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It's Not All Doom and Gloom: Protection Motivation Theory Factors That Reverse the Negative Impact of Social Media Use on Compliance and Protective Health Behaviors

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A nationally representative online survey was conducted in the United States in July 2020 to examine the role of social media use in knowledge about COVID-19, compliance with public health guidelines, and protective behaviors. Building on the Protection Motivation Theory, the analysis revealed that threat severity perceptions and self-efficacy, but not vulnerability perceptions, mediated the negative impact of social media use during the pandemic. Implications for theory, risk communication via social media, and the public are discussed.

Keywords: COVID-19, coronavirus, efficacy, Protection Motivation Theory, risk communication, social media use

Communicating about risks to increase knowledge and motivate people to take preventive measures is one of the core functions of media, which becomes more critical in times of health crises or global pandemics that have much bigger impact. As Norman (2012) has observed, social media have transformed the way people and organizations communicate, thus changing society and the way health promotion and communication is practiced. In a pandemic, health organizations use social media extensively to inform and educate the public about risks and to motivate attitude and behavior change, as observed during the Coronavirus 2019 (COVID-19) caused by SARS-CoV-2, an acute respiratory infection with significant morbidity and mortality rate globally (Wang et al., 2020). But the role of social media in influencing how people

appraise COVID-19-related threats and make self-protective decisions has not been adequately studied given the recency of the pandemic.

The current study aims to examine the extent to which social media use affects knowledge about the virus and motivates people to comply with public health directives and take preventive measures during a pandemic. Moreover, the analysis explores whether variables suggested by the Protection Motivation Theory, such as self-efficacy, threat severity perceptions, and perceived vulnerability, moderate the negative effects of social media use.

LITERATURE REVIEW

Social Media Use and Health Knowledge

Despite the deadly nature of COVID-19, even before a vaccine became available, infection was preventable if precautions were taken and adhered to by health professionals, caregivers, and the public. Health organizations and national authorities including the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) have recommended good personal and hand hygiene such as hand washing regularly with soap and water, face covering with masks when in proximity with others, social distancing, and avoiding contaminated spaces (Wang et al., 2020; Whitworth, 2020). However, adhering to these recommendations to protect oneself and others from COVID-19 infection requires adequate knowledge. In persuasive communication about risk and potential threats, knowledge has been shown to influence attitudes, which may consequently lead to action (Wood et al., 2012), although that is not often a linear process and often depends on various factors. Non-compliance is attributed to low or inadequate knowledge, for instance, of the correct medication dosage, but may also be due to inadequate understanding of the recommended action. By enhancing knowledge, the media, including social media, aim to influence the extent to which people perceive their vulnerability and assess the severity or seriousness of the risk that they are likely to encounter (Heath & Abel, 1996).

With adequate knowledge, people can process the information they receive (Palenchar & Heath, 2007), which is a prerequisite for altering perceptions, attitudes, and behavioral compliance (Muturi, 2020). As emphasized in the health communication literature, the goal of health communication is to increase knowledge and understanding of health-related issues (Schiavo, 2013) and consequently influence motivation for protective behaviors. In risk communication, knowledge is viewed as a precursor to action, by raising awareness, influencing attitudes and perceptions that people have about a risk, and preparing them to mitigate it so they can avoid negative outcomes (Wood et al., 2012). Similarly, diffusion studies have addressed knowledge as the initial step in the innovation-decision process (Rogers, 2003; Woods et al., 2012).

In preventing COVID-19, health organizations have focused on providing information to increase not only awareness of the pandemic but also factual knowledge about the coronavirus, modes of transmission, risk factors associated with infection, and effective preventive measures to be taken at individual, community, national and international levels. There is a broad understanding that the virus could be eliminated if all countries took appropriate measures (Li et al., 2020), which may be achieved through enhanced health communication and the development of policies that support prevention. For example, knowledge of available services was critical for adherence to preventive protocols in maternal

to child transmission (PMCT) of HIV and for effective administration of antiretroviral drugs (Muriithi et al., 2015).

Social media platforms have been credited as major disseminators of health information during a health crisis (Allington, et al., 2021). From YouTube to Facebook and other platforms, the use of social media in healthcare, health education and health promotion enables instantaneous accessibility of information about the pandemic. As studies have shown, presenting risk information in a dual modality, audio and visual formats, can increase comprehension particularly among those with low literacy (Sullivan et al., 2017; Wogalter et al., 2014). With social media using both modalities and more people turning to online health information, social media platforms could be effective channels for COVID-19 information, especially as they allow a higher public involvement in the health communication process through content development, linking or sharing within digital social networks. The interactive nature of social media has also been associated with empowerment, which has in turn improved people's engagement in their healthcare, delivery, and outcomes. On the other hand, some studies report that people tend to simplify issues, to ignore evidence that contradicts their current beliefs, and to base their perceptions of risk on what they see in the media and observe in their daily lives (Slovic et al., 1987; Heath & Abel, 1996). Furthermore, social media platforms have been associated with misinformation and with lack of compliance to health-protective behaviors (Allington et al., 2021). In a content analysis of information coronavirus messages, AVAAZ (2020) found much misinformation that was not only unchecked for correctness but had also gained traction through likes and shares from the public. Moreover, a study by the Pew Research Center (Mitchell et al., 2020) found that Americans who get their news on social media are less likely to be knowledgeable about politics as well as the coronavirus outbreak and more likely to be exposed to unproven claims. The spread of misinformation is dire during a pandemic since it is likely to fuel paranoia and panic, and to hamper efforts to contain it (Bora, 2018). This study therefore formulates the following hypotheses:

H1a: *Social media use is negatively associated with knowledge of COVID-19.*

H1b: *Knowledge is positively associated with protective behaviors and compliance.*

Behavioral Compliance and the Protection Motivation Theory

Compliance, defined as the extent to which a person's behavior coincides with health or medical advice (Fielding & Duff, 1999), is one of health communication's main goals for disease prevention and overall health and well-being attainment. Often used interchangeably with adherence, compliance refers to the extent to which a patient follows a prescribed treatment regimen (Mehta et al., 1997). From cardiovascular disease prevention to dietary intake and physical activity to HIV and other communicable diseases, identified factors for non-compliance range from demographics to psychosocial, behavioral, physical and medication characteristics, but health communication has been shown to play a crucial part in the decision-making process (Mehta et al., 1997). Using the health belief model to examine hypertension compliance among women, Peltzer (2004) highlighted cognitive factors that include perceived severity of the health problem, perceived susceptibility or vulnerability, and cues to action, as well as people's beliefs and evaluations of health and medical care practices.

With no definite cure or a vaccination for COVID-19 at the time this study was conducted, preventive and control measures were critical, and in a highly contagious global pandemic, each individual was and continues to be the most important factor in preventing further spread of the disease

and maintaining public health. However, the extent to which individuals comply with recommended preventive behaviors may be determined by various factors that include individual knowledge, attitudes, values and habits (Barakat & Kasemy, 2020). As Costa (2020) suggests, understanding the determinants for people's resistance to protective measures against the disease and the overall non-compliance is important not only for effective prevention but also for public policy to guide the overall eradication of the disease.

The Protection Motivation Theory (Rogers, 1975; 1983) is a theory of persuasion that explains why people take action in preventing health risks and the motivation for engaging in risk reduction behaviors. PMT was initially developed as a framework for understanding the impact of fear appeals but was later extended to provide a more general account of the impact of persuasive communications with an emphasis on cognitive processes that mediate behavior change (Norman et al., 2005). The expanded model includes key cognitions that motivate people to engage in desirable protective or risk-reduction behaviors. These cognitions are aligned along two processes: 1) threat appraisal that evaluates the maladaptive behavior (severity of the risk and one's vulnerability to a health threat, in this case COVID-19), and 2) coping appraisal, which entails efficacy for risk reduction (self-efficacy and response efficacy) (Norman et al., 2005; Ralph et al., 2014; Rogers, 1983). PMT postulates that the motivation to protect oneself from a health risk is a positive linear function of severity, vulnerability, response efficacy and self-efficacy, and a negative function of rewards and response costs (Ralph et al., 2014; Rogers, 1983).

A key variable of PMT, risk perception is the belief that one is vulnerable to the outcome of a disease, injury, harm or illness (Muturi, 2020a). Often described in terms of probability of danger, harm, or loss occurring, which may include loss of life as a result of magnitude or risk (McComas, 2006; Reisinger & Mavando, 2006; Vasvari, 2015), risk perception is the evaluation of severity of the risk and the potential for one to be impacted directly (Lippke, 2004; Popova, 2012). People are more likely to engage in preventive behaviors if they feel vulnerable to a health risk and view the risk as severe (Muturi, 2020a). In health crises such as the COVID-19 pandemic, risk perception refers to various kinds of attitudes associated with the pandemic and entails the examination of affective processes that determine risk judgements (Grasmuck & Scholtz, 2005). For people to take self-protective measures they must not only believe that there is a threat but also perceive it as severe, which refers to cognitions of potential consequences (Popova, 2012).

In public health communication, risk perception is conceptualized as a significant predictor for self-protective behavior and a motivational factor in individuals' propensity to seek information about a risk, where those who become more aware of the risk or their susceptibility will be motivated to take preventive action (Muturi, 2020a; Rimal, 2001; Chaffee & Roser, 1986). For example, those who feel vulnerable to COVID-19 and its dire consequences are likely to seek further information about the disease. Furthermore, those who are more knowledgeable about a risk are more likely to make the requisite behavioral changes. As researchers have acknowledged, several cognitive, emotional, social and cultural elements influence self-protective behavior, including protecting oneself from COVID-19 (Dryhurst et al., 2020), which demonstrates that "risk does not exist independent of our own minds" (p.160). Studies have reported negative correlations between risk perception and behavior change in cases where perceived risk (e.g., cardiovascular diseases) may lead to fear, which in turn inhibits behavior change (Rimal, 2001). There is also evidence that risk perception is not explicitly associated

with communication activity, while others have found a moderated relationship between risk perception and self-protective behavior (Rimal, 2001). As such, the following hypotheses are proposed:

H1c: *Knowledge moderates the relationship between media use and protective behaviors.*

H1d: *Knowledge moderates the relationship between media use and compliance.*

H2a: *Vulnerability perceptions moderate the effect of social media use on protective behaviors.*

H2b: *Vulnerability perceptions moderate the effect of social media use on compliance.*

H3a: *COVID-19 severity perceptions moderate the effect of social media use on protective behaviors.*

H3b: *COVID-19 severity perceptions moderate the effect of social media use on compliance.*

Self-efficacy

Self-efficacy is a crucial component of the coping appraisal process in PMT. Defined as the cognition about effectiveness, feasibility and ease with which a recommended response impedes or averts a risk (Witte, 1998), self-efficacy is the confidence people have in the ability to actually carry out the recommended protective behaviors (Rogers, 1983). Bandura (1977; 1986) conceptualized self-efficacy as individuals' beliefs in their capabilities and competences to mobilize and in their cognitive resources and agency to exert control over a potential risk. This implies that those at a health risk believe that they have the necessary skills to perform a specified preventive behavior to avoid risk. For instance, in preventing COVID-19, people must believe that they can exert personal control over the disease, potential infection and its consequences, and to adopt and master the recommended actions to avoid the risk of infection. People are more likely to engage in certain self-protective behaviors if they believe their efforts will be successful (Bandura, 1977, 2006; Moore et al., 2015).

Increasingly, studies have highlighted self-efficacy in health promotion and communication, specifically in motivating behavior change or as a moderating factor between risk perception and self-protective behavior. For instance, the extended parallel process model (Witte, 1992) elaborated the moderating role of self-efficacy in the relationship between their level of risk perception and likelihood of taking preventive action. In Bandura's social cognitive theory, self-efficacy plays a key role in the triadic interaction between the person, behavior and environment that leads to behavior change (Bandura, 1986). Personal factors that contribute to that change based on the cognitive model include knowledge about the risk, values, beliefs, attitudes and self-efficacy all of which are correlated to risky behaviors and the environmental impediments in behavior change (Bandura, 2004; Muturi et al., 2016).

Self-efficacy is attributed to cognitive factors where knowledge about the risk plays a key role. As Bandura put it, self-efficacy beliefs operate together with knowledge of health risks, goals, outcome and expectations, and perceived environmental impediments to facilitate behavior change (Bandura, 2004). Self-efficacy is also likely to trigger information seeking, which can lead to a deeper understanding of a disease symptoms, prevention tactics, or effective cures, but people are not always motivated to seek information on their own (Turner et al., 2006) and to interpret the risk and recommended self-protective measures appropriately.

Other studies have shown a correlation between attitudinal barriers such as stigma of some diseases and self-efficacy (Anderson et al., 2013; Moore et al., 2016). In the case of COVID-19, those with negative attitudes about the disease or recommended preventive measures, which include face coverings that are often stigmatized (Sotgiu & Dobler, 2020), are likely to have low self-efficacy for

adopting self-protective behaviors. On the contrary, efficacious people tend to be optimistic about performing behaviors rather than focusing on negative thoughts about their inability to achieve a goal, and those who retain the belief that they will be able to exert control over their thoughts are more likely to persevere in their thoughts (Turner et al., 2006). Based on the literature on self-efficacy and its moderating role in self-protective behavior, this study asks the following research question and makes the following propositions:

RQ1: *What is the relationship between social media use and self-efficacy?*

H4a: *Self-efficacy moderates the effect of social media use on compliance.*

H4b: *Self-efficacy moderates the effect of social media use on protective behaviors.*

METHODS

A nationally representative online panel of Americans was surveyed in July 2020, during the initial surge of the COVID-19 pandemic in the United States, using the survey company Dynata, widely recognized as a leader in the market research industry (Kimball, 2019). Because the survey was deployed online, a response rate could not be computed. The questionnaire, which relied mostly on standardized measures adopted from previous studies, was pretested with a small group of faculty members and graduate students to ensure there were no problems before launching the survey. After discarding incomplete answers and the participants who failed the attention checks, the final sample consisted of 1,260 respondents who match the U.S. population by gender, income, race, education, and age. Namely, 50.2 percent of the participants identified as women, and the median age of the sample was 47 ($M=46.3$, $SD=16.6$). In terms of race, 51.7 percent identified as white/Caucasian, 18.9 percent as black, 15.2 percent as Hispanic, 9.6 percent as Asian American, 1.7 percent as Native American, and 3 percent as other. In terms of education attainment, 30.3 percent had a college degree, 29.8 percent had some college or technical training, 19.5 percent had a high school diploma, including GED, and 18 percent had post-graduate work or degree. Only 2.3 percent had an education of less than high school. As for household income, 22.3 percent made less than \$25,000 per year, 28.6 percent reported making between \$25,000 to \$50,000, 16.5 percent fell within the \$50,000 to \$75,000 category, 13.9 percent reported an income between \$75,000 to \$100,000, and 18.7 percent made more than \$100,000 annually.

Measurement

Social media use (Cronbach's alpha = .871) was measured with an index of items assessing the respondents' frequency of use of platforms like Facebook, Instagram, Twitter, YouTube, Pinterest, etc. on a 7-point scale ranging from 1 = I don't use this platform to 7 = Multiple times per hour. *Knowledge* about the coronavirus was measured with an additive scale of four items assessing participant knowledge of the COVID-19 incubation period, symptoms, and transmission, based on information shared by the CDC at the time of the survey. The items were treated as dummy variables with 1=correct answer and 0=incorrect, for a total maximum of 4 for the knowledge index. *Vulnerability perceptions* were measured with a two-item scale adapted from de Zwart et al. (2009) that measured on a 5-point Likert scale how likely respondents thought they were to contract the disease in the next year and how likely they thought they were to contract it compared to other men/women of their age. *Coronavirus threat severity perceptions* (Cronbach's alpha = .860) were measured with a 4-item scale where participants were asked to indicate their level of agreement or disagreement to statements about how

severe/ serious/ threatening/ personally impactful they believed the Coronavirus crisis to be. *Self-efficacy* (Cronbach's alpha = .753) was measured with two items where respondents were asked their level of agreement or disagreement on a 5-point Likert scale with the following statements: "I have confidence in my ability to provide knowledge/information about COVID-19 that others consider valuable" and "I have the expertise needed to provide valuable knowledge/information about COVID-19." The *compliance* scale (Cronbach's alpha = .878) consisted of three items that measured respondents' compliance with their community or municipality's order limiting the size of social gatherings, with their community or municipality's stay-at-home/shelter-in-place order, and with the quarantine period recommended by their health provider if diagnosed with COVID-19 (on a 5-point disagree-agree Likert scale). Finally, *protective behaviors* (Cronbach's alpha = .797) were measured with three items that respondents had to agree or disagree with on a 5-point Likert scale, such as maintaining six feet of space from others while in public, avoiding leaving home except for essential activities, and wearing a mask in public.

RESULTS

The first hypothesis predicted the social media use is negatively associated with knowledge of COVID-19. Regression analysis found that social media use significantly predicted a decrease in knowledge, $b = -.38$, $t(1257) = -14.5$, $p < .001$. H1a is supported.

H2b predicted that knowledge is positively associated with compliance and protective behaviors. Indeed, regression analyses found that increased knowledge led to increased compliance, $b = .25$, $t(1109) = 8.62$, $p < .001$, as well as an increase in self-protective behaviors, $b = .21$, $t(1250) = 7.77$, $p < .001$. H2b is supported.

H1c predicted that knowledge moderates the relationship between media use and protective behaviors. Moderation analysis with PROCESS in SPSS (Hayes, 2013), where the protective behaviors index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and knowledge as moderator (W) variable (Model 1 in PROCESS in SPSS) found that the interaction effect was not statistically significant ($p = .79$). H1c is not supported.

H1d predicted that knowledge moderates the relationship between media use and compliance. Moderation analysis found that the interaction effect was not significant ($p = .11$). H1d is not supported.

H2a predicted that vulnerability perceptions moderate the effect of social media use on protective behaviors. While linear regression analysis revealed that social media use is negatively associated with protective behaviors, $b = -.06$, $t(1249) = -3.37$, $p < .001$, a simple moderation analysis (Hayes, 2013), where the protective behaviors index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and perceived vulnerability as moderator (W) variable (Model 1 in PROCESS in SPSS), however, found that vulnerability perceptions did not moderate this relationship. H2a is not supported.

H2b predicted that vulnerability perceptions moderate the effect of social media use on compliance. Linear regression analysis revealed that social media use is negatively associated with compliance, $b = -.14$, $t(1107) = -7.1$, $p < .001$. A simple moderation analysis (Model 1 in PROCESS), however, found that vulnerability perceptions moderated this relationship and changed its direction, making it positive, but the coefficient only approached significance, $b = .033$, $t(1106) = 1.805$, $p = .07$. H2b is not supported.

H3a predicted that COVID-19 severity perceptions moderate the effect of social media use on protective behaviors. A simple moderation analysis where the protective behaviors index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and perceived severity as moderator (W) variable (Model 1 in PROCESS) found that social media use had a negative association to protective behaviors that was not significantly moderated by severity perceptions ($b=.025$, $p=.18$). H3a is not supported.

H3b predicted that COVID-19 severity perceptions moderate the effect of social media use on compliance. A simple moderation analysis where the compliance index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and perceived severity as moderator (W) variable (Model 1 in PROCESS) found that although social media use had a negative association to compliance, when interacted with severity perceptions, the association became positive, $F(3, 1106)=78.95$, $b=.117$, $p < .001$. The model explains 17% of the variance in the dependent variable. H3b is supported. In other words, when participants were concerned about the seriousness of the pandemic, they were more likely to comply with public health guidelines even when they used social media heavily.

The last set of research questions and hypotheses focused on self-efficacy. Namely, RQ1 asked what is the association between social media use and self-efficacy? Regression analysis found a significant positive association, $b=.14$, $t(1250) = 7.16$, $p < .001$.

H4a predicted that self-efficacy would moderate the effect of social media use on compliance. A simple moderation analysis where the compliance index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and self-efficacy as moderator (W) variable (Model 1 in PROCESS) found that although social media use had a negative association to compliance, when interacted with self-efficacy, the association became positive, $F(3, 1106)=55.56$, $b=.133$, $p < .001$. The model explains 13% of the variance in the dependent variable. H4a is supported. When respondents had higher self-efficacy, they were more likely to comply with public health guidelines even when they used social media heavily.

Finally, H4b proposed that self-efficacy would moderate the effect of social media use on protective behaviors. A simple moderation analysis where the protective behaviors index was entered as the dependent (Y) variables, social media use was entered as independent (X) variable, and self-efficacy as moderator (W) variable (Model 1 in PROCESS) found that although social media use had a negative association to protective behaviors, when interacted with self-efficacy, the association became positive, $F(3, 1247)=23.73$, $b=.09$, $p < .001$. The model explains 5% of the variance in the dependent variable. H5b is supported. Namely, when participants had higher self-efficacy, they were more likely to engage in protective health behaviors even when they used social media heavily.

DISCUSSION

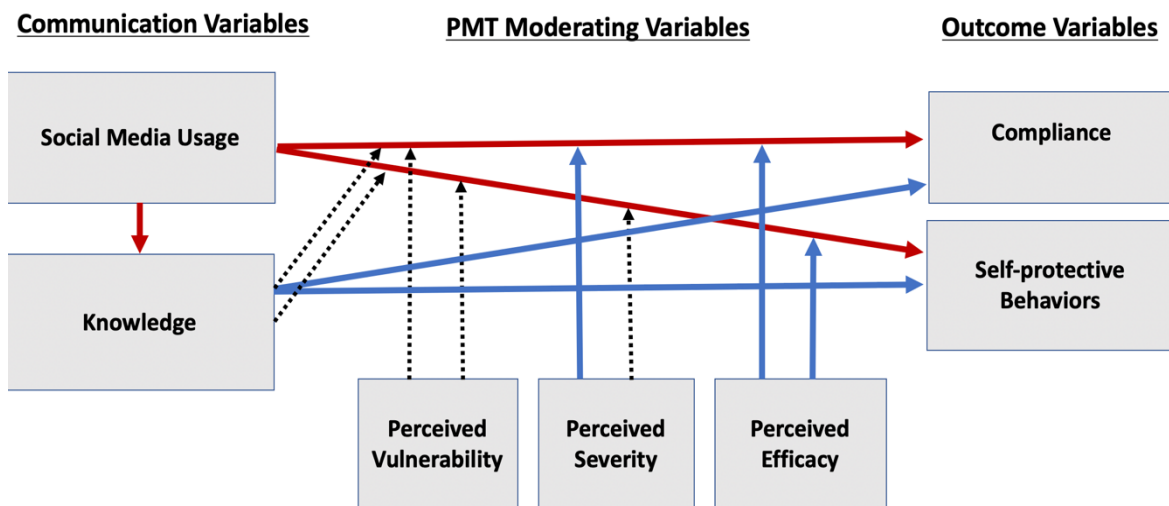
The study set out to apply the Protection Motivation Theory in the context of the 2020 coronavirus pandemic. It extends PMT by exploring the moderation effects of several cognitive processes related to threat appraisal (severity and vulnerability perceptions) and coping appraisal (self-efficacy) in the relationship between social media use and behavior change. Regression and moderation analyses point out to associations that have important implications for risk communication at a time when media consumers rely increasingly on alternative sources of news, such as social media (Mitchell

et al., 2020). Indeed, the analysis revealed that social media use was negatively associated with all dependent variables under scrutiny, namely knowledge about the disease, compliance with public health guidelines, and protective behaviors. To put these findings in context, six months into the pandemic, descriptive analysis revealed a mediocre level of knowledge about the novel coronavirus ($M=2.7$, $SD=1$, on a 4-point scale) and fairly high levels of compliance ($M=4.33$, $SD=.88$, on a 5-point scale) and protective behaviors ($M=4.22$, $SD=.88$, on a 5-point scale) among the participants in this study.

The finding on the negative association between social media use and knowledge supports similar results from the Pew Research Center reported during the same month, July 2020 (Mitchell et al., 2020). This has important implications for risk communication, especially as separate regression analysis revealed that age and education attainment were positively associated with knowledge (while gender and race did not make a difference), and knowledge was found to be positively associated with compliance and protective behaviors. As young people use social media more, their knowledge level is affected by the double whammy of young age and reliance on social media.

Moderation analysis, as suggested by PMT, found that several variables reversed the negative impact of social media use, however. The study's findings did not support existing literature (Chaffee & Roser, 1986; Rimal, 2001; Muturi, 2020a) on vulnerability perceptions, which did not moderate the negative effect of the communication variable (i.e., social media use) on either knowledge, compliance, or protective behaviors (the moderation coefficient was only marginally significant for compliance). This may be because, relative to severity perceptions ($M=3.91$, $SD=.89$), perceived vulnerability to the virus among participants was low in July 2020 ($M=2.80$, $SD=1.00$).

Figure 1: PMT Moderation Model during the COVID-19 Pandemic



Note: Dotted lines indicate non-significant moderation effects. Blue lines indicate positive associations and red lines indicate negative associations.

Two variables, however, stood out as significant in the moderation analyses (see Figure 1). When interacted with severity perceptions, the effect of social media use on compliance became positive. In other words, if respondents were concerned about the seriousness of the COVID-19 crisis, they were more likely to comply with public health guidelines during the pandemic, even if they used social media heavily. This finding supports the literature that sees severity perceptions as a positive

predictor of health practices (Peltzer, 2004) rather than a barrier to behavior change due to risk perceptions' potential to lead to paralyzing fear (Rimal, 2001). The finding that the level of perceived vulnerability, another dimension of fear, was low among the respondents, might explain that as well.

Somewhat reflecting the lack of consensus in the risk communication literature, while severity perceptions made a difference on compliance, they did not moderate the effect of social media use on protective behaviors. Costa (2020) argues that understanding the roots of people's resistance to protective measures is crucial not only for effective prevention but also for public policy to guide the containment of the virus. In this study's case, the implications to effective prevention are that inundating social media with messages about the severity of the disease might not necessarily reverse the negative impact of social media consumption. Instead, based on the study's findings on self-efficacy, messaging on social media should emphasize to audiences that taking protection actions would be both manageable and effective in protecting the self and others against a threat (Floyd et al., 2000; Popova, 2012). In the case of the COVID-19 pandemic, at a time when no universally treatment or intervention was yet known, and the long-term health effects among survivors were (and still are, as of this writing) to be understood, it is particularly important to emphasize self-efficacy in preventive behaviors.

Indeed, self-efficacy made a difference on both protective behaviors and compliance, reversing the negative effect of social media use. The finding aligns with literature on the positive impact of self-efficacy on adoption of public health guidelines (Rogers, 1983; Mosca et al., 2005). The reversal of the negative impact of social media use has important practical implications for risk communicators who may try to reach audiences via social platforms. We know from the related literature that self-efficacy can be enhanced by sharing specific guidelines on what the public should do during a health crisis, by communicating over multiple channels, by repeating messages frequently, and by citing official sources (Milleti & Fitzpatrick, 1992). These practices could easily be adopted on social media platforms.

The study also has some theoretical implications. Although the focus on PMT is on risk communication messages, there has been limited research on the sources of information or the mode of delivery and how that may influence expected health outcomes. The study adds to existing literature on PMT variables, specifically on their moderating role between communication elements and self-protective behavior in the context of an ongoing pandemic. Furthermore, as the health communication disciplines put more emphasis in e-health strategy, it is crucial to examine digital information sources through the lens of PMT and other theories that focus on message effectiveness in health decision making.

Given the current debates surrounding the effect of social media use on both political and health knowledge, the current study focused exclusively on social media as communication variables, to keep the model manageable. In future studies, we plan to tease out the effect of traditional news media consumption, as well as the effect of misinformation concerns. Further analysis of variables predicting compliance and protective health behaviors could complement the findings of the study in the subsequent waves of the pandemic, when more respondents were likely to personally know someone affected by the disease.

From the public's perspective, some practical implications of this study's findings would be that social-media users could benefit from following a wide range of accounts to get a more complete picture as a public health crisis is emerging, vary their news diet to include news sources beyond social media,

as well as seek out practical information that would explicitly teach them how to protect themselves rather than fear-inducing messages about the severity of the risk.

CONCLUSION

Using a nationally representative sample that matches the U.S. population across several key demographic variables, the present study offers reasons for both pessimism and optimism. On one hand, during the initial surge of the COVID-19 pandemic, the survey revealed mediocre levels of knowledge about the virus, which were largely predicted by social media use. Moreover, social media use correlated negatively with both compliance and protective behaviors. Instead of demonizing social media and communication technologies, the findings of this study suggest that risk communication that meets audiences where they are and enhance both self-efficacy and severity perceptions could lead to wider adoption of protective responses, especially as no cure or vaccine was available for the novel coronavirus when the survey was conducted.

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