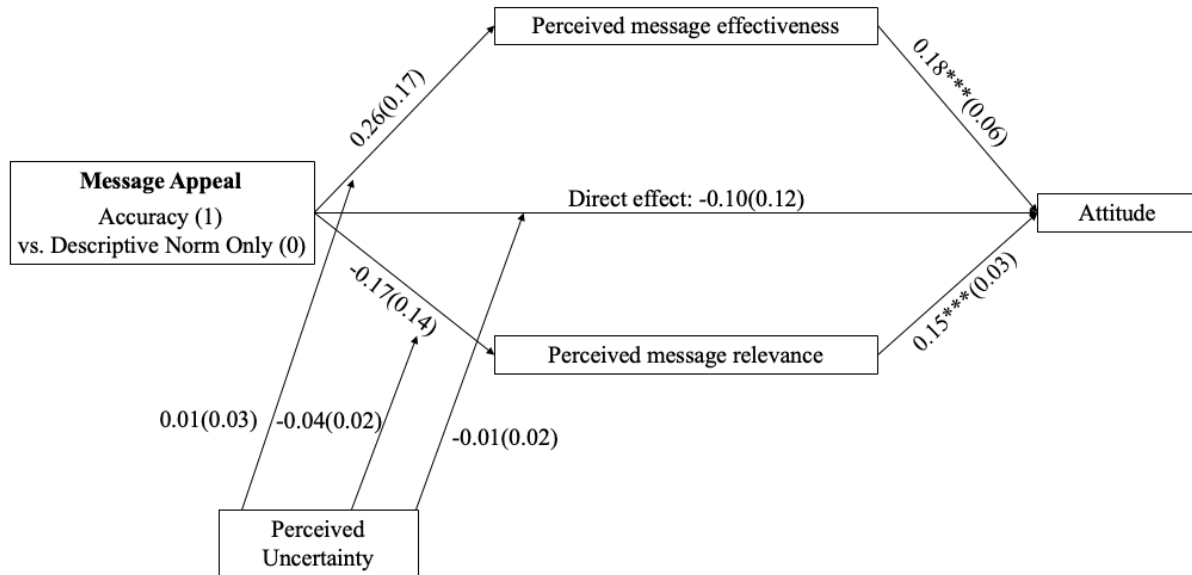


Table 26

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Perceived Uncertainty; N = 204)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.73***	0.51	[2.76, 4.71]
Booster (Taken = 1, Not taken = 0)	0.26	0.17	[-0.07, 0.60]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.54**	0.19	[0.19, 0.90]
PU	0.03	0.02	[-0.01, 0.06]
PU*Condition	0.01	0.03	[-0.05, 0.08]
$R^2 = .08^{**}$, $F(4, 199) = 4.19$, $p = .003$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.81***	0.36	[4.09, 5.51]
Booster (Taken = 1, Not taken = 0)	0.42**	0.14	[0.15, 0.71]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.17	0.14	[-0.46, 0.11]
PU	0.06***	0.02	[0.03, 0.09]

PU*Condition	-0.04	0.02	[-0.09, 0.01]
$R^2 = .11^{***}, F(4, 199) = 6.10, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.84***	0.41	[2.03, 3.66]
Booster (Taken = 1, Not taken = 0)	-0.07	0.11	[-0.29, 0.14]
PDN	0.02	0.02	[-0.01, 0.06]
PME	0.18***	0.06	[0.06, 0.29]
PMR	0.15***	0.03	[0.09, 0.22]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.10	0.12	[-0.34, 0.15]
PU	0.03	0.01	[0.00, 0.05]
PU*Condition	-0.01	0.02	[-0.05, 0.03]
$R^2 = .44^{***}, F(7, 196) = 22.29, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, PU = Perceived Uncertainty.

Relative Benefit (Gain) Condition vs. Descriptive Norm Only Condition

The mediation model (Table 27, Table 28, and Figure 14) showed that the relative benefit motivation appeal – gain frame message (vs. descriptive norm only message) did not have a total effect on attitudes (Effect = -0.07, bootstrap *SE* = 0.11, 95% bootstrap *CI* [-0.30, 0.16]). Relative benefit motivation appeal – gain frame message (vs. descriptive norm only message) significantly increased perceived message effectiveness ($B = 0.39, p = .030$, bootstrap *SE* = 0.18, 95% bootstrap *CI* [0.04, 0.73]) but did not affect perceived message relevance ($B = -0.05, p = .767$, bootstrap *SE* = 0.15, 95% bootstrap *CI* [-0.33, 0.24]). Both perceived message effectiveness ($B = 0.22, p = .000$, bootstrap *SE* = 0.05, 95% bootstrap *CI* [0.11, 0.31]) and perceived message relevance ($B = 0.15, p = .000$, bootstrap *SE* = 0.02, 95% bootstrap *CI* [0.11, 0.19]) were positively associated with attitude. The indirect effect of relative benefit motivation

appeal – gain frame message on attitude through perceived message effectiveness was significant (effect = 0.09, bootstrap *SE* = 0.04, 95% bootstrap *CI* [0.01, 0.16]). The direct effect of relative benefit motivation appeal – gain frame message on attitude (effect = 0.08, bootstrap *SE* = 0.05, 95% bootstrap *CI* [-0.03, 0.18]) and the indirect effect through perceived message relevance (effect = -0.01, bootstrap *SE* = 0.02, 95% bootstrap *CI* [-0.05, 0.04]) were not significant.

Figure 14

Mediation Model of Relative Benefit Motivation Appeal – Gain Frame

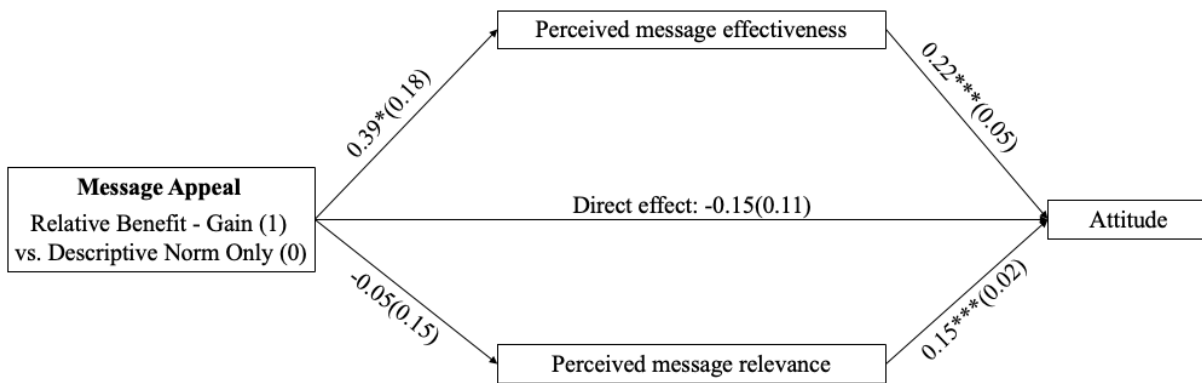


Table 27

Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.55***	0.37	[3.84, 5.33]
Booster (Taken = 1, Not taken = 0)	0.14	0.17	[-0.22, 0.46]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.39*	0.18	[0.04, 0.73]
$R^2 = .03, F(2, 193) = 2.59, p = .077$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.80***	0.30	[4.18, 5.38]
Booster (Taken = 1, Not taken = 0)	0.48**	0.14	[0.18, 0.76]

Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.05	0.15	[-0.33, 0.24]
$R^2 = .05^{**}$, $F(2, 193) = 5.05$, $p = .007$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.97***	0.38	[2.25, 3.72]
Booster (Taken = 1, Not taken = 0)	-0.25*	0.10	[-0.45, -0.04]
PDN	0.06***	0.01	[0.03, 0.08]
PME	0.22***	0.05	[0.11, 0.31]
PMR	0.15***	0.02	[0.11, 0.19]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.15	0.11	[-0.35, 0.07]
$R^2 = .55^{***}$, $F(5, 190) = 45.56$, $p = .000$			

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. PME = Perceived Message Effectiveness (measured

by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm.

Table 28

Total, Indirect and Direct Effects of Relative Benefit Motivation Appeal – Gain Frame (N = 196)

	Effect	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Total Effect	-0.07	0.11	[-0.30, 0.16]
Condition —> PME —> ATT	0.09*	0.04	[0.01, 0.16]
Condition —> PMR —> ATT	-0.01	0.02	[-0.05, 0.04]
Condition —> ATT	0.08	0.05	[-0.03, 0.18]

Note. * denotes significance based on 95% bootstrap *CI*. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 29, Table 30, Figure 15, and Figure 16) showed that relative benefit motivation and fear of missing out did not moderate the effect of relative benefit motivation appeal – gain frame message (vs. descriptive norm only message) on message

perceptions and attitude. In addition, relative benefit motivation was positively associated with perceived message relevance ($B = 0.04$, $p = .003$, bootstrap $SE = 0.01$, 95% bootstrap $CI [0.02, 0.06]$) and negatively associated with attitude ($B = -0.02$, $p = .011$, bootstrap $SE = 0.01$, 95% bootstrap $CI [-0.04, -0.01]$). Fear of missing out was positively associated with perceived message relevance ($B = 0.02$, $p = .049$, bootstrap $SE = 0.01$, 95% bootstrap $CI [0.00, 0.04]$).

Figure 15

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator: Relative Benefit Motivation)

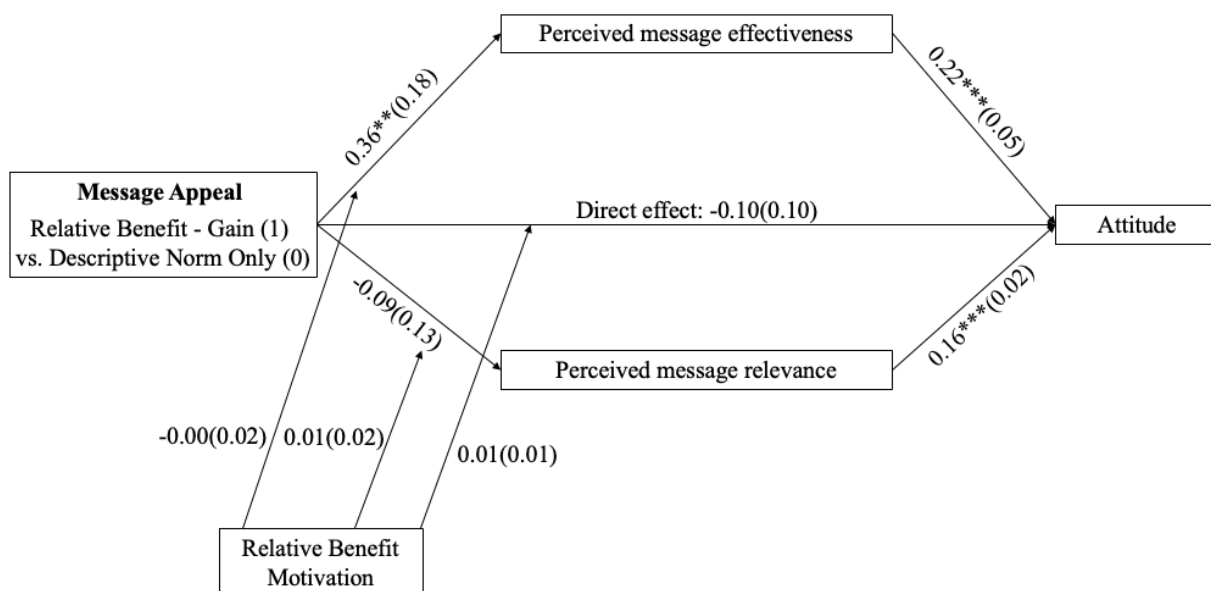


Table 29

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator: Relative Benefit Motivation; N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)

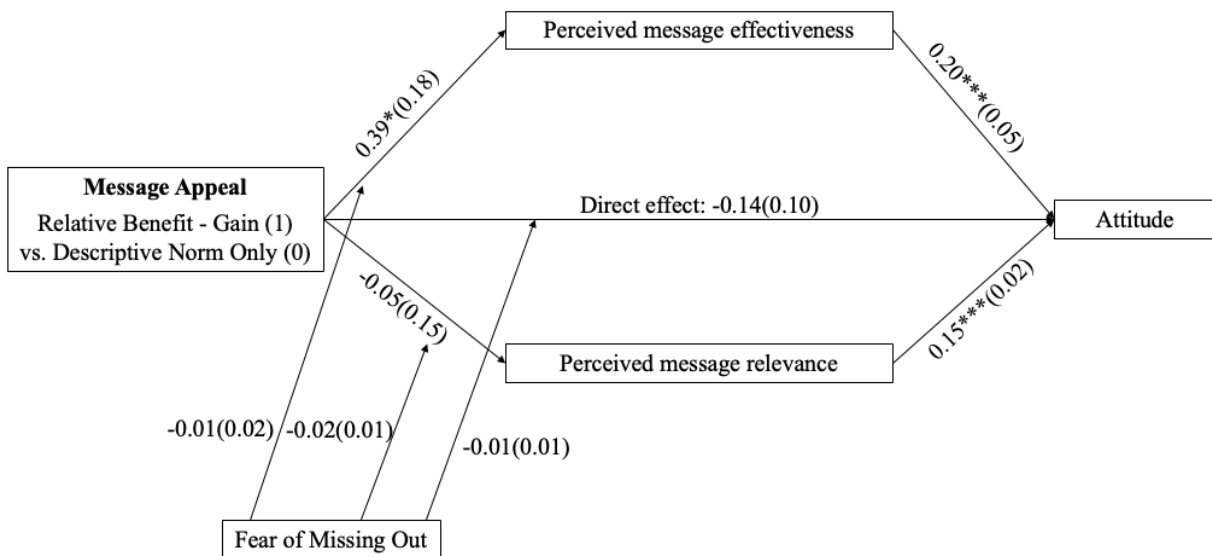
Constant	4.41***	0.44	[3.57, 5.36]
Booster (Taken = 1, Not taken = 0)	0.07	0.17	[-0.30, 0.40]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.36**	0.18	[0.01, 0.66]
BEN	0.03	0.01	[-0.00, 0.05]
BEN*Condition	-0.00	0.02	[-0.05, 0.04]
$R^2 = .05^*$, $F(4, 191) = 2.46$, $p = .047$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	4.48***	0.34	[3.80, 5.13]
Booster (Taken = 1, Not taken = 0)	0.35*	0.14	[0.08, 0.63]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.09	0.13	[-0.34, 0.18]
BEN	0.04**	0.01	[0.02, 0.06]
BEN*Condition	0.01	0.02	[-0.02, 0.04]
$R^2 = .13^{***}$, $F(4, 191) = 7.16$, $p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	2.78***	0.40	[2.02, 3.57]
Booster (Taken = 1, Not taken = 0)	-0.24*	0.10	[-0.43, -0.04]
PDN	0.06***	0.01	[0.04, 0.09]
PME	0.22***	0.05	[0.12, 0.32]
PMR	0.16***	0.02	[0.12, 0.20]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.10	0.10	[-0.29, 0.11]
BEN	-0.02*	0.01	[-0.04, -0.01]
BEN*Condition	0.01	0.01	[-0.01, 0.04]
$R^2 = .56^{***}$, $F(7, 188) = 34.45$, $p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, BEN = Relative Benefit Motivation.

Figure 16

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator: Fear of Missing Out)

**Table 30**

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator: Fear of Missing Out; N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.73***	0.41	[3.95, 5.56]
Booster (Taken = 1, Not taken = 0)	0.20	0.18	[-0.15, 0.54]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.39*	0.18	[0.03, 0.73]
FOMO	0.00	0.01	[-0.03, 0.02]
FOMO*Condition	-0.01	0.02	[-0.05, 0.02]
$R^2 = .03, F(4, 191) = 1.56, p = .186$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.88***	0.31	[4.23, 5.47]
Booster (Taken = 1, Not taken = 0)	0.42**	0.15	[0.12, 0.71]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.05	0.15	[-0.34, 0.23]
FOMO	0.02*	0.01	[0.00, 0.04]
FOMO*Condition	-0.02	0.01	[-0.05, 0.01]
$R^2 = .07^*, F(4, 191) = 3.53, p = .008$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)

Constant	3.17***	0.40	[2.40, 3.98]
Booster (Taken = 1, Not taken = 0)	-0.16	0.10	[-0.37, 0.04]
PDN	0.07***	0.01	[0.04, 0.09]
PME	0.20***	0.05	[0.09, 0.30]
PMR	0.15***	0.02	[0.11, 0.19]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.14	0.10	[-0.34, 0.07]
FOMO	-0.01	0.01	[-0.02, 0.00]
FOMO*Condition	-0.01	0.01	[-0.03, 0.01]
$R^2 = .57***, F(7, 188) = 35.00, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, FOMO = Fear of Missing Out.

Relative Benefit (Loss) Condition vs. Descriptive Norm Only Condition

The mediation model (Table 31, Table 32, and Figure 17) showed that the relative benefit motivation appeal – loss frame message (vs. descriptive norm only message) did not have a total effect on attitudes (Effect = -0.10, bootstrap $SE = 0.12$, 95% bootstrap $CI [-0.34, 0.13]$). Relative benefit motivation appeal – loss frame message (vs. descriptive norm only message) significantly increased perceived message effectiveness ($B = 0.84$, $p = .000$, bootstrap $SE = 0.22$, 95% bootstrap $CI [0.41, 1.29]$) but did not affect perceived message relevance ($B = -0.15$, $p = .333$, bootstrap $SE = 0.16$, 95% bootstrap $CI [-0.47, 0.14]$). Perceived message effectiveness ($B = 0.01$, $p = .875$, bootstrap $SE = 0.04$, 95% bootstrap $CI [-0.06, 0.08]$) was not significantly associated with attitude. Perceived message relevance ($B = 0.24$, $p = .000$, bootstrap $SE = 0.03$, 95% bootstrap $CI [0.19, 0.29]$) was positively associated with attitude. Neither perceived message effectiveness (effect = 0.01, bootstrap $SE = 0.03$, 95% bootstrap $CI [-0.06, 0.07]$) nor perceived message relevance (effect = -0.04, bootstrap $SE = 0.04$, 95% bootstrap $CI [-0.12, 0.03]$) mediated

the effect of relative benefit motivation appeal – loss frame message on attitude. The direct effect of relative benefit motivation appeal – loss frame message on attitude (effect = -0.07, bootstrap $SE = 0.12$, 95% bootstrap $CI [-0.29, 0.17]$) was also not significant.

Figure 17

Mediation Model of Relative Benefit Motivation Appeal – Loss Frame

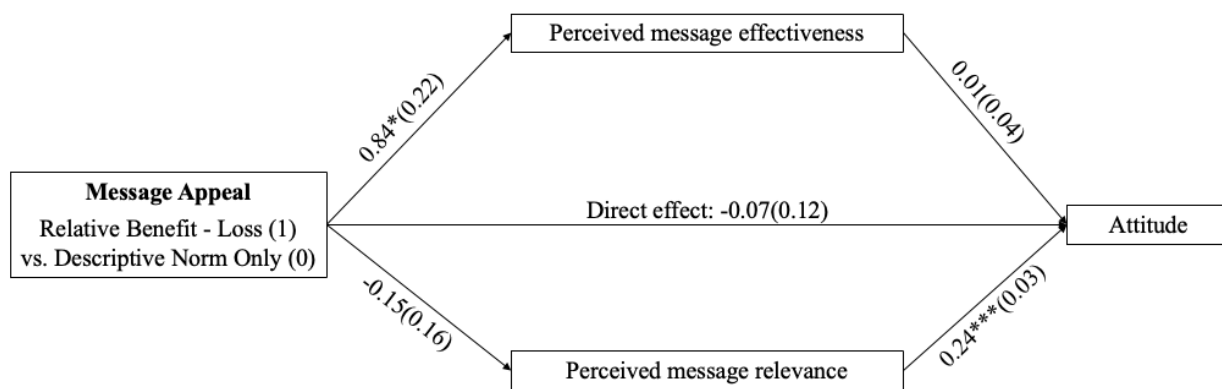


Table 31

Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (N = 198)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.55***	0.50	[1.64, 3.61]
Booster (Taken = 1, Not taken = 0)	0.54*	0.23	[0.09, 0.98]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	0.84***	0.22	[0.41, 1.29]
$R^2 = .09^{**}$, $F(2, 195) = 9.69$, $p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.15***	0.32	[4.55, 5.82]
Booster (Taken = 1, Not taken = 0)	0.31*	0.16	[-0.02, 0.61]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.15	0.16	[-0.47, 0.14]
$R^2 = .03$, $F(2, 195) = 2.54$, $p = .082$			
Dependent Variable: ATT			

	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.44***	0.36	[2.74, 4.11]
Booster (Taken = 1, Not taken = 0)	-0.25*	0.11	[-0.46, -0.04]
PDN	0.02	0.01	[-0.00, 0.05]
PME	0.01	0.04	[-0.06, 0.08]
PMR	0.24***	0.03	[0.19, 0.29]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.07	0.12	[-0.29, 0.17]
$R^2 = .52***, F(5, 192) = 41.41, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm.

Table 32

Total, Indirect and Direct Effects of Relative Benefit Motivation Appeal – Loss Frame (N = 198)

	Effect	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Total Effect	-0.10	0.12	[-0.34, 0.13]
Condition —> PME —> ATT	0.01	0.03	[-0.06, 0.07]
Condition —> PMR —> ATT	-0.04	0.04	[-0.12, 0.03]
Condition —> ATT	-0.07	0.12	[-0.29, 0.17]

Note. * denotes significance based on 95% bootstrap *CI*. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 33, Table 34, Figure 18, and Figure 19) showed that relative benefit motivation and fear of missing out did not moderate the effect of relative benefit motivation appeal – loss frame message (vs. descriptive norm only message) on message perceptions and attitude. In addition, relative benefit motivation was positively associated with perceived message effectiveness ($B = 0.04, p = .018$, bootstrap $SE = 0.02$, 95% bootstrap *CI*

[0.00, 0.08]) and negatively associated with attitude ($B = -0.02$, $p = .020$, bootstrap $SE = 0.01$, 95% bootstrap $CI [-0.04, -0.00]$). FEAR OF MISSING OUT was positively associated with PME ($B = 0.06$, $p = .000$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.03, 0.10]$) and PMR ($B = 0.03$, $p = .024$, bootstrap $SE = 0.01$, 95% bootstrap $CI [0.01, 0.04]$).

Figure 18

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Relative Benefit Motivation)

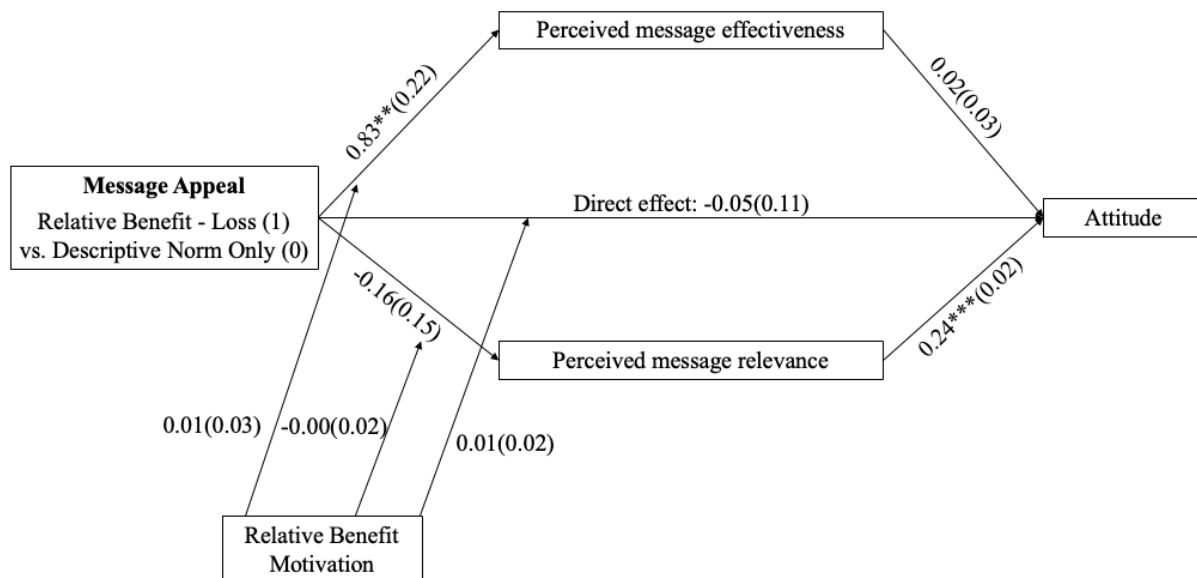


Table 33

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Relative Benefit Motivation; N = 198)

	Mediator: PME		
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.99**	0.56	[0.95, 3.18]
Booster (Taken = 1, Not taken = 0)	0.48	0.22	[0.05, 0.07]

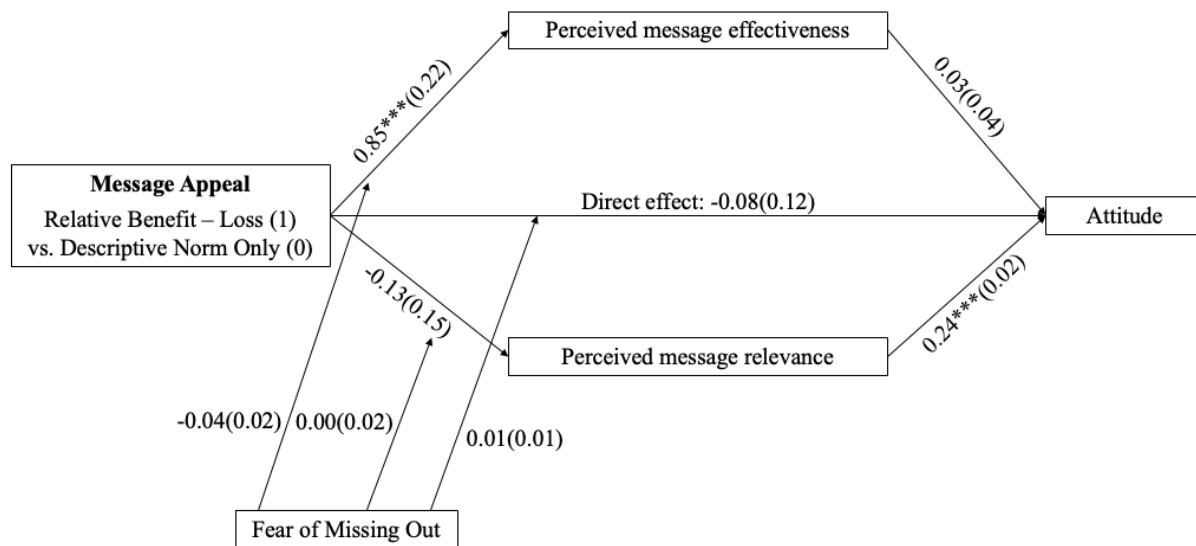
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	0.83***	0.22	[0.40, 1.27]
BEN	0.04*	0.02	[0.00, 0.08]
BEN*Condition	0.01	0.03	[-0.06, 0.07]
$R^2 = .14***, F(4, 193) = 8.07, p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	4.79***	0.41	[3.98, 5.59]
Booster (Taken = 1, Not taken = 0)	0.27	0.15	[-0.03, 0.56]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.16	0.15	[-0.47, 0.10]
BEN	0.04**	0.01	[0.01, 0.06]
BEN*Condition	-0.00	0.02	[-0.04, 0.04]
$R^2 = .09***, F(4, 193) = 5.05, p = .001$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	3.33***	0.36	[2.67, 4.03]
Booster (Taken = 1, Not taken = 0)	-0.25*	0.11	[-0.48, -0.04]
PDN	0.03*	0.01	[0.00, 0.06]
PME	0.02	0.03	[-0.05, 0.09]
PMR	0.24***	0.02	[0.19, 0.29]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.05	0.11	[-0.26, 0.18]
BEN	-0.02*	0.01	[-0.04, -0.00]
BEN*Condition	0.01	0.02	[-0.02, 0.04]
$R^2 = .54***, F(7, 190) = 31.23, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, BEN = Relative Benefit Motivation.

Figure 19

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Fear of Missing Out)

**Table 34**

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Fear of Missing Out; N = 198)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.50***	0.52	[1.50, 3.61]
Booster (Taken = 1, Not taken = 0)	0.31	0.22	[-0.16, 0.76]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	0.85***	0.22	[0.41, 1.27]
FOMO	0.06***	0.02	[0.03, 0.10]
FOMO*Condition	-0.04	0.02	[-0.09, 0.00]
$R^2 = .16^*, F(4, 193) = 9.30, p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.79***	0.34	[4.16, 5.49]
Booster (Taken = 1, Not taken = 0)	0.13	0.16	[-0.19, 0.44]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.13	0.15	[-0.45, 0.14]
FOMO	0.03*	0.01	[0.01, 0.04]
FOMO*Condition	0.00	0.02	[-0.02, 0.04]
$R^2 = .09^{**}, F(4, 193) = 4.56, p = .002$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.40***	0.36	[2.73, 4.09]

Booster (Taken = 1, Not taken = 0)	-0.20	0.02	[-0.42, 0.02]
PDN	0.03*	0.02	[-0.00, 0.06]
PME	0.03	0.04	[-0.05, 0.09]
PMR	0.24***	0.02	[0.19, 0.29]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.08	0.12	[-0.31, 0.16]
FOMO	-0.01	0.01	[-0.03, 0.00]
FOMO*Condition	0.01	0.01	[-0.02, 0.03]
$R^2 = .53***, F(7, 190) = 30.41, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, FOMO = Fear of Missing Out.

Identification Condition vs. Descriptive Norm Only Condition

The mediation model (Table 35, Table 36, and Figure 20) showed that the identification motivation appeal message (vs. descriptive norm only message) did not have a total effect on attitudes (Effect = -0.06, bootstrap $SE = 0.13$, 95% bootstrap $CI [-0.29, 0.20]$). Identification motivation appeal message (vs. descriptive norm only message) significantly increased perceived message effectiveness ($B = 0.48, p = .007$, bootstrap $SE = 0.18$, 95% bootstrap $CI [0.14, 0.86]$) but did not affect perceived message relevance ($B = -0.15, p = .332$, bootstrap $SE = 0.16$, 95% bootstrap $CI [-0.46, 0.16]$). Both perceived message effectiveness ($B = 0.23, p = .000$, bootstrap $SE = 0.06$, 95% bootstrap $CI [0.10, 0.36]$) and perceived message relevance ($B = 0.13, p = .000$, bootstrap $SE = 0.03$, 95% bootstrap $CI [0.08, 0.19]$) were positively associated with attitude. Perceived message effectiveness mediated the effect of identification motivation appeal on attitude (effect = 0.11, bootstrap $SE = 0.05$, 95% bootstrap $CI [0.03, 0.22]$) while perceived message relevance did not mediate the effect on attitude (effect = -0.02, bootstrap $SE = 0.02$, 95% bootstrap $CI [-0.07, 0.02]$). The direct effect of identification motivation appeal message on

attitude (effect = -0.15, bootstrap SE = 0.12, 95% bootstrap CI [-0.38, 0.08]) was also not significant.

Figure 20

Mediation Model of Identification Motivation Appeal

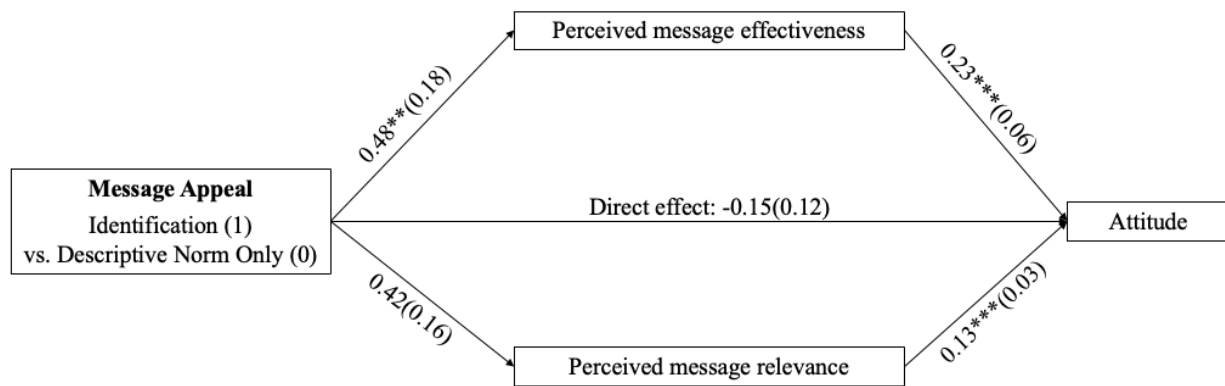


Table 35

Mediation Model of Identification Motivation Appeal (N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.28***	0.36	[3.53, 5.01]
Booster (Taken = 1, Not taken = 0)	0.26	0.18	[-0.09, 0.61]
Condition (Identification = 1, Descriptive norm only = 0)	0.48**	0.18	[0.14, 0.86]
$R^2 = .05^{**}$, $F(2, 193) = 4.41$, $p = .009$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.99***	0.32	[4.35, 5.60]
Booster (Taken = 1, Not taken = 0)	0.42**	0.16	[0.11, 0.73]
Condition (Identification = 1, Descriptive norm only = 0)	-0.15	0.16	[-0.46, 0.16]
$R^2 = .04^*$, $F(2, 193) = 4.26$, $p = .016$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.76***	0.47	[1.92, 3.80]

Booster (Taken = 1, Not taken = 0)	-0.17	0.11	[-0.38, 0.05]
PDN	0.06***	0.02	[0.02, 0.09]
PME	0.23***	0.06	[0.10, 0.36]
PMR	0.13***	0.03	[0.08, 0.19]
Condition (Identification = 1, Descriptive norm only = 0)	-0.15	0.12	[-0.37, 0.11]
$R^2 = .48***, F(5, 190) = 35.22, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm.

Table 36

Total, Indirect and Direct Effects of Identification Motivation Appeal (N = 196)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.06	0.13	[-0.29, 0.20]
Condition —> PME —> ATT	0.11*	0.05	[0.03, 0.22]
Condition —> PMR —> ATT	-0.02	0.02	[-0.07, 0.02]
Condition —> ATT	-0.15	0.12	[-0.38, 0.08]

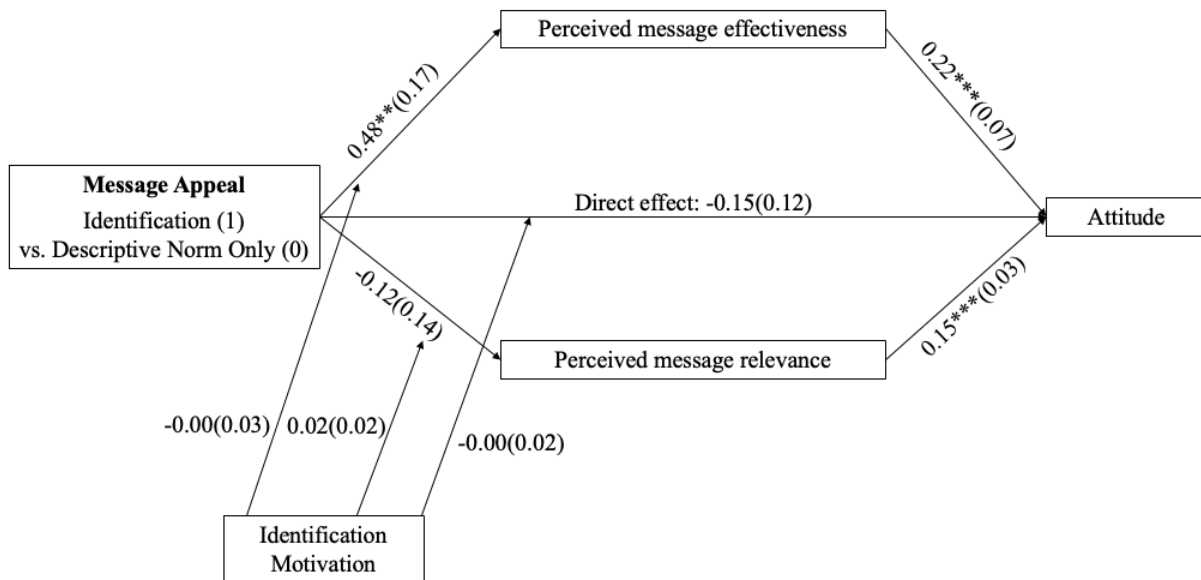
Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 37, Table 38, Figure 21, and Figure 22) showed that identification motivation and upward social comparison did not moderate the effect of identification motivation appeal message (vs. descriptive norm only message) on message perceptions and attitude. In addition, identification motivation was positively associated with perceived message effectiveness ($B = 0.03, p = .021$, bootstrap $SE = 0.01$, 95% bootstrap $CI [0.01, 0.06]$).

Figure 21

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Identification Motivation)

**Table 37**

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Identification Motivation; N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.13***	0.47	[3.22, 5.08]
Booster (Taken = 1, Not taken = 0)	0.23	0.18	[-0.13, 0.59]
Condition (Identification = 1, Descriptive norm only = 0)	0.48**	0.17	[0.14, 0.83]
IDEN	0.02	0.02	[-0.02, 0.05]
IDEN*Condition	-0.00	0.03	[-0.06, 0.06]
$R^2 = .06^*, F(4, 191) = 2.93, p = .022$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.34***	0.38	[3.60, 5.07]

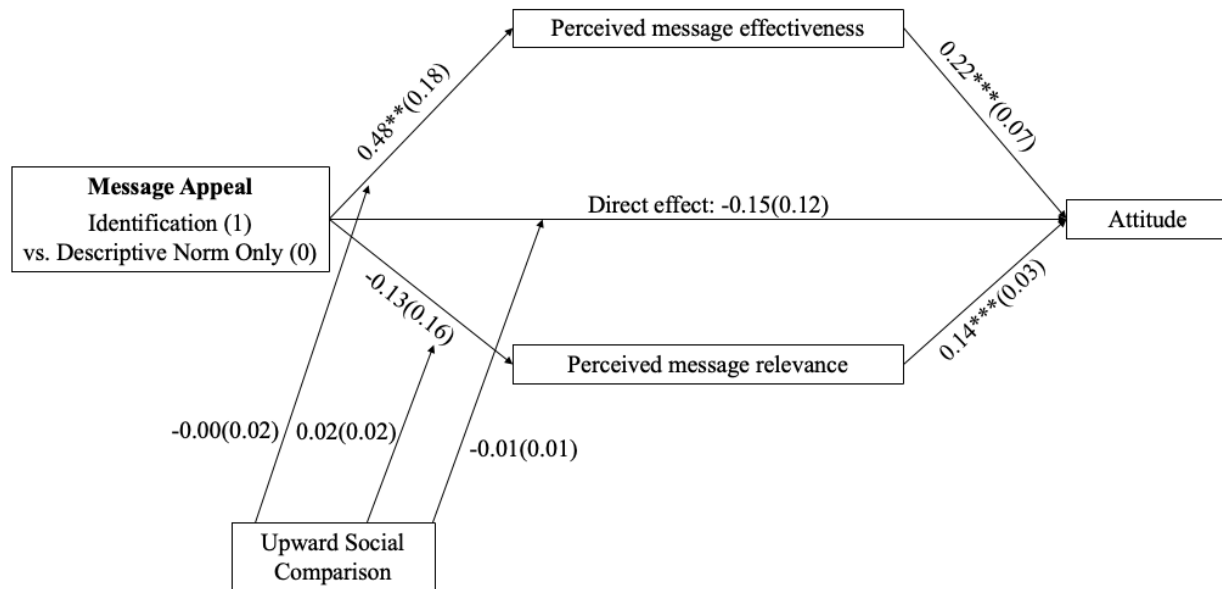
Booster (Taken = 1, Not taken = 0)	0.34*	0.15	[0.05, 0.64]
Condition (Identification = 1, Descriptive norm only = 0)	-0.12	0.14	[-0.41, 0.16]
IDEN	0.03*	0.01	[0.01, 0.06]
IDEN*Condition	0.02	0.02	[-0.02, 0.06]
$R^2 = .13^{***}, F(4, 191) = 7.40, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.84***	0.52	[1.93, 4.01]
Booster (Taken = 1, Not taken = 0)	-0.15	0.10	[-0.36, 0.06]
PDN	0.06***	0.02	[0.03, 0.10]
PME	0.22***	0.07	[0.09, 0.35]
PMR	0.15***	0.03	[0.09, 0.20]
Condition (Identification = 1, Descriptive norm only = 0)	-0.15	0.12	[-0.37, 0.10]
IDEN	-0.02	0.01	[-0.04, 0.00]
IDEN*Condition	-0.00	0.02	[-0.04, 0.03]
$R^2 = .50^{***}, F(7, 188) = 26.55, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, IDEN = Identification Motivation.

Figure 22

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Upward Social Comparison)

**Table 38**

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Upward Social Comparison; N = 196)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.16***	0.45	[3.27, 5.05]
Booster (Taken = 1, Not taken = 0)	0.26	0.18	[-0.08, 0.62]
Condition (Identification = 1, Descriptive norm only = 0)	0.48**	0.18	[0.14, 0.87]
USC	0.01	0.01	[-0.02, 0.04]
USC*Condition	-0.00	0.02	[-0.04, 0.04]
$R^2 = .05^*, F(4, 191) = 2.54, p = .041$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.41***	0.40	[3.64, 5.17]
Booster (Taken = 1, Not taken = 0)	0.42**	0.15	[0.12, 0.72]
Condition (Identification = 1, Descriptive norm only = 0)	-0.13	0.16	[-0.44, 0.17]
USC	0.02	0.01	[-0.00, 0.03]
USC*Condition	0.02	0.02	[-0.02, 0.06]
$R^2 = .09^{**}, F(4, 191) = 4.65, p = .001$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)

Constant	2.97***	0.48	[2.13, 4.05]
Booster (Taken = 1, Not taken = 0)	-0.19	0.10	[-0.40, 0.02]
PDN	0.06***	0.02	[0.03, 0.10]
PME	0.22***	0.07	[0.09, 0.35]
PMR	0.14***	0.03	[0.09, 0.20]
Condition (Identification = 1, Descriptive norm only = 0)	-0.15	0.12	[-0.38, 0.10]
USC	-0.01	0.01	[-0.03, 0.00]
USC*Condition	-0.01	0.01	[-0.03, 0.02]
$R^2 = .50***, F(7, 188) = 26.53, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PDN = Perceived Descriptive Norm, USC = Upward Social Comparison.

Social Award Condition vs. Injunctive Norm Only Condition

The mediation model (Table 39, Table 40, and Figure 23) showed that the social award motivation appeal message (vs. injunctive norm only message) did not have a total effect on attitudes (Effect = -0.21, bootstrap $SE = 0.12$, 95% bootstrap $CI [-0.44, 0.04]$). Social award motivation appeal message (vs. injunctive norm only message) significantly increased perceived message effectiveness ($B = 0.37, p = .011$, bootstrap $SE = 0.14$, 95% bootstrap $CI [0.09, 0.66]$) but did not affect perceived message relevance ($B = 0.13, p = 0.394$, bootstrap $SE = 0.16$, 95% bootstrap $CI [-0.18, 0.44]$). Both perceived message effectiveness ($B = 0.19, p = 0.004$, bootstrap $SE = 0.09$, 95% bootstrap $CI [0.03, 0.37]$) and perceived message relevance ($B = 0.12, p = .000$, bootstrap $SE = 0.03$, 95% bootstrap $CI [0.06, 0.17]$) were positively associated with attitude. Perceived message effectiveness mediated the effect of social award motivation appeal on attitude (effect = 0.07, bootstrap $SE = 0.05$, 95% bootstrap $CI [0.00, 0.18]$) while perceived message relevance did not mediate the effect on attitude (effect = 0.02, bootstrap $SE = 0.02$, 95%

bootstrap *CI* [-0.02, 0.05]). The direct effect of social award motivation appeal on attitude (effect = -0.30, bootstrap *SE* = 0.11, 95% bootstrap *CI* [-0.53, -0.07]) was significant but contrary to the direction proposed in hypothesis.

Figure 23

Mediation Model of Social Award Motivation Appeal

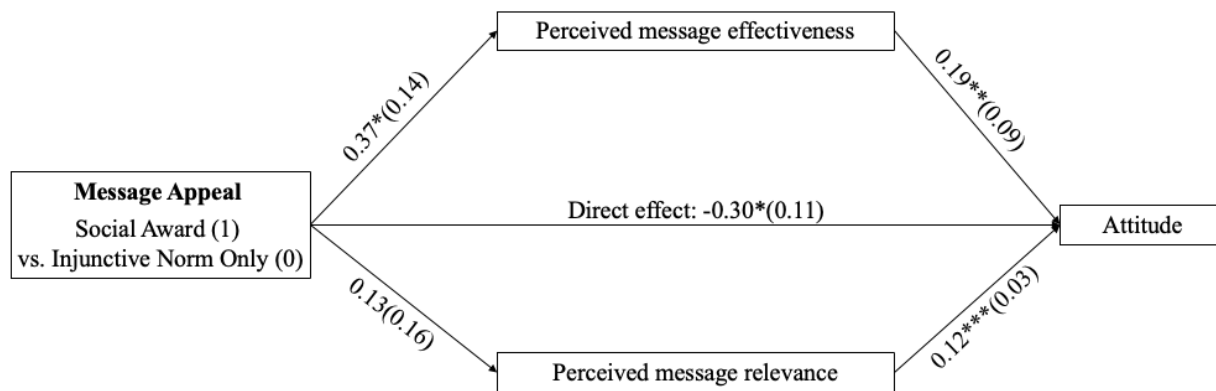


Table 39

Mediation Model of Social Award Motivation Appeal (N = 194)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.34***	0.34	[4.66, 6.04]
Booster (Taken = 1, Not taken = 0)	-0.15	0.14	[-0.43, 0.11]
Condition (Social award = 1, Injunctive norm only = 0)	0.37*	0.14	[0.09, 0.66]
$R^2 = .04^*, F(2, 191) = 3.89, p = .022$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.61***	0.36	[3.92, 5.34]
Booster (Taken = 1, Not taken = 0)	0.44**	0.15	[0.14, 0.73]
Condition (Social award = 1, Injunctive norm only = 0)	0.13	0.16	[-0.18, 0.44]
$R^2 = .04^*, F(2, 191) = 4.42, p = .013$			
Dependent Variable: ATT			

	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.83***	0.50	[2.94, 4.94]
Booster (Taken = 1, Not taken = 0)	-0.18	0.12	[-0.41, 0.05]
PIN	0.03*	0.02	[-0.01, 0.07]
PME	0.19**	0.09	[0.03, 0.37]
PMR	0.12***	0.03	[0.06, 0.17]
Condition (Social award = 1, Injunctive norm only = 0)	-0.30*	0.11	[-0.53, -0.07]
$R^2 = .34***, F(5, 188) = 19.46, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PIN = Perceived Injunctive Norm.

Table 40

Total, Indirect and Direct Effects of Social Award Motivation Appeal (N = 194)

	Effect	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Total Effect	-0.21	0.12	[-0.44, 0.04]
Condition —> PME —> ATT	0.07*	0.05	[0.00, 0.18]
Condition —> PMR —> ATT	0.02	0.02	[-0.02, 0.05]
Condition —> ATT	-0.30*	0.11	[-0.53, -0.07]

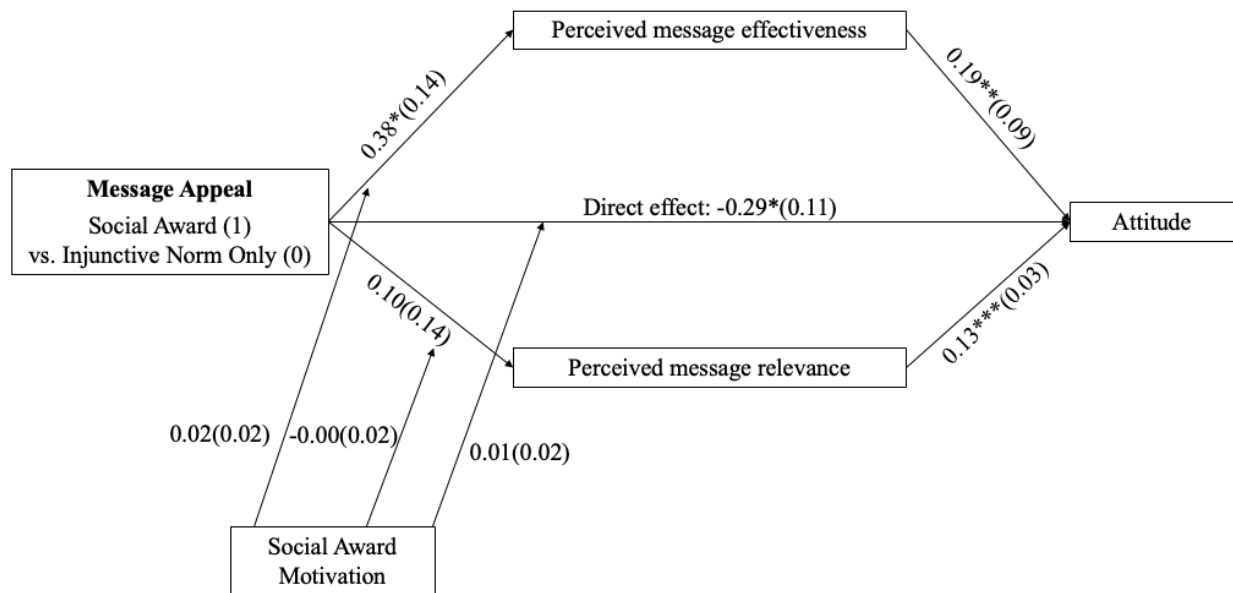
Note. * denotes significance based on 95% bootstrap *CI*. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 41, Table 42, Figure 24, and Figure 25) showed that social award motivation and need for approval did not moderate the effect of social award motivation appeal message (vs. injunctive norm only message) on message perceptions and attitude. In addition, social award motivation was positively associated with perceived message relevance ($B = 0.04, p = .000$, bootstrap $SE = 0.01$, 95% bootstrap $CI [0.02, 0.07]$).

Figure 24

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Social Award Motivation)

**Table 41**

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Social Award Motivation; N = 194)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.97***	0.40	[4.16, 5.78]
Booster (Taken = 1, Not taken = 0)	-0.20	0.15	[-0.52, 0.07]
Condition (Social award = 1, Injunctive norm only = 0)	0.38*	0.14	[0.10, 0.67]
AWA	0.01	0.01	[-0.01, 0.04]
AWA*Condition	0.02	0.02	[-0.02, 0.05]
$R^2 = .07^{**}$, $F(4, 189) = 3.60$, $p = .008$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.24***	0.38	[3.51, 4.98]

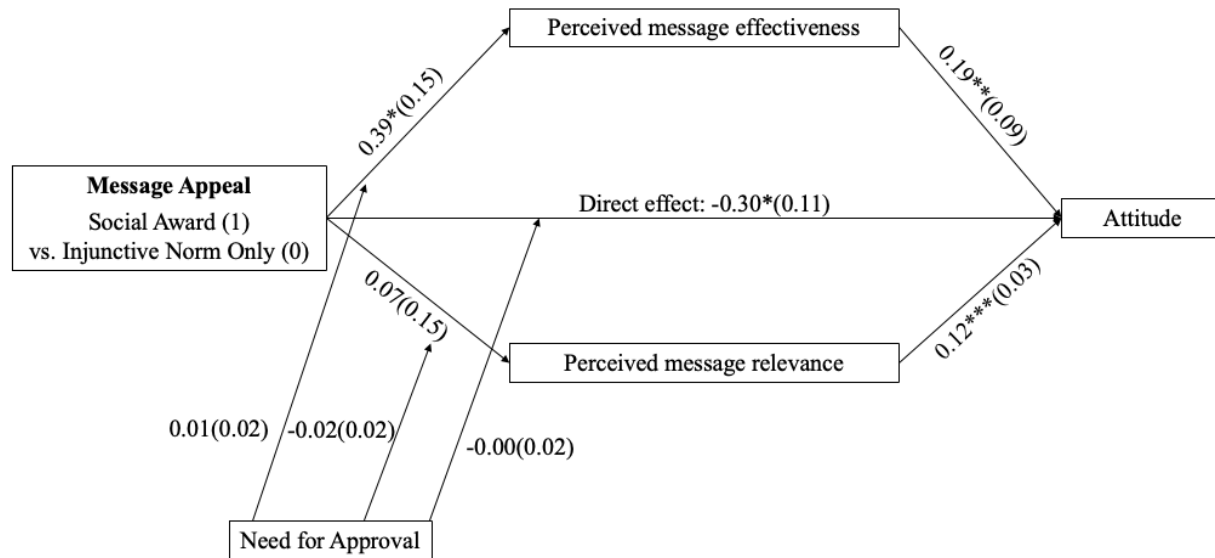
Booster (Taken = 1, Not taken = 0)	0.32*	0.14	[0.04, 0.59]
Condition (Social award = 1, Injunctive norm only = 0)	0.10	0.14	[-0.16, 0.37]
AWA	0.04**	0.01	[0.02, 0.07]
AWA*Condition	-0.00	0.02	[-0.04, 0.04]
$R^2 = .15^{***}, F(4, 189) = 8.19, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.73***	0.51	[2.79, 4.80]
Booster (Taken = 1, Not taken = 0)	-0.16	0.12	[-0.40, 0.07]
PIN	0.04*	0.02	[-0.00, 0.08]
PME	0.19**	0.09	[0.02, 0.37]
PMR	0.13***	0.03	[0.07, 0.18]
Condition (Social award = 1, Injunctive norm only = 0)	-0.29*	0.11	[-0.51, -0.06]
AWA	-0.01	0.01	[-0.03, 0.01]
AWA*Condition	0.01	0.02	[-0.02, 0.04]
$R^2 = .35^{***}, F(8, 186) = 14.00, p = .000$			

Note. ⁺ $p < 0.1$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PIN = Perceived Injunctive Norm, AWA = Social Award Motivation.

Figure 25

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Need for Approval)

**Table 42**

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Need for Approval; N = 194)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.28***	0.44	[4.45, 6.17]
Booster (Taken = 1, Not taken = 0)	-0.14	0.14	[-0.44, 0.13]
Condition (Social award = 1, Injunctive norm only = 0)	0.39*	0.15	[0.10, 0.69]
NFA	-0.00	0.01	[-0.02, 0.02]
NFA*Condition	0.01	0.02	[-0.04, 0.04]
$R^2 = .04^*, F(4, 189) = 1.97, p = .100$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.77***	0.45	[3.93, 5.66]
Booster (Taken = 1, Not taken = 0)	0.39*	0.15	[0.08, 0.69]
Condition (Social award = 1, Injunctive norm only = 0)	0.07	0.15	[-0.24, 0.36]
NFA	0.02	0.01	[-0.00, 0.04]
NFA*Condition	-0.02	0.02	[-0.06, 0.02]
$R^2 = .06^*, F(4, 189) = 3.16, p = .015$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.84***	0.54	[2.88, 5.08]

Booster (Taken = 1, Not taken = 0)	-0.19	0.12	[-0.42, 0.06]
PIN	0.03*	0.02	[-0.01, 0.07]
PME	0.19**	0.09	[0.02, 0.37]
PMR	0.12***	0.03	[0.06, 0.17]
Condition (Social award = 1, Injunctive norm only = 0)	-0.30*	0.11	[-0.53, -0.09]
NFA	0.00	0.01	[-0.02, 0.02]
NFA*Condition	-0.00	0.02	[-0.03, 0.03]
$R^2 = .34^{***}, F(7, 186) = 13.75, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PIN = Perceived Injunctive Norm, NFA = Need for Approval.

Social Punishment Condition vs. Injunctive Norm Only Condition

The mediation model (Table 43, Table 44, and Figure 26) showed that the social punishment motivation appeal message (vs. injunctive norm only message) did not have a total effect on attitudes (Effect = -0.14, bootstrap $SE = 0.12$, 95% bootstrap $CI [-0.35, 0.10]$). Social punishment motivation appeal message (vs. injunctive norm only message) significantly increased perceived message effectiveness ($B = 0.46, p = .002$, bootstrap $SE = 0.23$, 95% bootstrap $CI [0.00, 0.90]$) but did not affect perceived message relevance ($B = -0.27, p = .106$, bootstrap $SE = 0.17$, 95% bootstrap $CI [-0.59, 0.06]$). Perceived message effectiveness ($B = -0.06, p = .171$, bootstrap $SE = 0.04$, 95% bootstrap $CI [-0.14, 0.03]$) was not significantly associated with attitude. Perceived message relevance was positively associated with attitude ($B = 0.16, p = .000$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.11, 0.20]$). Neither perceived message effectiveness (effect = -0.03, bootstrap $SE = 0.03$, 95% bootstrap $CI [-0.09, 0.01]$) nor perceived message relevance (effect = -0.04, bootstrap $SE = 0.03$, 95% bootstrap $CI [-0.10, 0.01]$) mediated the effect of social punishment motivation appeal message on attitude. The direct effect of social

punishment motivation appeal message on attitude (effect = -0.07, bootstrap SE = 0.12, 95% bootstrap CI [-0.29, 0.16]) was also not significant.

Figure 26

Mediation Model of Social Punishment Motivation Appeal

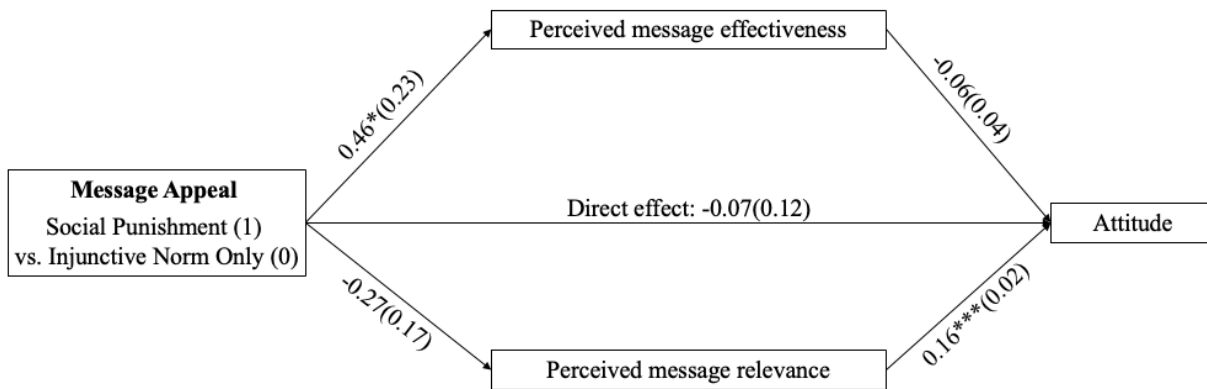


Table 43

Mediation Model of Social Punishment Motivation Appeal (N = 203)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.80***	0.51	[1.79, 3.77]
Booster (Taken = 1, Not taken = 0)	0.71**	0.22	[0.30, 1.18]
Condition (Social punishment = 1, Injunctive norm only = 0)	0.46*	0.23	[0.00, 0.90]
$R^2 = .07***, F(2, 200) = 7.38, p = .001$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.67***	0.38	[3.88, 5.40]
Booster (Taken = 1, Not taken = 0)	0.67***	0.17	[0.34, 1.02]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.27	0.17	[-0.59, 0.06]
$R^2 = .08***, F(2, 200) = 9.04, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.49***	0.44	[2.57, 4.35]

Booster (Taken = 1, Not taken = 0)	0.00	0.12	[-0.23, 0.22]
PIN	0.05***	0.02	[0.02, 0.08]
PME	-0.06	0.04	[-0.14, 0.03]
PMR	0.16***	0.02	[0.11, 0.20]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.07	0.12	[-0.29, 0.16]

$$R^2 = .37***, F(5, 197) = 23.35, p = .000$$

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PIN = Perceived Injunctive Norm.

Table 44

Total, Indirect and Direct Effects of Social Punishment Motivation Appeal (N = 203)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.14	0.12	[-0.35, 0.10]
Condition —> PME —> ATT	-0.03	0.03	[-0.09, 0.01]
Condition —> PMR —> ATT	-0.04	0.03	[-0.10, 0.01]
Condition —> ATT	-0.07	0.12	[-0.29, 0.16]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude.

The moderated mediation model (Table 45, Table 46, Figure 27, and Figure 28) showed that social punishment motivation and fear of negative evaluation did not moderate the effect of social punishment motivation appeal message (vs. injunctive norm only message) on message perceptions and attitude. In addition, social punishment motivation was positively associated with perceived message effectiveness ($B = 0.03$, $p = .039$, bootstrap $SE = 0.02$, 95% bootstrap CI

[0.00, 0.07]). Fear of missing out was also positively associated with perceived message relevance ($B = 0.04$, $p = .034$, bootstrap $SE = 0.02$, 95% bootstrap $CI [0.00, 0.07]$).

Figure 27

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Social Punishment Motivation)

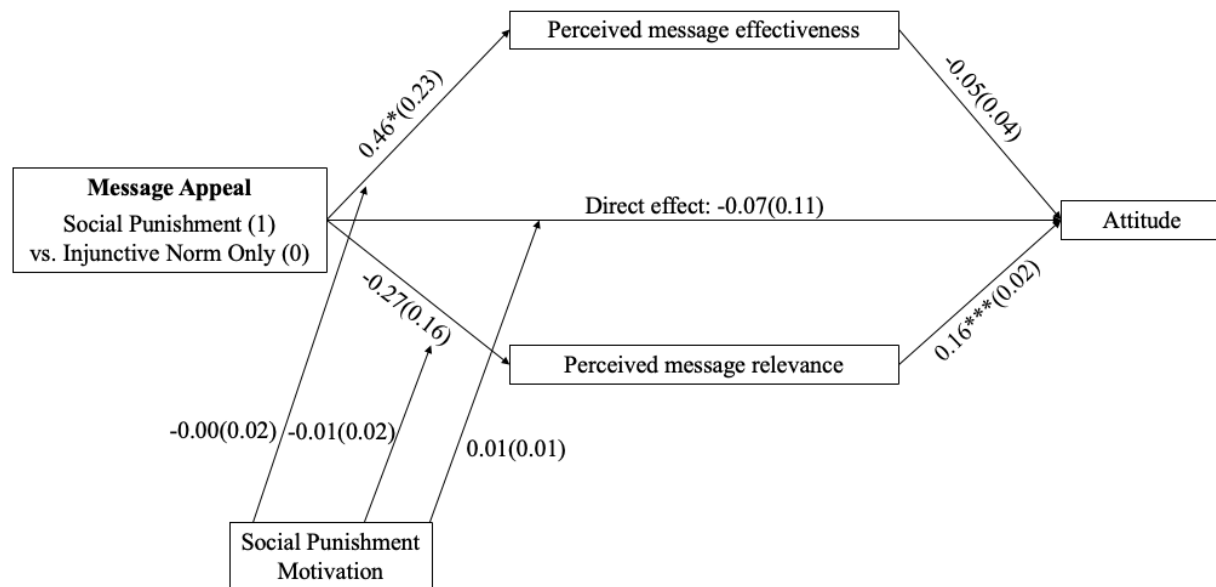


Table 45

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Social Punishment Motivation; N = 203)

	Mediator: PME		
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.30***	0.53	[1.19, 3.32]
Booster (Taken = 1, Not taken = 0)	0.64**	0.22	[0.22, 1.08]
Condition (Social punishment = 1, Injunctive norm only = 0)	0.46*	0.23	[0.00, 0.90]
PUN	0.03*	0.02	[0.00, 0.07]
PUN*Condition	-0.00	0.02	[-0.05, 0.04]

$R^2 = .11^{***}, F(4, 198) = 5.81, p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.44***	0.43	[3.56, 5.25]
Booster (Taken = 1, Not taken = 0)	0.62***	0.17	[0.29, 0.98]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.27	0.16	[-0.59, 0.06]
PUN	0.02	0.01	[0.00, 0.04]
PUN*Condition	-0.01	0.02	[-0.04, 0.03]
$R^2 = .10^{***}, F(4, 198) = 5.78, p = .000$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.42***	0.48	[2.50, 4.41]
Booster (Taken = 1, Not taken = 0)	0.01	0.12	[-0.22, 0.24]
PIN	0.05***	0.02	[0.02, 0.09]
PME	-0.05	0.04	[-0.14, 0.03]
PMR	0.16***	0.02	[0.12, 0.21]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.07	0.11	[-0.29, 0.16]
PUN	-0.01	0.01	[-0.03, 0.01]
PUN*Condition	0.01	0.01	[-0.02, 0.04]
$R^2 = .38^{***}, F(7, 195) = 16.81, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness, PMR =

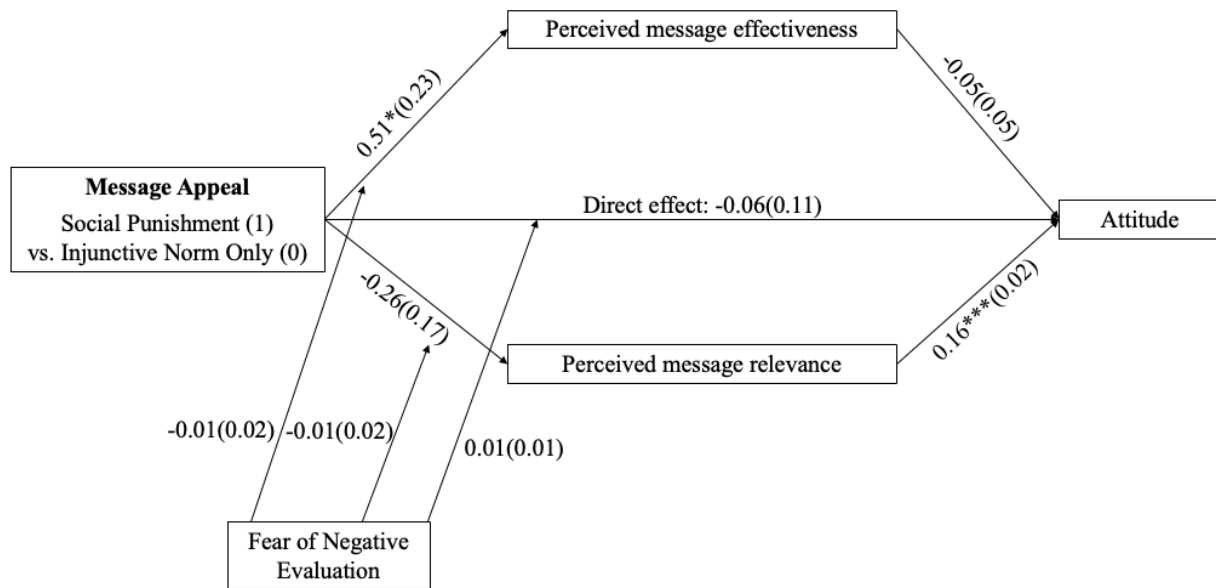
Perceived Message Relevance (measured by “This message makes me think about the negative

outcomes of not getting a COVID-19 booster shot.”), ATT = Attitude, PIN = Perceived

Injunctive Norm, PUN = Social Punishment Motivation.

Figure 28

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Fear of Negative Evaluation)

**Table 46**

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Fear of Negative Evaluation; N = 203)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.37***	0.61	[1.15, 3.55]
Booster (Taken = 1, Not taken = 0)	0.66**	0.22	[0.26, 1.14]
Condition (Social punishment = 1, Injunctive norm only = 0)	0.51*	0.23	[0.06, 0.93]
FNE	0.04*	0.02	[0.00, 0.07]
FNE*Condition	-0.01	0.02	[-0.06, 0.04]
$R^2 = .10***, F(4, 198) = 5.51, p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	4.56***	0.50	[3.52, 5.47]
Booster (Taken = 1, Not taken = 0)	0.65***	0.17	[0.33, 0.99]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.26	0.17	[-0.58, 0.08]
FNE	0.02	0.01	[-0.00, 0.04]
FNE*Condition	-0.01	0.02	[-0.04, 0.03]
$R^2 = .09***, F(4, 198) = 5.00, p = .001$			
Dependent Variable: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)

Constant	3.35***	0.49	[2.41, 4.34]
Booster (Taken = 1, Not taken = 0)	0.00	0.12	[-0.23, 0.23]
PIN	0.05***	0.02	[0.02, 0.09]
PME	-0.05	0.05	[-0.14, 0.04]
PMR	0.16***	0.02	[0.12, 0.20]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.06	0.11	[-0.26, 0.17]
FNE	-0.01	0.01	[-0.03, 0.01]
FNE*Condition	0.01	0.01	[-0.01, 0.04]
$R^2 = .38***, F(7, 195) = 16.76, p = .000$			

Note. ⁺ $p < .1$. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness

(measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, PIN = Perceived Injunctive Norm, FNE = Fear of Negative Evaluation.

Chapter 8 Discussion

Results Summary

Pilot study 1 developed and validated an instrument for norm conformity motivations. The study showed that the scale had adequate face validity, content validity, convergent and discriminant validity, and reliability.

Pilot study 2 developed norm-based messages with motivation appeals in the context of getting a COVID-19 booster, followed by the main study that tested the persuasiveness of the motivation appeals on attitudes and behavioral intentions. The main study found that norm-based messages with motivation appeals did not result in more favorable attitudes of getting a COVID-19 booster compared to norm-based messages. Also, there was no direct effect of motivation appeals on attitudes toward getting a COVID-19 booster in all models, except that social award motivation appeal had a negative direct effect on attitudes.

When looking at the mediation paths, norm-based messages with motivation appeals led to higher perceived message effectiveness but did not change perceived message relevance compared to norm-based messages without motivation appeals. In the models involving accuracy motivation condition, identification condition, relative benefit (gain) condition, and social award condition, perceived message effectiveness was positively associated with attitudes. In the models involving relative benefit (loss) condition and social punishment condition, perceived message effectiveness was not associated with attitudes. Perceived message relevance was positively associated with attitudes toward getting a COVID-19 booster. Individual characteristics did not moderate the effect of norm-based messages with motivation appeals on message perceptions and attitudes compared to norm-based messages.

The Main Effect of Motivation Appeals

The study found that norm-based messages with motivation appeals did not increase attitudes and behavioral intentions of COVID-19 vaccination compared to norm-based messages. The results suggest that the persuasiveness of norm conformity motivation appeals is generally limited.

The lack of the main effect may be due to psychological reactance and counterargument against the benefits or costs of COVID-19 vaccination. Previous studies found that adding benefits or costs statements to norm-based messages increased favorable attitudes and behavioral intentions (Do et al., 2021; Koh, 2019; van der Linden, 2015; Yoon et al., 2016). But the topics in these studies (i.e., recycling, drinking bottled water, reusing towels, and saving) were unlikely to induce high psychological reactance and counterargument.

However, in this study, there might be strong counterargument and psychological reactance given the context and the time of data collection. Thinking that the vaccines were unsafe and useless was one of the main reasons for COVID-19 vaccine hesitancy (Troiano & Nardi, 2021). Message recipients with strong beliefs of vaccine unsafety and uselessness may argue back the benefits or costs presented in the motivation appeals. For example, the accuracy motivation appeal may be argued back if the message recipients believe that a booster is not safe or useful. Also, Bokhari and Shahzad (2022) found that for individuals that were not fully compliant with COVID-19 prevention measures, psychological reactance is a significant factor in influencing their behaviors. Participants in this study likely had strong psychological reactance because they did not follow the booster recommendation though they were already eligible for a booster before taking Survey I.

The time of data collection may also result in recruiting participants with strong counterargument and psychological reactance against COVID-19 booster recommendation. Most participants in this study were recruited in February and March 2022, about three months after authorization of a booster shot to all U.S. individuals 18 years of age and older (U.S. Food and Drug Administration, 2021c). Individuals who were eligible but had not got a booster in February and March likely had a strong opinion against COVID-19 boosters and easily argued against the benefits or costs of norm (non)conformity presented in the messages. Research shows that it is a more and more difficult task to change COVID-19 vaccination attitudes and behavioral intentions with persuasion messages as time passes. Bokemper et al. (2021) found that messages emphasizing community interest and reciprocity of vaccination benefits and embarrassment of not getting vaccinated were effective for participants recruited in fall 2020. However, the same messages were not effective for participants recruited in spring 2021. The authors explained that individuals who remained unvaccinated in spring 2021 were harder to persuade.

Research also suggests that what individuals care about changes as the pandemic progresses. Jordan et al. (2021) found that messages emphasizing public health benefits were more effective than messages highlighting personal health benefits for participants recruited in March 2020. But the effect was not significant for the participants recruited in late April 2020. These findings suggests that the individual perceived importance of collective health benefits decreases and the perceived importance of personal health benefits increases as the pandemic continues. These findings probably also indicates that the influence of social norms may wane over time. As individuals care more about their own health, they may be concerned more with protection and side effects brought by the vaccination. In that case, they may not be persuaded by

social benefits of vaccination such as social award, social punishment, and identification with admired groups. Also, although accuracy and relative benefit motivation presented personal health benefits, the arguments were based on social norms (i.e., what others do are likely to be correct and do not miss out on the protection other people get). Individuals may see these arguments weak when they care much about personal health.

Perceived Message Effectiveness as a Mediator

This study showed that motivation appeals increased perceived message effectiveness, which was indicated by the extent to which individuals thought about the positive or negative outcomes of the norm (non)conformity behavior. The type of outcome (i.e., positive or negative) that individuals thought about was consistent with the type of outcome that the motivation appeals intended to present. Specifically, accuracy motivation appeal, identification motivation appeal, relative benefit motivation appeal – gain frame, and social award motivation appeal led individuals to think about the positive outcomes of the norm conformity behavior. Relative benefit motivation appeal – loss frame and social punishment motivation led individuals to think about the negative outcomes of the norm nonconformity behavior. The extent to which individuals thought about the positive outcomes of norm conformity behaviors was positively associated with attitudes toward getting a COVID-19 booster. In contrast, the extent to which individuals thought about the negative outcomes of norm conformity behaviors was not associated with attitudes. In sum, the mediation path through the thinking about positive outcomes of norm conformity was significant while the mediation path through the thinking about negative outcomes of norm nonconformity was not significant. Although some of the mediation paths through perceived message effectiveness were significant, discussing the theoretical and practical implications should take caution given the absence of the total effect.

The Significant Mediation Path Through Thinking About Positive Outcomes

The study found that motivation appeals that presented the benefits of getting a COVID-19 booster increased participants' thinking about the positive outcomes of getting a booster. The thinking about positive outcomes was positively associated with attitudes toward getting a booster. The results suggest that norm conformity motivation appeals likely increased attitudes and intentions through the cognitive process of generating positive thoughts about the norm (non)conformity behavior. The number and the valence of thoughts elicited by messages is an important indicator of message persuasiveness and message recipients' cognitive responses (Gilbert et al., 1998; Kim & Cappella, 2019). Messages that elicit more favorable thoughts about a behavior are more likely to increase favorable attitudes, and messages that produce more unfavorable thoughts are typically not persuasive (Kim & Cappella, 2019). The cognitive process may also explain previous studies which found that communicating the gain or loss of health behaviors increased perceived message effectiveness (Grummon et al., 2019; Grummon et al., 2022; Noar et al., 2018; Taillie et al., 2020; Tripp et al., 2021), attitudes (Yoon et al., 2016), and behavioral intentions (Do et al., 2021; Koh, 2019; van der Linden, 2015).

In addition, the mediation path provides support for the argument that norm conformity is driven by the evaluation of the expected benefits and costs of norm (non)conformity behaviors (Farrow et al., 2017; Falk & Scholz, 2018; Gavrillets, 2020; Stallen et al., 2013; Young, 2015). By making message recipients think about the benefits of the norm conformity behavior, the motivation appeals add to the value of the norm conformity behavior. The valuation system changes attitudes and behavioral intentions because of individuals' tendency to maximize the value they expect from their actions (Buckholtz, 2015; Colombo, 2014; Folk & Scholz, 2018).

The Nonsignificant Mediation Path Through Thinking About Negative Outcomes

The study found that motivation appeals that presented the costs of not getting a COVID-19 booster increased thinking about the negative outcomes of not getting a booster. However, thinking about negative outcomes was not associated with attitudes toward getting a booster. Previous studies also found that communicating the negative outcomes of not getting a COVID-19 vaccine may not influence attitudes and behavioral intentions. Capasso et al. (2021) found that compared to no message control, emphasizing the possible pride of getting the vaccine (i.e., feeling proud about taking the opportunity to protect yourself and others) increased attitudes and intentions of vaccination. However, emphasizing the possible regret of not getting the vaccine (i.e., avoiding feeling regret about not taking the opportunity to protect yourself and others) did not affect the attitude and intention of vaccination (Capasso et al., 2021).

Psychological reactance may explain the unintended effect of loss-framed messages (Huang & Liu, 2021). Studies found that loss-framed (vs. gain-framed) messages led to stronger psychological reactance (Cho & Sands, 2011; Reinhart et al., 2007; Shen, 2015). It is likely because the language used in a loss-framed message is more intense and controlling and is often perceived as “a command that must be answered, obeyed, or reacted against” (Cho & Sands, 2011, p. 310). Also, because a loss-framed message often elicits negative emotions, it is likely perceived as more “manipulative” (Shen, 2015, p. 977). Therefore, more thinking about the negative outcomes of not getting a COVID-19 booster may induce psychological reactance. And the increased psychological reactance may offset the persuasiveness of motivation appeals.

In addition, uncertainty about the vaccine may also affect the effectiveness of messages communicating the benefits or cost of a behavior. Huang and Liu (2021) found that a loss-framed message communicating the risk of not getting a COVID-19 vaccine was more effective than a gain-framed message among participants who were primed with high uncertainty about the

vaccine through a thought-listing task. However, the loss-framed message was less persuasive in the low uncertainty condition through increased psychological reactance (Huang & Liu, 2021). Huang and Liu explained that individuals were more likely to engage in heuristic processing under low uncertainty. When using heuristic processing, individuals may use the valence of message frames as a heuristic cue and thus feel more reactance when reading the loss-framed message. In this current study, participants had an average perceived uncertainty score of 5.79 on a 1 to 7 scale. A higher score indicated less uncertainty about getting a COVID-19 booster. Therefore, participants in this study generally had low uncertainty about getting a booster. Based on Huang and Liu's findings, messages communicating the negative outcomes of not getting a booster may be less persuasive.

Cognitive Deliberation and Persuasiveness of Norm-based Message

The results about the mediation path involving perceived message effectiveness also suggest that presenting the benefits of norm (non)conformity in norm-based messages may have the same effect as prompting message recipients to engage in cognitive deliberation of social norm information. Melnyk et al. (2011) found that increasing cognitive deliberation of descriptive and injunctive norm messages elicited more positive and less negative thoughts about the norm conformity behavior and changed attitudes and behavioral intentions. This study shows that presenting the benefits or costs of the norm conformity behavior has a similar effect: it makes message recipients think about the positive or negative outcomes of the norm (non)conformity behavior. And in turn, thinking about positive outcomes affects attitudes and behavioral intentions.

However, this study did not formally test the role of cognitive deliberation. In Melnyk and colleagues' study (2011), participants in the high deliberation condition read the instruction,

“You will see an article on the screen. Please read the article very carefully! Afterward, you will be asked to write down your thoughts about the topic of the article.” In this current study, message recipients read the instruction before seeing the Facebook post, “In this study, we would like to read a Facebook post about COVID-19 booster shot by Immunization Action Coalition (IAC) and then answer a few questions. Please read the message carefully.” The instruction was similar to the high cognitive deliberation condition in Melnyk and colleagues’ study, but the language was less impelling. Therefore, message recipients in this current study likely engaged in a moderate amount of cognitive deliberation of the Facebook post. This study and Melnyk and colleagues’ study suggest that prompting individuals to engage in high cognitive deliberation of social norm information or presenting the benefits or costs of norm (non)conformity when cognitive deliberation is moderate may similarly lead to more favorable and less unfavorable thoughts about the behavior.

Future studies should manipulate cognitive deliberation to fully understand how the effectiveness of norm conformity motivation appeals is related to cognitive deliberation. Supposing that individuals who read norm-based messages are less likely to think about positive and negative outcomes when cognitive deliberation is low (vs. high), the difference in persuasiveness between norm-based messages with motivation appeals and norm-based messages should be larger when cognitive deliberation is low (vs. high). However, the hypothesis should be tested by future experimental studies.

Perceived Message Relevance as a Mediator

The study found that perceived message relevance was associated with attitudes, which is consistent with the findings in previous studies (Hullet, 2002; Keating, 2020; Rettie et al., 2005; O’Reilly et al., 2016; Varnali, 2014). However, the motivation appeals did not affect perceived

message relevance. Previous studies on perceived message relevance suggest that messages are perceived as more relevant when they describe behavioral outcomes that are more important to message recipients (Roser, 1990; Zhao & Peterson, 2016). This hypothesis was further supported by studies on matching, which found that messages addressing the outcomes that message recipients care about were perceived as more relevant than messages addressing other outcomes (DeBono & Packer, 1991; Hullet, 2002; Yoon & Ferle, 2018). In this study, it is likely that the benefits or costs presented in the motivation appeals were not perceived as important to message recipients when they were not matched with norm conformity motivations.

Direct Effect of Motivation Appeals on Attitudes

This study found social award appeal had a significant negative direct effect on attitudes toward getting a COVID-19 booster. It is possibly because message recipients thought the benefit stated in the social award motivation appeal message was unlikely to happen. The social award motivation appeal said that “People around you will be proud of you if you take the responsibility to protect families, friends, and fellow community members by getting the booster shot.” Being proud may be a strong social award that is more difficult to obtain than other social awards like appreciation. Also, being proud of an individual may likely occur among the individuals’ close social networks (e.g., family and close friends) and less likely among the general “people around you.” Therefore, message recipients may consider the benefits stated in the social award motivation appeal unlikely to happen. Although the motivation appeal may increase favorable attitudes by making recipients think about the positive outcomes, the perception that the positive outcome is unlikely to happen may negatively affect attitudes. However, the explanation needs to be empirically tested.

Except for social award appeal, the direct effect of other motivation appeals on attitudes was not significant. It means that the impact of motivation appeals on attitudes that is not through perceived message effectiveness and perceived message relevance was not significant (VanderWeele, 2015). It does not rule out the existence of other mediation pathways that were not examined in this study. This study focused only on the cognitive pathways through which motivation appeals affect attitudes. Motivation appeals may affect attitudes also through affective processes. For example, given that different motivation appeals lead to consideration of either positive or negative outcomes, positive or negative emotion may also be a mediator in the process. Future studies may explore other possible mediation paths in the process.

The Insignificant Moderation Effect

This study did not find any moderation effects of message recipients' characteristics. The result is inconsistent with what was found in previous studies about message matching (Teeny et al., 2021). One underlying assumption of the matching effect is that a targeted message recipient's characteristics reflect motivational tendencies (Rothman et al., 2020). Although the message recipients' characteristics examined in this study may reflect their motivational tendencies, the motivational tendencies may not be the motivation that guides the behavior of getting a COVID-19 booster. For example, although a need for approval suggests that individuals may typically be guided by the desire to obtain social approval in most life scenarios, individuals may not necessarily be guided by this motivation when they make a behavioral decision on getting a COVID-19 booster.

Goal framing theory (Lindenberg & Step, 2007) posits that multiple goals may guide individual behaviors. The goal that becomes focal at the moment guides the cognitive process and the behavioral choice. For example, when the normative goal, an overarching goal identified

in goal framing theory, becomes focal, individuals' norm beliefs become more accessible; they are more sensitive to social norm cues like approval and disapproval; and their tendency to conform to norms is activated (Lindenberg & Steg, 2007). The theory posits that both internal and situational factors shift the relative weight of different goals: They determine which goal carries more weight than other goals and becomes the focal goal that guides behaviors at the moment of decision. For example, internal factors, such as a strong egoistic value, may make the goal to pursue personal benefits consistently more salient than other goals and discourage individuals from engaging in environmental behaviors (Lindenberg & Steg, 2007). However, situational factors, such as the presence of significant others who support environmental behaviors, may make the normative goal more salient at the moment and encourage the individual to engage in ecological behaviors (Lindenberg & Steg, 2007).

In this study, the message recipients' characteristics are the internal factors that reflect individuals' consistent tendency to pursue a particular goal. Based on the conceptual meanings, the individual characteristics measured in this study, including need for closure, upward social comparison, fear of missing out, need for approval, and fear of negative evaluation may reflect the motivational tendency to arrive at a definite and correct decision (Gelfand & Harrington, 2015), to compare to and emulate the superior group (Butzer & Kuiper, 2006), to secure the benefits that other people obtain (Przybylski et al., 2013), to gain approval from others (Cramer, 2014), and avoid negative evaluation from others (Leary, 1983).

However, the context, COVID-19 booster shots, is the situational factor that may influence which goal governs the behavior choice at the moment. Although the message recipients' characteristics may make a motivational tendency consistently more salient, the motivation that drives the context-specific behavior (i.e., getting a COVID-19 booster shot) may

differ from the general motivational tendency. When processing the persuasion messages and deciding on getting a booster shot, other motivations, such as restoring the freedom of behavior choice and avoiding side effects of vaccination, may outweigh these underlying motivational tendencies.

In addition, the norm conformity motivation measure in this study also reflects general motivational tendencies. The instruction of the norm conformity motivation scale says, “Consider situations when you follow what most people do” and “Consider situations when you follow what most people think you should do or expect you to do.” Therefore, the scores show what motivations drive norm conformity in a typical life scenario that participants think of. However, the motivation that drives conformity to the norm of getting a COVID-19 booster shot may differ from the motivation that drives norm conformity in the case that participants think of. Pool and Schwegler (2007) found that individuals may be driven by different norm conformity motivations for different behaviors. They found that the accuracy motive was the strongest motivation that drove recycling behavior while other-related motive (i.e., social punishment and award motivation) was the strongest motive that drove drinking behavior. The findings suggest that the measure of norm conformity motivation may need to be context-specific to capture the motivations that drive norm conformity of the focal behavior. For example, to understand the motivations that drive conformity to COVID-19 booster norms, the measure should prompt participants to think about following the norms to get a COVID-19 booster.

Different from the individual characteristics mentioned above, perceived uncertainty of behavioral choice was measured in the context of getting a COVID-19 booster (i.e., When you think about whether your decision to get a COVID-19 booster shot is correct, how do you feel?). However, it was also not a significant moderator in the model. It is possibly because the overall

uncertainty about getting a COVID-19 booster was low. Only 71 (8.95%) participants scored lower than 4 on a 7-point scale. A lower score indicated more uncertainty about getting a COVID-19 booster. The low uncertainty among the participants meant that most participants were not motivated to follow social norms to make a correct decision and reduce uncertainty. Therefore, the message matching did not work.

Limitations

The studies have several limitations, which suggest a careful interpretation of the results and future studies to further validate the findings. First, the pilot study only tested the construct validity and reliability of the instrument with a single sample recruited from MTurk. It is unclear if the instrument is valid and reliable in other samples. In addition, several psychometric characteristics, such as criterion validity (Allen, 2017), item information, and differential item functioning (Livingston, 2006), were not evaluated in this study. Therefore, it is unclear if the score obtained from the instrument predicts the score of an expected outcome (i.e., criterion validity), if each item provides a similar amount of information on the test score (i.e., item information), and if the instrument or items function differently for different demographic groups of participants (i.e., differential item functioning). To further evaluate the validity and generalizability of the instrument, future studies may test the instrument in different samples and examine these psychometric characteristics.

Second, the main study analyses did not have adequate power to detect the effect due to an insufficient sample size, a small effect size, and measurement error. The final sample size in the main study did not meet the sample size computed from the a priori power analysis. Several reasons led to the failure to recruit enough participants. Robinson et al. (2019) estimated that there were at least 14,600 workers active on MTurk every month. As of February 10, 2022,

64.3% of the U.S. population had been fully vaccinated, and 53.2% of the total booster-eligible population had not yet received a booster (CDC, 2022a). This means that less than 34.2% of the U.S. population were eligible for a booster but had not received the dose. If the MTurk participant pool was representative of the U.S. population, then about 4,990 MTurk participants were eligible for this study every month. Moss et al. (2020) found that the response rate of MTurk participants for a single wave study was 19.12%, with a pay rate of 9 dollars per hour. Therefore, if this study included a single-wave survey with a pay rate of 9 dollars per hour, there would be about 954 participants per month. However, because this study had a two-wave survey with a pay rate of \$6.3–\$9 per hour for completing both Survey 1 and 2, the expected sample size should be much smaller than 954 participants per month. In addition, the size of the effect found in this study was smaller than the effect size used for a priori power analysis. A larger sample size is needed to detect a small effect size. Otherwise, the power is low (Reinhart, 2015). Furthermore, the main study did not use an analysis method that takes into account the measurement error (e.g., structural equation modeling). The measurement error may also affect the power to detect the effect (Reinhart, 2015).

In sum, due to the small effect size, insufficient sample size, and the possible measurement error, the main study analyses were underpowered (Reinhart, 2015). Therefore, we may not make a confident conclusion that the main, mediation and interaction effect that were not detected in this study does not exist. Future studies may test the hypotheses with adequate power by recruiting enough participants and using an analysis method that takes into account measurement error.

Third, the main study used a single-item measure for perceived message effectiveness. It is because this study found that the UNC Perceived Message Effectiveness Scale (Baig et al.,

2019) had a low reliability with the sample of this study. The scale was developed for anti-smoking messages and was validated in three samples, including a convenience U.S. adult sample recruited from MTurk, an adolescent sample, and an adult sample from a previous tobacco study. The scale had a high reliability in the Baig et al. (2019) study but had a low reliability in this study. This may suggest that the scale may be suitable for the context of reducing unhealthy behaviors, but may not be suitable for the context of COVID-19 boosters or the context of encouraging healthy behaviors.

Using a single-item measure brings several concerns. Compared to a multi-item measure that may cover different construct dimensions, a single-item measure may only capture one of the construct dimensions (Viswanathan, 2005). Studies show that perceived message effectiveness includes various dimensions and that different measures of perceived message effectiveness cover different dimensions. For example, perceived message effectiveness may be considered a two-dimension construct that includes message attribute and message impact (Dillard & Ye, 2008) or be considered a two-dimension construct that includes message-directed or personalized effect (Brennan et al., 2014). In addition, Noar et al. (2018a) found considerable variability in perceived message effectiveness measures in terms of what dimensions were captured by the measure. Some measures focus on the general perceptions of a message and ask if a message is believable, memorable, or interesting, while some measures focus on perceptions of expected message effects and ask if a message motivates behavior, makes one think about the risks, or increases one's confidence to engage in a behavior (Noar et al., 2018a). With the single-item measure, this study only captured the thinking about positive or negative outcome dimension of message effectiveness. Therefore, the interpretation of the results should be constrained to the effect of motivation appeals on recipients' thinking about positive or negative

outcomes (one dimension of perceived message effectiveness) instead of an impact on the general perceived message effectiveness construct.

Also, it is unlikely to evaluate many psychometric properties of a single-item measure, such as internal consistency (Viswanathan, 2005). If a single-item need to be employed, its validity should be demonstrated through a high covariation with other measures of the construct and a high test-retest reliability across studies (Viswanathan, 2005). However, this study cannot provide such validation.

Fourth, although the main study tested a mediation model, it does not warrant a causal mediation process. Some of the assumptions for causal inference, including temporal order and confounding variables (VanderWeele, 2015), may not be met in this study. Although the measure of message perceptions preceded the measure of attitudes and behavioral intentions in the questionnaire, the observed temporal order may not accurately reflect the temporal order in cognitive process. Also, in addition to perceived norms, other confounding variables in the mediator-outcome path may not be captured in this study. For example, the value of the outcome before the treatment may be a confounding variable (VanderWeele, 2015). Therefore, prior attitudes and intentions toward COVID-19 boosters may be confounding variables and should have been measured and included in the analysis. With these in mind, we need to refrain from making a causal interpretation of the mediation findings in this study.

Lastly, several limitations of message design constrain the generalizability and ecological validity of the study. The study only tested one message for each condition. Although the study used one of the three different images in the Facebook posts, it may still be considered a single-message design because each treatment (i.e., motivation appeal) was only represented by one version of message content. A single-message design does not provide good evidence for

generalization (O’Keefe, 2015). Future studies may test multiple messages generated based on the same idea of norm conformity motivation appeal. In addition, to avoid the intervening effect of social media cues (i.e., number of comments, likes, and shares), the Facebook posts did not include any social media cues. Therefore, the stimuli were different from real Facebook posts. This may reduce the credibility of the Facebook post stimuli and affect the persuasion effect. Future studies may explore how to rule out the effect of social media cues while including them in the experiment stimuli.

Also, although this study shows that social punishment message increased thinking about negative outcomes, this study does not recommend using social punishment message in practice. This study tested the social punishment condition due to theoretical consideration. If the social punishment motivation appeal message was found persuasive, then it supported the theoretical idea that social punishment motivates norm conformity. However, health communication practices seldomly use messages indicating punishment because punishment statement may lead to unintended backfire effect. Therefore, future studies and health communication practices should take cautions if they consider including social punishment motivation appeal in messages.

Moreover, future studies may improve on selecting and testing the visuals accompanying the social media messages. To increase the study generalizability, future studies may use a more rigorous procedure to choose the visuals in the message stimuli. To ensure that the visuals were representative of the pictures used by health organizations, studies may gather all vaccine-related visuals from social media posts by health organizations and randomly sample several visuals from the pool. Also, research has shown that social media messages with visuals were shared more but research was needed on what kinds of images were shared most (King & Lazard,

2020). Future studies may design different visuals and examine which type of visuals produce better persuasion and message dissemination outcomes.

Theoretical and Practical Implications

Theoretically, the pilot study contributes to social norm theories by synthesizing and defining five norm conformity motivations. The framework fills the gap in research of social norm influence process by providing clear conceptual and operational definitions of norm conformity motivations; synthesizing motivations identified in previous studies; distinguishing motivations to conform to descriptive and injunctive norms; and considering the understanding of norm conformity motivations from the perspectives of different fields including social psychology, economics, neuroscience, and communication. In addition, by developing and employing a norm conformity motivation instrument, the pilot study found individual variations in the norm conformity motivation scores, which suggests the existence of different levels of norm conformity motivations in the population. The instrument also contributes to future social norm theory development by providing a tool to test the process of social norm influence (Bell & Cox, 2015).

In health communication practices, the instrument can be used to understand message recipients' norm conformity motivations. And then, health communication practitioners can design persuasion messages that match message recipients' motivations to change health behaviors. Although the message strategies tested in this study had limited persuasion effect, the instrument allows researchers and practitioners to test other possible message strategies that target norm conformity motivations. For example, are messages presenting the benefits or costs related to norm conformity motivations more persuasive for individuals with high perceived norms? Do social award and social punishment motivation appeal more persuasive when the

referent group is more proximal to message recipients (e.g., people in your neighborhood vs. people in the United States)? For individuals with a high social award or punishment motivation, do interventions that promote family or peer discussion about social award or punishment increase norm conformity in a community?

The main study contributes to the advancement of social norm and message matching theories by suggesting the role of benefits and costs evaluation in norm influence and the importance of motivation salience in message matching. The main study found that including motivation appeals (i.e., linking norm (non)conformity with the benefits or costs related to norm conformity motivations) in norm-based messages may increase favorable attitudes by making message recipients think about the positive or negative outcomes of norm (non)conformity. This suggests that individual responses to norm-based persuasion messages may be partially driven by cognitive evaluation of the positive or negative outcomes. Future theorizing of social norm influence may consider the role of evaluations of positive or negative outcomes. For example, TNSB theorizes outcome expectation as a moderator in the influence of descriptive norms on behavioral intentions. It is possible that expectation and evaluation of norm (non)conformity outcomes is a mediator in the norm conformity process. These hypotheses need to be tested in future studies.

In addition, the lack of message matching effect in the main study suggests the importance of considering motivation salience in the message matching theory. Compared to matching message content with individual characteristics that represent general motivation tendencies, the message matching theory may emphasize more on matching message content with salient or focal motivations at the moment of message processing and behavioral decision making. In communication practice, it is unlikely to learn which motivations are salient at the

moment, matching can also be done by priming a motivation before message exposure (e.g., Wheeler et al., 2008).

Unfortunately, the main study did not find a main effect of norm conformity motivation appeal on attitudes. So, we cannot recommend it as an effective message strategy to encourage COVID-19 booster uptake in health communication practice. The results may suggest that norm conformity motivation appeals may be persuasive at the early stage of the pandemic or for individuals who do not have a strong attitude against COVID-19 vaccination. Also, norm conformity motivation appeal may be useful in other health contexts such as flu and HPV vaccination where message recipients do not have strong attitudes and psychological reactance as in the COVID-19 booster context. In addition, using a proximal referent group (e.g., use people in your neighborhood instead of people in the United States) in the messages may increase the value of the benefits and costs. Health communication practitioners may observe a stronger persuasion effect of norm conformity motivation appeals when the message use a more proximal norm referent group. Such hypotheses need to be tested in future studies.

Conclusion

The dissertation provided a framework that synthesized norm conformity motivations identified in previous research, developed and validated an instrument to measure the motivations, and tested the effectiveness of norm conformity motivation appeals in changing attitudes and intentions to engage in health behaviors (i.e., get a COVID-19 booster). The main study showed that norm conformity motivation appeals only indirectly increased attitudes through changing perceived message effectiveness. Matching motivation appeals with individual characteristics did not increase message persuasiveness. The dissertation contributes to the social norm literature and health communication practice by providing a conceptual framework and a

measurement tool of norm conformity motivations. The framework and the instrument allow future studies to further the understanding of the process of social norm influence in different contexts and enable health communication practitioners to gauge recipients' norm conformity motivations and design tailored messages. The main study contributes to social norm theories by suggesting the importance of benefits and costs evaluation in social norm influence. The main study also contributes to the message matching theory and practice by suggesting the importance of motivation salience. Future studies and practices of message matching may need to consider what motivations are salient when making behavioral decisions.

Appendix A Message Stimuli¹

Figure A1

Descriptive Norm Only Message Option 1 (52 Words)



¹ Motivational appeals are highlighted with italic font in the appendix. In pilot study 2 and main study, all the message text was nonitalic.

Figure A2

Descriptive Norm Only Message Option 2 (54 Words)



Figure A3

Accuracy Motivation Message Option 1 (49 Words)



Figure A4

Accuracy Motivation Message Option 2 (50 Words)



Figure A5

Relative Benefit Motivation Message (Gain Frame) Option 1 (54 Words)



Figure A6

Relative Benefit Motivation Message (Gain Frame) Option 2 (53 Words)



Figure A7

Relative Benefit Motivation Message (Loss Frame) Option 1 (52 Words)



Figure A8

Relative Benefit Motivation Message (Loss Frame) Option 2 (53 Words)



Figure A9

Identification Motivation Message Option 1 (54 Words)



Figure A10

Identification Motivation Message Option 2 (54 Words)



Figure A11

Injunctive Norm Only Message Option 1 (82 Words)



Figure A12

Injunctive Norm Only Message Option 2 (80 Words)



Figure A13*Social Award Motivation Message Option 1 (81 Words)*

Figure A14*Social Award Motivation Message Option 2 (81 Words)*

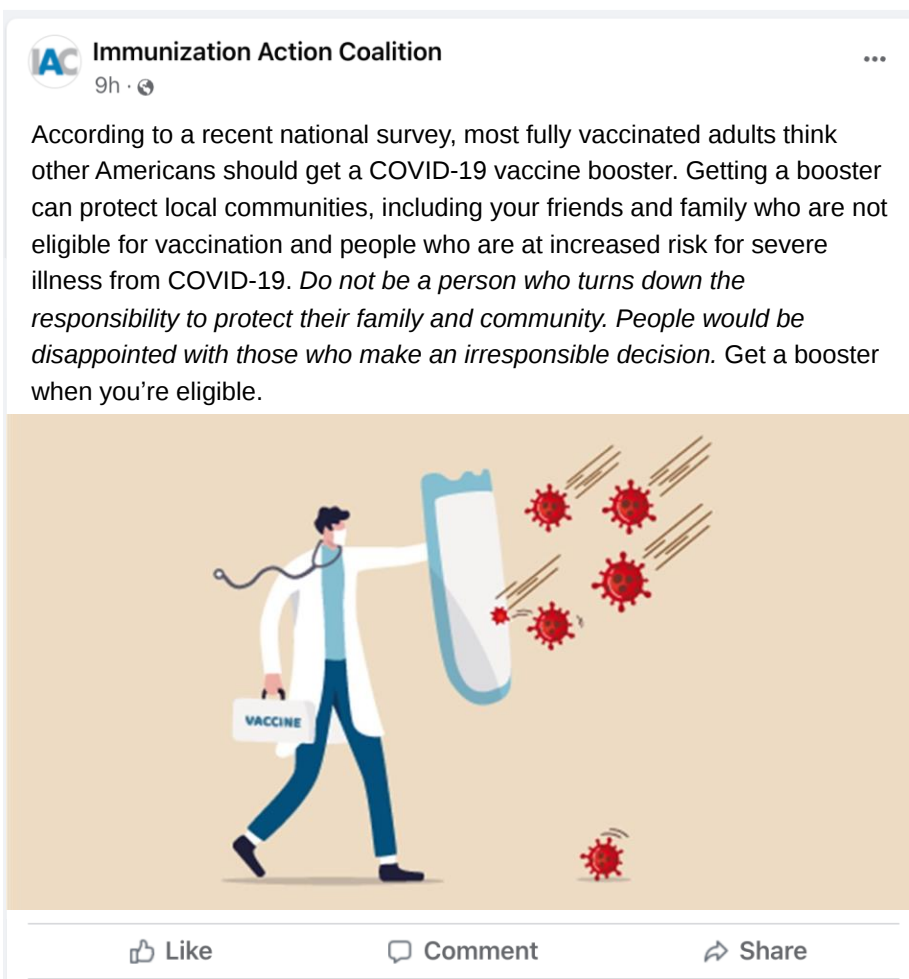
Figure A15

Social Punishment Motivation Message Option 1(85 Words)



Figure A16

Social Punishment Motivation Message Option 2 (82 Words)



Appendix B Pilot Study 2 Questionnaire

The purpose of the survey is to gather feedback on messages designed to promote COVID-19 booster shots. You will read definitions of 5 norm conformity motivations and 16 messages about COVID-19 booster shots. We would like your feedback on the extent to which the messages appeal to each norm conformity motivations, the extent to which the messages are easy to read and understand, and your general feeling about the persuasiveness of the messages.

[Next Page]

People follow social norms for different reasons. People may follow *descriptive norm* (i.e., *what most other people do*) because of the following motivations:

- ***Accuracy motivation*** refers to the desire to take correct actions in respond to a situation. When motivated for accuracy reasons, people often look at what most other people do to find out the most correct and adaptive behaviors to respond to the situation at hand.
 - ***Example:*** If most people get a COVID-19 booster shot, I may follow what they do to get a booster shot because it is likely that getting a booster shot is effective in preventing infections of COVID-19 if most people do that.
- ***Relative benefit motivation*** refers to the desire to obtain the benefits that others who engage in the behavior may obtain. As individuals perceive that most other people obtain benefits by engaging in a behavior, they are more likely to follow the descriptive norms because they are afraid of missing the opportunity to gain the benefits that most others who engage in the behavior are able to obtain.

- **Example:** When I see most people get a COVID-19 booster shot, I will follow the norm because I do not want to miss the protection that most other people obtain by getting the booster shot.
- **Identification with admired group motivation** refers to the desire to identify with a group that one admires. By following the behavior of people that a person admires, the person may feel that they are a member of the group that they admire.
 - **Example:** I admire people who are knowledgeable, dependable, manage their health very well, and plan for their life wisely. When I find that most of them (i.e., people I admire) get a COVID-19 booster shot, I will follow their norm to get a booster shot because conforming to the norm makes me feel that I am one of those who I admire, which makes me feels good about myself.

Also, people may follow *injunctive norm* (i.e., *what most other people expect one to do*) because of the following motivations:

- **Social award motivation** refers to the desire to gain social award such as gaining approval, acceptance, encouragement, and compliments from others, and therefore maintain rewarding relationship with others.
 - **Example:** If most people around me think that I should get a COVID-19 booster shot because getting a COVID-19 booster shot can help people around me prevent COVID-19 infection, I will do that because I want to be seen as responsible and liked by others.

- ***Social punishment motivation*** refers to the desire to avoid social penalty such as being ostracized, disapproved, criticized, and disliked by others.
 - ***Example:*** If most people around me think that I should get a COVID-19 booster shot because getting a COVID-19 booster shot can help people around me prevent infection, I will do that because I do not want others to think me as being irresponsible and disapprove me.

[Next Page]

[Participants will read each message and answer the following questions for each message.]

Appeal to Motivation

1. How well does the message you just read appeal to accuracy motivation? (Note: Appealing to accuracy motivation means the message shows that one makes a correct decision if they follow the norm of getting a booster.)
2. How does well the message you just read appeal to relative benefit motivation in a gain frame? (Note: Appealing to relative benefit motivation in a gain frame means the message shows that one get the benefit that most other people get if they follow the norm of getting a booster.)
3. How well does the message you just read appeal to relative benefit motivation in a loss frame? (Note: Appealing to relative benefit motivation in a gain frame means the message shows that one loses the benefit that most other people get if they DO NOT follow the norm of getting a booster.)
4. How well does the message you just read appeal to identification with admired group motivation? (Note: Appealing to identification with admired group motivation means the

message shows that one becomes a person who is admired if they follow the norm of getting a booster.)

5. How well does the message you just read appeal to social award motivation? (Note: Appealing to social award motivation means the message shows that one will get social award such as approval, acceptance, and compliments if they follow the norm of getting a booster.)
6. How well does the message you just read appeal to social punishment motivation? (Note: Appealing to social punishment motivation means the message shows that one will get social punishment such as being ostracized, disapproved, criticized, and disliked if they DO NOT follow the norm of getting a booster.)

Scale

1 = not appeal to the motivation at all to 10 = appeal to the motivation very well

Suggestions on Improving Motivational Appeals

The message was designed to appeal to the [insert the motivation name] motivation. Do you have any suggestions to make the message better appeal to the motivation? (text-entry box)

Message Comprehensibility

Based on your experience reading the message, please rate the message on the following scales.

1. Hard (1) – Easy (7)
2. Difficult (1) – Simple (7)
3. Demanding (1) – Effortless (7)
4. Confusing (1) – Clear (7)
5. Incomprehensible (1) – Understandable (7)

Suggestions on Improving Message Readability and Comprehensibility

Do you have any suggestions to make the message easier to read and understand?

[Next Page]

Demographics

You are almost done. Now we would like to know more about yourself. Please answer the following questions.

1. What is your age? ____ (enter a number from 18 to 99)
2. What is your sex?
 - a. Male
 - b. Female
 - c. Intersex
 - d. Other
3. Does your gender identity match your sex assigned at birth?
 - a. Yes
 - b. No - Please list your gender identity: ()
4. What is your ethnic background? (circle all that apply)
 - a. American Indian or Alaska Native
 - b. Asian
 - c. Black or African American
 - d. Native Hawaiian or other Pacific Islander
 - e. White
 - f. Hispanic or Latino

5. Thinking about members of your family living in this household, what is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?
- a. \$0 to \$9,999
 - b. \$10,000 to \$14,999
 - c. \$15,000 to \$19,999
 - d. \$20,000 to \$34,999
 - e. \$35,000 to \$49,999
 - f. \$50,000 to \$74,999
 - g. \$75,000 to \$99,999
 - h. \$100,000 to \$199,999
 - i. \$200,000 or more
6. What is your marital status?
- a. Married
 - b. Widowed
 - c. Divorced
 - d. Separated
 - e. Never been married
7. What is the highest level of school you have completed or the highest degree you have received?
- a. Less than 8 years
 - b. 8 through 11 years
 - c. 12 years or completed high school

- d. Post high school training other than college (vocational or technical)
 - e. Some college
 - f. College graduate
 - g. Postgraduate
8. Are you fully vaccinated against COVID-19? (Yes/No)
9. Have you got a COVID-19 booster shot? (Yes/No)

Appendix C Main Study Questionnaire Part I

Thank you for participating in this study. First, we would like to know about your motivations to comply with social norms. Please answer the following questions.

Norm Conformity Motivations

Measurements of norm conformity motivations developed in pilot study 1 were inserted here. The instruction for motivation to comply with descriptive norms was: Consider situations when you follow what most people do, how much do you agree with the following statements? The instruction for motivation to comply with injunctive norms was: Consider situations when you follow what most people think you should do or expect you to do, how much do you agree with the following statements?

Perceived Uncertainty

When you think about whether your decision of getting a COVID-19 booster shot is correct or not, how do you feel?

1. Uncertain (1) – Certain (7)
2. Unsure (1) – Sure (7)
3. Unconfident (1) – Confident (7)

Need for Closure

Please indicate your agreement with the following statement.

Items

1. I don't like situations that are uncertain.
2. I dislike questions which could be answered in many different ways.
3. I find that a well ordered life with regular hours suits my temperament.

4. I feel uncomfortable when I don't understand the reason why an event occurred in my life.
5. I feel irritated when one person disagrees with what everyone else in a group believes.
6. I don't like to go into a situation without knowing what I can expect from it.
7. When I have made a decision, I feel relieved.
8. When I am confronted with a problem, I'm dying to reach a solution very quickly.
9. I would quickly become impatient and irritated if I would not find a solution to a problem immediately.
10. I don't like to be with people who are capable of unexpected actions.
11. I dislike it when a person's statement could mean many different things.
12. I find that establishing a consistent routine enables me to enjoy life more.
13. I enjoy having a clear and structured mode of life.
14. I do not usually consult many different opinions before forming my own view.
15. I dislike unpredictable situations.

Scale

1=Strongly disagree to 7=Strongly agree

Fear of Missing Out

Below is a collection of statements about your everyday experience. Using the scale provided please indicate how true each statement is of your general experiences. Please answer according to what really reflects your experiences rather than what you think your experiences should be. Please treat each item separately from every other item.

Items

1. I fear others have more rewarding experiences than me.

2. I fear my friends have more rewarding experiences than me.
3. I get worried when I find out my friends are having fun with- out me.
4. I get anxious when I don't know what my friends are up to.
5. It is important that I understand my friends "in jokes".
6. Sometimes, I wonder if I spend too much time keeping up with what is going on.
7. It bothers me when I miss an opportunity to meet up with friends.
8. When I have a good time it is important for me to share the details online (e.g. updating status).
9. When I miss out on a planned get-together it bothers me.
10. When I go on vacation, I continue to keep tabs on what my friends are doing.

Scale

1=Not at all true of me

2=Slightly true of me

3=Moderately true of me

4=Very true of me

5=Extremely very true of me

Upward Social Comparison

Most people compare themselves from time to time with others. For example, they may compare the way they feel, their opinions, their abilities, and/or their situation with those of other people. There is nothing particularly "good" or "bad" about this type of comparison, and some people do it more than others. We would like to find out how often you compare yourself with other people. To do that we would like to ask you to indicate how much you agree with each statement below, by using the following scale.

Items

1. When it comes to my personal life, I sometimes compare myself with others who have it better than I do.
2. When I consider how I am doing socially (e.g. social skills, popularity), I prefer to compare with others who are more socially skilled than I am.
3. When evaluating my current performance (e.g. how I am doing at home, work, school, or wherever), I often compare with others who are doing better than I am.
4. When I wonder how good I am at something, I sometimes compare myself with others who are better at it than I am.
5. When things are going poorly, I think of others who have it better than I do.
6. I sometimes compare myself with others who have accomplished more in life than I have.

Scale

1=Strongly disagree to 7=Strongly agree

Attention Check

For this question, please select number two to demonstrate your attention.

- a) One
- b) Two
- c) Three
- d) Four

Need for Approval

Please indicate how much you agree with the following statements.

Items

1. I would rather be myself than be well thought of. (R)

2. I change my opinion (or the way that I do things) in order to please someone else.
3. In order to get along and be liked, I tend to be what people expect me to be.
4. I find it difficult to talk about my ideas if they are contrary to group opinion.
5. I am willing to argue only if I know that my friend will back me up.
6. I seldom feel the need to make excuses or apologize for my behavior. (R)
7. It is not important to me that I behave “properly” in social situations. (R)
8. If there is any criticism or anyone says anything about me, I can take it. (R)
9. I am careful at parties and social gatherings for fear that I will do or say things that others won’t like.
10. I usually do not change my position when people disagree with me. (R)

Scale

1=Strongly disagree to 7=Strongly agree

Fear of Negative Evaluation

Read each of the following statements carefully and indicate how characteristic it is of you according to the following scale:

Items

1. I worry about what other people will think of me even when I know it doesn't make any difference.
2. I am unconcerned even if I know people are forming an unfavorable impression of me.
(R)
3. I am frequently afraid of other people noticing my shortcomings.
4. I rarely worry about what kind of impression I am making on someone. (R)
5. I am afraid others will not approve of me.

6. I am afraid that people will find fault with me.
7. Other people's opinions of me do not bother me. (R)
8. When I am talking to someone, I worry about what they may be thinking about me.
9. I am usually worried about what kind of impression I make.
10. If I know someone is judging me, it has little effect on me. (R)
11. Sometimes I think I am too concerned with what other people think of me.
12. I often worry that I will say or do the wrong things.

Scale

- 1 = Not at all characteristic of me
- 2 = Slightly characteristic of me
- 3 = Moderately characteristic of me
- 4 = Very characteristic of me
- 5 = Extremely characteristic of me

Perceived Injunctive norm

Items

- 1) Most Americans would approve of me getting a COVID-19 booster shot.
- 2) Most people in the US would approve of me getting a COVID-19 booster shot.
- 3) Most people at my age would approve of me getting a COVID-19 booster shot.
- 4) Most people who are similar to me would approve of me getting a COVID-19 booster shot.
- 5) Most people whom I discuss important matters with would approve of me getting a COVID-19 booster shot.

Scale

1=Strongly disagree to 7=Strongly agree

Perceived Descriptive norm

Items

- 1) Most Americans will get a COVID-19 booster shot.
- 2) Most people in the US will get a COVID-19 booster shot.
- 3) Most people at my age will get a COVID-19 booster shot.
- 4) Most people who are similar to me will get a COVID-19 booster shot.
- 5) Most people whom I discuss important matters with will get a COVID-19 booster shot.

Scale

1=Strongly disagree to 7=Strongly agree

Self-efficacy

Items

- 1) Whether or not I get a COVID-19 booster shot is completely up to me.
- 2) I am confident that if I wanted to I could get a COVID-19 booster shot.
- 3) It is possible for me to get a COVID-19 booster shot.

Scale

1=Strongly disagree to 7=Strongly agree

Demographics

You are almost done. Now we would like to know more about yourself. Please answer the following questions.

10. What is your age? ____ (enter a number from 18 to 99)
11. What is your sex?

- a. Male
 - b. Female
 - c. Intersex
 - d. Other
12. Does your gender identity match your sex assigned at birth?
- a. Yes
 - b. No - Please list your gender identity: ()
13. What is your ethnic background? (circle all that apply)
- a. American Indian or Alaska Native
 - b. Asian
 - c. Black or African American
 - d. Native Hawaiian or other Pacific Islander
 - e. White
 - f. Hispanic or Latino
14. Thinking about members of your family living in this household, what is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?
- a. \$0 to \$9,999
 - b. \$10,000 to \$14,999
 - c. \$15,000 to \$19,999
 - d. \$20,000 to \$34,999
 - e. \$35,000 to \$49,999
 - f. \$50,000 to \$74,999

- g. \$75,000 to \$99,999
 - h. \$100,000 to \$199,999
 - i. \$200,000 or more
15. What is your marital status?
- a. Married
 - b. Widowed
 - c. Divorced
 - d. Separated
 - e. Never been married
16. What is the highest level of school you have completed or the highest degree you have received?
- a. Less than 8 years
 - b. 8 through 11 years
 - c. 12 years or completed high school
 - d. Post high school training other than college (vocational or technical)
 - e. Some college
 - f. College graduate
 - g. Postgraduate
17. Here is a 7-point scale on which the political views that people might hold are arranged from extremely liberal (left) to extremely conservative (right). Where would you place yourself on this scale?
- Scale*
- 3=Extremely liberal to 3=Extremely conservative

Appendix D Main Study Questionnaire Part II

Thank you for participating in this study. In this study, we would like to read a Facebook post about COVID-19 booster shot by Immunization Action Coalition (IAC) and then answer a few questions. Please read the message carefully.

[Next Page]

[Participants was randomly assigned to read one of the eight stimuli messages. After message exposure, they answered the following questions.]

[Next Page]

Perceived message effectiveness

The following statements are about the Facebook post you just read. Please indicate your agreement with the statements.

Items

1. The Facebook post encourages me to get a COVID-19 booster shot.
2. This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.
3. The Facebook post makes getting a COVID-19 booster shot seem pleasant to me.
4. This message makes me think about the positive outcomes of getting a COVID-19 booster shot.

Scale

1=Strongly disagree to 7=Strongly agree

Perceived message relevance

The following statements are about the Facebook post you just read. Please indicate your agreement with the statements.

Items

1. The Facebook post was relevant to my life.
2. The Facebook post grasped my attention.
3. The Facebook post said something important to me

Scale

1=Strongly disagree to 7=Strongly agree

Attitude toward Getting Booster Shot Once

Which of the following best describes getting a COVID-19 booster shot?

Bad (1) – Good (7)

Harmful (1) – Beneficial (7)

Useless (1) – Useful (7)

Foolish (1) – Wise (7)

Behavioral Intention of Getting Booster Shot Once

How much do you agree with the following statements?

Items

1. I will get a COVID-19 booster shot when it is recommended by health professionals.
2. I plan to get a COVID-19 booster shot when it is recommended by health professionals.
3. I intend to get a COVID-19 booster shot when it is recommended by health professionals.

Scale

1=Strongly disagree to 7=Strongly agree

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Attention Check

Most modern theories of psychology recognize the fact that social preceptions do not take place in a social vacuum. Individual preferences and knowledge, along with situational variables can greatly impact the perception process. In order to facilitate our research on perceptions of scientific topics, we are interested in knowing certain factors about you, the perceiver. Specifically, we are interested in whether you actually take the time to read the instructions throughout the survey. If not, then some of our manipulations that rely on changes in the instructions will be ineffective. So, in order to demonstrate that you have read the instructions, please ignore the facility items below. Instead, simply click the other option and in the corresponding box, enter the text: I read the instructions.

- a) canteen/vending machine
- b) lounge
- c) coffee maker
- d) air conditioning/heating
- e) storeroom
- f) washroom
- g) windows
- h) parking
- i) childcare facilities
- j) other (followed by a text-entry box)

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Booster Taken Between Survey I and II

Did you get the booster shot after you took the Part I survey and before you take this current Part II survey? (Yes/No)

Appendix E Comparing Samples Recruited Before and After February 8, 2022

Table E1

Comparison Between Samples Recruited Before and After February 8, 2022

Variable Compared	Before Feb 8	After Feb 8	<i>t</i>	χ^2
Age	37.63	35.10	2.59*	-
Gender			-	6.00
Women	50.57	59.13		
Men	49.43	40.55		
Nonbinary	0.00	0.32		
Race			-	5.78
White	78.74	79.16		
Black or African American	3.45	3.23		
Asian	13.79	2.75		
American Indian or Alaska American	0.00	0.48		
Hispanic or Latinx	0.57	0.48		
Multiple	1.72	3.07		
Marital Status			-	16.67***
Married	58.05	73.51		
Widowed	0.57	0.81		
Never married	33.91	21.49		
Separated	1.72	1.29		
Divorced	5.75	2.91		
Education			-	28.77***
Less than 8 years	0.57	0.16		
8 through 11 years	1.15	1.13		
12 years or completed high school	10.92	4.20		
Post high school training other than college	5.17	1.78		
Some college	22.41	15.67		
College graduate	47.13	55.57		
Postgraduate	12.64	21.49		
Income				1.60
Under \$49,999	44.83	40.71		
\$50,000 to \$99,000	45.98	47.17		
Above \$100,000	9.20	12.12		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. The numbers in the second and third columns represent percentages or means.

Appendix F Behavioral Intention as Outcome Model with Non-Boosted Sample

Accuracy Condition vs. Descriptive Norm Only Condition

Table F1

Mediation Model of Accuracy Motivation Appeal (N = 97)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.11***	0.19	[4.70, 5.48]
Gender (Male = 1, Other = 0)	-0.18	0.29	[-0.71, 0.40]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.55**	0.28	[0.03, 1.09]
$R^2 = .04, F(2, 94) = 1.82, p = .167$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.35***	0.18	[4.98, 5.67]
Gender (Male = 1, Other = 0)	-0.10	0.26	[-0.59, 0.41]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.17	0.25	[-0.65, 0.33]
$R^2 = .01, F(2, 94) = 0.25, p = .708$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.92**	0.58	[0.82, 3.10]
Gender (Male = 1, Other = 0)	0.05	0.19	[-0.31, 0.45]
PDN	0.13	0.13	[-0.09, 0.40]
PME	0.21*	0.07	[0.05, 0.35]
PMR	0.46***	0.12	[0.20, 0.68]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.35	0.20	[-0.74, 0.08]
$R^2 = .44***, F(5, 91) = 14.47, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.33	0.83	[-2.88, 0.39]
PDN	0.38**	0.13	[0.13, 0.64]
ATT	0.75***	0.15	[0.45, 1.02]
$R^2 = .48***, F(2, 94) = 43.50, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm. Gender was controlled because there was significant difference in gender between treatment and control groups.

Table F2

Total, Indirect and Direct Effects of Accuracy Motivation Appeal (N = 97)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.24	0.19	[-0.64, 0.11]
Condition → PME → ATT → INT	0.09*	0.05	[0.00, 0.21]
Condition → PMR → ATT → INT	-0.06	0.10	[-0.27, 0.12]
Condition → ATT → INT	-0.27	0.16	[-0.57, 0.05]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F3

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Accuracy Motivation;

N = 97)

Mediator: PME			
	<i>B</i>	SE (Boot)	95% CI (Boot)
Constant	5.11***	0.18	[4.72, 5.47]
Gender (Male = 1, Other = 0)	-0.16	0.28	[-0.66, 0.40]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.51	0.27	[0.01, 1.06]
ACC	0.28	0.21	[-0.11, 0.71]
ACC*Condition	0.16	0.30	[-0.46, 0.69]
$R^2 = .15^{**}$, $F(4, 92) = 4.04$, $p = .005$			
Mediator: PMR			
	<i>B</i>	SE (Boot)	95% CI (Boot)
Constant	5.36***	0.17	[4.98, 5.67]
Gender (Male = 1, Other = 0)	-0.08	0.23	[-0.49, 0.43]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.22	0.22	[-0.65, 0.25]

ACC	0.29	0.14	[-0.00, 0.57]
ACC*Condition	0.28	0.22	[-0.19, 0.67]
$R^2 = .23^{***}, F(4, 92) = 6.68, p = .000$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	1.67*	0.66	[0.50, 3.03]
Gender (Male = 1, Other = 0)	0.04	0.19	[-0.31, 0.46]
PDN	0.16	0.13	[-0.06, 0.43]
PME	0.23**	0.08	[0.06, 0.37]
PMR	0.46***	0.10	[0.25, 0.65]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.34	0.20	[-0.73, 0.08]
ACC	-0.27	0.11	[-0.50, -0.08]
ACC*Condition	0.30	0.20	[-0.07, 0.68]
$R^2 = .47^{***}, F(7, 89) = 11.12, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.33	0.83	[-2.88, 0.39]
PDN	0.38**	0.13	[0.13, 0.64]
ATT	0.75***	0.15	[0.45, 1.02]
$R^2 = .48^{***}, F(2, 94) = 43.50, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, ACC = Accuracy Motivation. Gender was controlled

because there was significant difference in gender between treatment and control groups.

Table F4

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Need for Closure; N = 97)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.04***	0.20	[4.59, 5.43]
Gender (Male = 1, Other = 0)	-0.07	0.29	[-0.62, 0.52]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.59*	0.28	[0.03, 1.14]
NFC	0.33	0.29	[-0.18, 0.91]

NFC *Condition	0.02	0.38	[-0.72, 0.72]
$R^2 = .08, F(4, 92) = 1.93, p = .113$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.29***	0.18	[4.92, 5.61]
Gender (Male = 1, Other = 0)	0.01	0.26	[-0.48, 0.53]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.13	0.24	[-0.60, 0.35]
NFC	0.26	0.23	[-0.20, 0.71]
NFC *Condition	0.11	0.31	[-0.49, 0.74]
$R^2 = .05, F(4, 92) = 1.30, p = .275$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	1.99**	0.61	[0.83, 3.28]
Gender (Male = 1, Other = 0)	0.09	0.18	[-0.26, 0.44]
PDN	0.13	0.13	[-0.08, 0.40]
PME	0.20*	0.08	[0.05, 0.35]
PMR	0.45***	0.12	[0.20, 0.67]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.35	0.21	[-0.77, 0.09]
NFC	0.00	0.21	[-0.49, 0.31]
NFC*Condition	0.14	0.26	[-0.32, 0.72]
$R^2 = .45***, F(7, 89) = 10.31, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.33	0.83	[-2.88, 0.39]
PDN	0.38**	0.13	[0.13, 0.64]
ATT	0.75***	0.15	[0.45, 1.02]
$R^2 = .48***, F(2, 94) = 43.50, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, NFC = Need for Closure. Gender was controlled because

there was significant difference in gender between treatment and control groups.

Table F5

Moderated Mediation Model of Accuracy Motivation Appeal (Moderator: Perceived

Uncertainty; N = 97)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.11***	0.19	[4.72, 5.50]
Gender (Male = 1, Other = 0)	-0.19	0.29	[-0.74, 0.37]
Condition (Accuracy = 1, Descriptive norm only = 0)	0.55**	0.28	[0.03, 1.06]
PU	-0.01	0.10	[-0.20, 0.17]
PU*Condition	0.12	0.16	[-0.23, 0.41]
$R^2 = .04, F(4, 92) = 1.05, p = .388$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.38***	0.16	[5.01, 5.67]
Gender (Male = 1, Other = 0)	-0.16	0.25	[-0.66, 0.35]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.17	0.24	[-0.61, 0.31]
PU	0.26*	0.07	[0.15, 0.42]
PU*Condition	-0.10		
$R^2 = .08, F(4, 92) = 2.07, p = .090$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.27***	0.64	[1.14, 3.59]
Gender (Male = 1, Other = 0)	0.02	0.19	[-0.34, 0.39]
PDN	0.09	0.13	[-0.13, 0.35]
PME	0.23**	0.07	[0.07, 0.37]
PMR	0.41***	0.13	[0.13, 0.64]
Condition (Accuracy = 1, Descriptive norm only = 0)	-0.39	0.20	[-0.76, 0.02]
PU	0.20*	0.08	[0.06, 0.37]
PU*Condition	-0.15	0.15	[-0.39, 0.20]
$R^2 = .47***, F(7, 89) = 11.48, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.33	0.83	[-2.88, 0.39]
PDN	0.38**	0.13	[0.13, 0.64]
ATT	0.75***	0.15	[0.45, 1.02]
$R^2 = .48***, F(2, 94) = 43.49, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PDN = Perceived Descriptive Norm, PU = Perceived Uncertainty. Gender was controlled because there was significant difference in gender between treatment and control groups.

Relative Benefit (Gain) Condition vs. Descriptive Norm Only Condition

Table F6

Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (N = 102)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.04***	0.18	[4.69, 5.37]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.48	0.26	[-0.05, 1.00]
$R^2 = .03, F(1, 100) = 2.99, p = .087$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.31***	0.15	[5.01, 5.61]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.20	0.24	[-0.68, 0.31]
$R^2 = .01, F(1, 100) = 0.58, p = .448$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.22**	0.49	[0.32, 2.24]
PDN	0.28**	0.09	[0.10, 0.44]
PME	0.24***	0.07	[0.08, 0.36]
PMR	0.42***	0.08	[0.28, 0.60]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.27	0.16	[-0.55, 0.06]
$R^2 = .63***, F(4, 97) = 40.46, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.41**	0.50	[-2.49, -0.44]
PDN	0.30**	0.11	[0.09, 0.52]
ATT	0.84***	0.11	[0.61, 1.06]
$R^2 = .63***, F(2, 99) = 84.87, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm.

Table F7

Total, Indirect and Direct Effects of Relative Benefit Motivation Appeal – Gain Frame (N = 102)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.20	0.17	[-0.56, 0.13]
Condition → PME → ATT → INT	0.09	0.05	[-0.01, 0.21]
Condition → PMR → ATT → INT	-0.07	0.09	[-0.27, 0.10]
Condition → ATT → INT	-0.22	0.13	[-0.46, 0.05]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F8

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator:

Relative Benefit Motivation; N = 102)

Mediator: PME			
	<i>B</i>	SE (Boot)	95% CI (Boot)
Constant	5.00***	0.18	[4.65, 5.32]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.55**	0.26	[0.05, 1.07]
BEN	0.27	0.17	[0.05, 0.60]
BEN*Condition	-0.10	0.25	[-0.55, 0.40]
$R^2 = .06, F(3, 98) = 2.26, p = .086$			
Mediator: PMR			
	<i>B</i>	SE (Boot)	95% CI (Boot)
Constant	5.26***	0.15	[4.95, 5.56]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.08	0.23	[-0.51, 0.38]
BEN	0.35*	0.12	[0.14, 0.61]
BEN*Condition	0.04	0.23	[-0.36, 0.56]
$R^2 = .13**, F(3, 98) = 5.06, p = .003$			
Mediator: ATT			
	<i>B</i>	SE (Boot)	95% CI (Boot)
Constant	0.54	0.50	[-0.34, 1.56]
PDN	0.38***	0.09	[0.19, 0.55]
PME	0.24***	0.06	[0.10, 0.35]

PMR	0.45***	0.08	[0.31, 0.63]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.32*	0.16	[-0.62, 0.01]
BEN	-0.20*	0.11	[-0.40, 0.03]
BEN*Condition	-0.05	0.12	[-0.32, 0.17]
$R^2 = .67***, F(6, 95) = 31.76, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	-1.41**	0.50	[-2.49, -0.44]
PDN	0.30**	0.11	[0.09, 0.52]
ATT	0.84***	0.11	[0.61, 1.06]
$R^2 = .62***, F(2, 99) = 84.87, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PDN = Perceived Descriptive Norm, BEN = Relative Benefit Motivation.

Table F9

Moderated Mediation Model of Relative Benefit Motivation Appeal – Gain Frame (Moderator: Fear of Missing Out; N = 102)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	4.99***	0.18	[4.63, 5.33]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	0.60*	0.26	[0.06, 1.13]
FOMO	0.28	0.21	[-0.19, 0.65]
FOMO*Condition	0.13	0.31	[-0.44, 0.76]
$R^2 = .08*, F(3, 98) = 2.78, p = .045$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	5.23***	0.16	[4.92, 5.53]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.00	0.22	[-0.43, 0.46]
FOMO	0.45*	0.16	[0.12, 0.76]
FOMO*Condition	0.21	0.26	[-0.27, 0.76]
$R^2 = .16***, F(3, 98) = 6.42, p = .001$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>

Constant	0.71	0.48	[-0.18, 1.69]
PDN	0.31***	0.08	[0.14, 0.49]
PME	0.24***	0.07	[0.09, 0.36]
PMR	0.48***	0.08	[0.33, 0.65]
Condition (Relative benefit – gain = 1, Descriptive norm only = 0)	-0.34*	0.16	[-0.64, -0.02]
FOMO	-0.13	0.12	[-0.36, 0.12]
FOMO*Condition	-0.25	0.16	[-0.60, 0.03]
$R^2 = .66***, F(6, 95) = 31.29, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.41**	0.50	[-2.49, -0.44]
PDN	0.30**	0.11	[0.09, 0.52]
ATT	0.84***	0.11	[0.61, 1.06]
$R^2 = .63***, F(2, 99) = 84.87, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, FOMO = Fear of Missing Out.

Relative Benefit (Loss) Condition vs. Descriptive Norm Only Condition

Table F10

Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (N = 95)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	3.83***	0.26	[3.30, 4.32]
Gender (Male = 1, Other = 0)	-0.05	0.37	[0.37, 1.82]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	1.09**	0.37	[0.37, 1.82]
$R^2 = .10**, F(2, 92) = 5.12, p = .008$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.29***	0.18	[4.94, 5.60]
Gender (Male = 1, Other = 0)	0.06	0.28	[-0.49, 0.63]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.15	0.27	[-0.71, 0.39]
$R^2 = .00, F(2, 92) = 0.16, p = .851$			
Mediator: ATT			

	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.10***	0.57	[0.93, 3.22]
Gender (Male = 1, Other = 0)	-0.25	0.15	[-0.55, 0.08]
PDN	0.06	0.09	[-0.12, 0.25]
PME	0.05	0.06	[-0.06, 0.17]
PMR	0.68***	0.08	[0.51, 0.84]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.14	0.16	[-0.46, 0.17]
$R^2 = .63***, F(5, 89) = 30.21, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.22*	0.66	[-2.50, 0.08]
PDN	0.29**	0.10	[0.08, 0.50]
ATT	0.83***	0.11	[0.60, 1.05]
$R^2 = .60***, F(2, 92) = 67.59, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PDN = Perceived Descriptive Norm.

Table F11

Indirect and Direct Effects of Relative Benefit Motivation Appeal – Loss Frame (N = 95)

	Effect	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Total Effect	-0.16	0.20	[-0.58, 0.24]
Condition —> PME —> ATT —> INT	0.04	0.06	[-0.05, 0.18]
Condition —> PMR —> ATT —> INT	-0.09	0.16	[-0.43, 0.18]
Condition —> ATT —> INT	-0.12	0.13	[-0.38, 0.16]

Note. * denotes significance based on 95% bootstrap *CI*. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F12

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Relative Benefit Motivation; N = 95)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.88**	0.26	[3.34, 4.37]
Gender (Male = 1, Other = 0)	-0.16	0.37	[-0.89, 0.56]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	1.09**	0.36	[0.41, 1.80]
BEN	0.30	0.24	[-0.14, 0.80]
BEN*Condition	0.33	0.31	[-0.29, 0.93]
$R^2 = .20^{***}, F(4, 90) = 5.59, p = .001$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.34***	0.17	[5.00, 5.63]
Gender (Male = 1, Other = 0)	-0.05	0.28	[-0.62, 0.51]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.15	0.27	[-0.71, 0.36]
BEN	0.35*	0.13	[0.12, 0.63]
BEN*Condition	0.14	0.26	[-0.36, 0.70]
$R^2 = .13^*, F(4, 90) = 3.50, p = .011$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	2.12***	0.59	[0.97, 3.27]
Gender (Male = 1, Other = 0)	-0.25	0.15	[-0.54, 0.08]
PDN	0.07	0.09	[-0.12, 0.27]
PME	0.04	0.06	[-0.07, 0.16]
PMR	0.67***	0.09	[0.50, 0.84]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.13	0.16	[0.43, 0.19]
BEN	-0.10	0.11	[-0.31, 0.12]
BEN*Condition	0.25	0.17	[-0.12, 0.55]
$R^2 = .64^{***}, F(7, 87) = 22.33, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.22*	0.66	[-2.50, 0.08]
PDN	0.29**	0.10	[0.08, 0.50]
ATT	0.83***	0.11	[0.60, 1.05]
$R^2 = .60^{***}, F(2, 92) = 67.59, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the negative outcomes of not getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PDN = Perceived Descriptive Norm, BEN = Relative Benefit Motivation.

Table F13

Moderated Mediation Model of Relative Benefit Motivation Appeal – Loss Frame (Moderator: Fear of Missing Out; N = 95)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	3.81***	0.24	[3.35, 4.27]
Gender (Male = 1, Other = 0)	-0.15	0.34	[-0.82, 0.53]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	1.20***	0.34	[0.54, 1.86]
FOMO	0.97***	0.24	[0.54, 1.86]
FOMO*Condition	-0.38	0.35	[-1.07, 0.29]
$R^2 = .26***, F(4, 90) = 8.03, p = .000$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.29***	0.17	[4.94, 5.60]
Gender (Male = 1, Other = 0)	-0.02	0.27	[-0.55, 0.53]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.07	0.26	[-0.60, 0.44]
FOMO	0.45*	0.16	[0.12, 0.77]
FOMO*Condition	0.32	0.31	[-0.25, 0.94]
$R^2 = .16**, F(4, 90) = 4.22, p = .004$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.77***	0.60	[0.58, 2.93]
Gender (Male = 1, Other = 0)	-0.23	0.15	[-0.49, 0.10]
PDN	0.09	0.10	[-0.11, 0.28]
PME	0.07	0.06	[-0.05, 0.20]
PMR	0.70***	0.09	[0.53, 0.86]
Condition (Relative benefit – loss = 1, Descriptive norm only = 0)	-0.18	0.18	[-0.52, 0.18]
FOMO	-0.15	0.13	[-0.40, 0.13]
FOMO*Condition	-0.05	0.23	[-0.55, 0.38]
$R^2 = .64***, F(7, 87) = 22.10, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.22*	0.66	[-2.50, 0.08]
PDN	0.29**	0.10	[0.08, 0.50]

ATT	0.83***	0.11	[0.60, 1.05]
$R^2 = .60***, F(2, 92) = 67.59, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the negative outcomes of not getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, FOMO = Fear of Missing Out.

Identification Condition vs. Descriptive Norm Only Condition

Table F14

Mediation Model of Identification Motivation Appeal (N = 93)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.16***	0.19	[4.79, 5.56]
Gender (Male = 1, Other = 0)	-0.34	0.30	[-0.90, 0.25]
Condition (Identification = 1, Descriptive norm only = 0)	0.52	0.30	[-0.09, 1.08]
$R^2 = .04, F(2, 90) = 1.78, p = .174$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.44***	0.17	[5.10, 5.78]
Gender (Male = 1, Other = 0)	-0.36	0.27	[-0.92, 0.15]
Condition (Identification = 1, Descriptive norm only = 0)	-0.17	0.27	[-0.72, 0.35]
$R^2 = .03, F(2, 90) = 1.30, p = .276$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	1.21*	0.73	[-0.10, 2.79]
Gender (Male = 1, Other = 0)	-0.11	0.17	[-0.42, 0.26]
PDN	0.34**	0.14	[0.05, 0.61]
PME	0.24**	0.10	[0.06, 0.46]
PMR	0.37***	0.11	[0.13, 0.59]
Condition (Identification = 1, Descriptive norm only = 0)	-0.34	0.21	[-0.75, 0.06]
$R^2 = .57***, F(5, 87) = 23.37, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.42*	0.55	[-2.67, -0.52]
PDN	0.46***	0.12	[0.25, 0.71]

ATT	0.69***	0.10	[0.49, 0.90]
$R^2 = .61***, F(2, 90) = 71.18, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PDN = Perceived Descriptive Norm. Gender was controlled because there was significant difference in gender between treatment and control groups.

Table F15

Total, Indirect and Direct Effects of Identification Motivation Appeal (N = 93)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.20	0.17	[-0.53, 0.13]
Condition → PME → ATT → INT	0.09	0.07	[-0.01, 0.24]
Condition → PMR → ATT → INT	-0.04	0.08	[-0.22, 0.10]
Condition → ATT → INT	-0.24	0.15	[-0.55, 0.04]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F16

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Identification Motivation; N = 93)

Mediator: PME			
	B	SE (Boot)	95% CI (Boot)
Constant	5.17***	0.20	[4.78, 5.59]
Gender (Male = 1, Other = 0)	-0.31	0.31	[-0.87, 0.27]
Condition (Identification = 1, Descriptive norm only = 0)	0.48	0.30	[-0.14, 1.01]

IDEN	0.11	0.13	[-0.14, 0.36]
IDEN*Condition	-0.02	0.20	[-0.42, 0.34]
$R^2 = .05, F(4, 88) = 1.11, p = .357$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.46***	0.13	[5.21, 5.72]
Gender (Male = 1, Other = 0)	-0.22	0.27	[-0.76, 0.29]
Condition (Identification = 1, Descriptive norm only = 0)	-0.35	0.25	[-0.87, 0.14]
IDEN	0.34**	0.10	[0.16, 0.53]
IDEN*Condition	0.05	0.16	[-0.26, 0.37]
$R^2 = .21***, F(4, 88) = 5.74, p = .000$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	0.88	0.81	[-0.51, 2.62]
Gender (Male = 1, Other = 0)	-0.14	0.16	[-0.46, 0.21]
PDN	0.37***	0.13	[0.11, 0.61]
PME	0.22**	0.10	[0.03, 0.44]
PMR	0.43***	0.13	[0.15, 0.66]
Condition (Identification = 1, Descriptive norm only = 0)	-0.26	0.20	[-0.64, 0.12]
IDEN	-0.04	0.09	[-0.20, 0.16]
IDEN*Condition	-0.15	0.12	[-0.39, 0.09]
$R^2 = .59***, F(7, 85) = 17.69, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.42*	0.55	[-2.67, -0.52]
PDN	0.46***	0.12	[0.25, 0.71]
ATT	0.69***	0.10	[0.49, 0.90]
$R^2 = .61***, F(2, 90) = 71.18, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, IDEN = Identification Motivation. Gender was controlled

because there was significant difference in gender between treatment and control groups.

Table F17

Moderated Mediation Model of Identification Motivation Appeal (Moderator: Upward Social Comparison; N = 93)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.15***	0.20	[4.73, 5.55]
Gender (Male = 1, Other = 0)	-0.31	0.31	[-0.88, 0.28]
Condition (Identification = 1, Descriptive norm only = 0)	0.52	0.29	[-0.10, 1.05]
USC	0.08	0.17	[-0.27, 0.42]
USC*Condition	-0.22	0.25	[-0.71, 0.32]
$R^2 = .05, F(4, 88) = 1.13, p = .450$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.43***	0.17	[5.06, 5.77]
Gender (Male = 1, Other = 0)	-0.33	0.28	[-0.90, 0.23]
Condition (Identification = 1, Descriptive norm only = 0)	-0.18	0.28	[-0.76, 0.33]
USC	0.06	0.13	[-0.19, 0.33]
USC*Condition	0.02	0.20	[-0.36, 0.44]
$R^2 = .03, F(4, 88) = 0.75, p = .561$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.19*	0.73	[-0.14, 2.73]
Gender (Male = 1, Other = 0)	-0.15	0.17	[-0.47, 0.22]
PDN	0.35**	0.13	[0.07, 0.60]
PME	0.24**	0.10	[0.05, 0.46]
PMR	0.37**	0.11	[0.14, 0.59]
Condition (Identification = 1, Descriptive norm only = 0)	-0.33	0.20	[-0.72, 0.07]
USC	-0.10	0.08	[-0.26, 0.04]
USC*Condition	0.10	0.13	[-0.15, 0.37]
$R^2 = .58***, F(7, 85) = 16.74, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.42*	0.55	[-2.67, -0.52]
PDN	0.46***	0.12	[0.25, 0.71]
ATT	0.69***	0.10	[0.49, 0.90]
$R^2 = .61***, F(2, 90) = 71.18, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention,

PDN = Perceived Descriptive Norm, USC = Upward Social Comparison. Gender was controlled because there was significant difference in gender between treatment and control groups.

Social Award Condition vs. Injunctive Norm Only Condition

Table F18

Mediation Model of Social Award Motivation Appeal (N = 101)

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.59***	0.24	[5.12, 6.04]
Marital status (Married = 1, Other = 0)	-0.23	0.23	[-0.65, 0.23]
Condition (Social award = 1, Injunctive norm only = 0)	0.58**	0.19	[0.21, 0.98]
$R^2 = .07^*, F(2, 98) = 3.64, p = .030$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.00***	0.26	[4.50, 5.49]
Marital status (Married = 1, Other = 0)	0.11	0.27	[-0.40, 0.66]
Condition (Social award = 1, Injunctive norm only = 0)	0.35	0.25	[-0.13, 0.84]
$R^2 = .02, F(2, 98) = 1.20, p = .307$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.00***	0.26	[4.50, 5.49]
Marital status (Married = 1, Other = 0)	0-0.28	0.18	[-0.66, 0.05]
PIN	0.29	0.14	[-0.06, 0.47]
PME	0.19*	0.15	[-0.12, 0.48]
PMR	0.45***	0.11	[0.25, 0.66]
Condition (Social award = 1, Injunctive norm only = 0)	-0.39*	0.17	[-0.71, -0.04]
$R^2 = .56^{***}, F(5, 95) = 23.85, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	0.12	0.97	[-1.86, 1.98]
PIN	0.07	0.14	[-0.17, 0.36]
ATT	0.80***	0.14	[0.51, 1.05]
$R^2 = .44^{***}, F(2, 98) = 38.14, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN = Perceived Injunctive Norm. Marital status was controlled because there was significant difference in gender between treatment and control groups.

Table F19

Total, Indirect and Direct Effects of Social Award Motivation Appeal (N = 101)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.10	0.16	[-0.41, 0.23]
Condition —> PME —> ATT —> INT	0.09	0.09	[-0.05, 0.31]
Condition —> PMR —> ATT —> INT	0.13	0.10	[-0.05, 0.31]
Condition —> ATT —> INT	-0.31*	0.15	[-0.61, -0.03]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F20

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Social Award Motivation; N = 101)

Mediator: PME			
	B	SE (Boot)	95% CI (Boot)
Constant	5.69***	0.19	[5.31, 6.06]
Marital status (Married = 1, Other = 0)	-0.35	0.20	[-0.75, 0.05]
Condition (Social award = 1, Injunctive norm only = 0)	0.55*	0.20	[0.17, 0.95]
AWA	0.24*	0.21	[-0.16, 0.65]
AWA*Condition	-0.04	0.23	[-0.49, 0.43]
$R^2 = .13^{**}$, $F(4, 96) = 3.73$, $p = .007$			
Mediator: PMR			
	B	SE (Boot)	95% CI (Boot)
Constant	5.15***	0.23	[4.69, 5.57]
Marital status (Married = 1, Other = 0)	-0.07	0.29	[-0.66, 0.51]

Condition (Social award = 1, Injunctive norm only = 0)	0.30	0.24	[-0.18, 0.78]
AWA	0.36*	0.17	[0.05, 0.69]
AWA*Condition	-0.03	0.21	[-0.42, 0.40]
$R^2 = .13^{**}, F(4, 96) = 3.71, p = .008$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	1.95***	0.68	[0.78, 3.38]
Marital status (Married = 1, Other = 0)	-0.27	0.20	[-0.67, 0.10]
PIN	0.19	0.15	[-0.08, 0.49]
PME	0.20*	0.16	[-0.14, 0.50]
PMR	0.45***	0.10	[0.25, 0.66]
Condition (Social award = 1, Injunctive norm only = 0)	-0.39*	0.17	[-0.72, -0.03]
AWA	-0.02	0.11	[-0.25, 0.16]
AWA*Condition	0.04	0.14	[-0.20, 0.35]
$R^2 = .56^{***}, F(7, 93) = 16.72, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	0.12	0.97	[-1.86, 1.98]
PIN	0.07	0.14	[-0.17, 0.36]
ATT	0.80***	0.14	[0.51, 1.05]
$R^2 = .44^{***}, F(2, 98) = 38.14, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster

shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN

= Perceived Injunctive Norm, AWA = Social Award Motivation. Marital status was controlled

because there was significant difference in gender between treatment and control groups.

Table F21

Moderated Mediation Model of Social Award Motivation Appeal (Moderator: Need for

Approval; N = 101)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	5.63***	0.22	[5.19, 6.05]
Marital status (Married = 1, Other = 0)	-0.28	0.20	[-0.64, 0.12]

Condition (Social award = 1, Injunctive norm only = 0)	0.58**	0.20	[0.18, 0.95]
NFA	0.14	0.33	[-0.39, 0.86]
NFA*Condition	-0.08	0.36	[-0.89, 0.56]
$R^2 = .08, F(4, 96) = 1.97, p = .106$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.09***	0.24	[4.60, 5.56]
Marital status (Married = 1, Other = 0)	-0.02	0.27	[-0.56, 0.53]
Condition (Social award = 1, Injunctive norm only = 0)	0.35	0.25	[-0.17, 0.83]
NFA	0.41	0.23	[0.01, 0.90]
NFA*Condition	-0.22	0.27	[-0.73, 0.29]
$R^2 = .06, F(4, 96) = 1.61, p = .177$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	1.96*	0.65	[0.80, 3.29]
Marital status (Married = 1, Other = 0)	-0.32	0.19	[-0.70, 0.04]
PIN	0.20*	0.15	[-0.06, 0.50]
PME	0.20*	0.16	[-0.11, 0.50]
PMR	0.44***	0.11	[0.23, 0.64]
Condition (Social award = 1, Injunctive norm only = 0)	-0.39*	0.17	[-0.71, -0.02]
NFA	0.11	0.16	[-0.27, 0.35]
NFA*Condition	-0.04	0.20	[-0.39, 0.41]
$R^2 = .56***, F(7, 93) = 16.98, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	0.12	0.97	[-1.86, 1.98]
PIN	0.07	0.14	[-0.17, 0.36]
ATT	0.80***	0.14	[0.51, 1.05]
$R^2 = .44***, F(2, 98) = 38.14, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the positive outcomes of getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN = Perceived Injunctive Norm, NFA = Need for Approval. Marital status was controlled because there was significant difference in gender between treatment and control groups.

Social Punishment Condition vs. Injunctive Norm Only Condition

Table F22*Mediation Model of Social Punishment Motivation Appeal (N = 98)*

Mediator: PME			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.45***	0.21	[5.02, 5.85]
Gender (Male = 1, Other = 0)	0.05	0.27	[-0.95, 0.11]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.41	0.28	[-0.95, 0.11]
$R^2 = .02, F(2, 95) = 1.09, p = .341$			
Mediator: PMR			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	5.11***	0.22	[4.66, 5.53]
Gender (Male = 1, Other = 0)	0.11	0.30	[-0.74, 0.44]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.27	0.28	[-0.85, 0.26]
$R^2 = .01, F(2, 95) = 0.48, p = .622$			
Mediator: ATT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	1.54*	0.84	[0.05, 3.19]
Gender (Male = 1, Other = 0)	-0.03	0.19	[-0.40, 0.32]
PIN	0.32*	0.16	[0.00, 0.62]
PME	0.18	0.11	[-0.03, 0.41]
PMR	0.39***	0.10	[0.18, 0.60]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.42*	0.17	[-0.75, -0.09]
$R^2 = .50***, F(5, 92) = 18.27, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE</i> (Boot)	95% <i>CI</i> (Boot)
Constant	-1.26*	0.72	[-2.83, 0.01]
PIN	0.29*	0.11	[0.07, 0.51]
ATT	0.83***	0.09	[0.66, 1.00]
$R^2 = .64***, F(2, 95) = 85.75, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN = Perceived Injunctive Norm. Gender was controlled because there was significant difference in gender between treatment and control groups.

Table F23

Total, Indirect and Direct Effects of Social Punishment Motivation Appeal (N = 98)

	Effect	SE (Boot)	95% CI (Boot)
Total Effect	-0.49*	0.19	[-0.89, -0.13]
Condition → PME → ATT → INT	-0.06	0.07	[-0.24, 0.03]
Condition → PMR → ATT → INT	-0.09	0.09	[-0.29, 0.08]
Condition → ATT → INT	-0.35*	0.14	[-0.63, -0.08]

Note. * denotes significance based on 95% bootstrap CI. PME = Perceived Message

Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention.

Table F24

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Social

Punishment Motivation; N = 98)

Mediator: PME			
	B	SE (Boot)	95% CI (Boot)
Constant	5.52***	0.21	[5.10, 5.93]
Gender (Male = 1, Other = 0)	-0.08	0.26	[-0.60, 0.45]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.46	0.29	[-1.07, 0.08]
PUN	0.09	0.16	[-0.21, 0.41]
PUN*Condition	0.20	0.21	[-0.31, 0.61]
$R^2 = .08, F(4, 93) = 1.89, p = .119$			
Mediator: PMR			
	B	SE (Boot)	95% CI (Boot)
Constant	5.16***	0.22	[4.69, 5.57]
Gender (Male = 1, Other = 0)	-0.18	0.28	[-0.77, 0.38]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.31	0.28	[-0.89, 0.22]
PUN	0.25*	0.12	[0.00, 0.47]
PUN*Condition	-0.05	0.17	[-0.36, 0.28]
$R^2 = .08, F(4, 93) = 1.94, p = .110$			
Mediator: ATT			
	B	SE (Boot)	95% CI (Boot)
Constant	1.47*	0.88	[-0.09, 3.20]

Gender (Male = 1, Other = 0)	-0.01	0.19	[-0.39, 0.34]
PIN	0.31*	0.16	[-0.01, 0.62]
PME	0.18	0.12	[-0.03, 0.42]
PMR	0.40***	0.11	[0.19, 0.62]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.40*	0.18	[-0.76, -0.06]
PUN	-0.05	0.07	[-0.19, 0.09]
PUN*Condition	-0.00	0.12	[-0.22, 0.24]
$R^2 = .50***, F(7, 90) = 12.92, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	-1.26*	0.72	[-2.83, 0.01]
PIN	0.29*	0.11	[0.07, 0.51]
ATT	0.83***	0.09	[0.66, 1.00]
$R^2 = .64***, F(2, 95) = 85.75, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by “This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN = Perceived Injunctive Norm, PUN = Social Punishment Motivation. Gender was controlled because there was significant difference in gender between treatment and control groups.

Table F25

Moderated Mediation Model of Social Punishment Motivation Appeal (Moderator: Fear of Missing Out; N = 98)

Mediator: PME			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.48***	0.22	[5.04, 5.89]
Gender (Male = 1, Other = 0)	0.00	0.27	[-0.55, 0.52]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.40	0.28	[-0.91, 0.13]
FNE	0.13	0.27	[-0.37, 0.71]
FNE*Condition	0.39	0.45	[-0.55, 0.52]
$R^2 = .06, F(4, 93) = 1.52, p = .204$			
Mediator: PMR			
	<i>B</i>	<i>SE (Boot)</i>	95% <i>CI (Boot)</i>
Constant	5.11***	0.23	[4.62, 5.52]
Gender (Male = 1, Other = 0)	-0.12	0.28	[-0.73, 0.45]

Condition (Social punishment = 1, Injunctive norm only = 0)	-0.25	0.27	[-0.78, 0.29]
FNE	0.47*	0.21	[0.09, 0.95]
FNE*Condition	0.26	0.37	[-0.42, 1.01]
$R^2 = .13^*, F(4, 93) = 3.53, p = .010$			
Mediator: ATT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	1.63*	0.92	[0.02, 3.49]
Gender (Male = 1, Other = 0)	-0.06	0.19	[-0.43, 0.31]
PIN	0.31*	0.16	[-0.02, 0.61]
PME	0.17	0.12	[-0.04, 0.41]
PMR	0.39***	0.11	[0.16, 0.60]
Condition (Social punishment = 1, Injunctive norm only = 0)	-0.42*	0.18	[-0.79, -0.09]
FNE	-0.07	0.16	[-0.44, 0.20]
FNE*Condition	0.17	0.26	[-0.30, 0.68]
$R^2 = .50^{***}, F(7, 90) = 12.91, p = .000$			
Dependent Variable: INT			
	<i>B</i>	<i>SE (Boot)</i>	<i>95% CI (Boot)</i>
Constant	-1.26*	0.72	[-2.83, 0.01]
PIN	0.29*	0.11	[0.07, 0.51]
ATT	0.83***	0.09	[0.66, 1.00]
$R^2 = .64^{***}, F(2, 95) = 85.75, p = .000$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PME = Perceived Message Effectiveness (measured by

“This message makes me think about the negative outcomes of not getting a COVID-19 booster shot.”), PMR = Perceived Message Relevance, ATT = Attitude, INT = Behavioral Intention, PIN

= Perceived Injunctive Norm, FNE = Fear of Negative Evaluation. Gender was controlled

because there was significant difference in gender between treatment and control groups.

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