

## Application of Risk Information Seeking and Processing Model to the Health Preventive Behavior: How Risk Susceptibility and Political Identity affect Vaccination

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### Abstract

*In the aftermath of the COVID-19 pandemic, the importance of collective efforts in promoting health preventive behaviors is accentuated, bringing sociopolitical factors into focus. To fully capture psychological drivers of health preventive behaviors in risk situations, anchored on the Model of Risk Information Seeking and Processing (RISP; Griffin, Dunwoody, and Neuwirth 1999), in retrospect of the recent COVID-19 pandemic, we explored whether and how individuals' vaccination behaviors are predicted by RISP-related variables (information insufficiency, affective responses, perceived information gathering capacity, subjective norms) and one's political identity. Findings from a survey of 705 adult participants in the U.S. showed that the effects of one's risk information insufficiency on his or her information seeking and affective response regarding the pandemic, which is also related to their risk susceptibility perceptions. More importantly, the impact of political identity on one's perceived risk susceptibility, and its association with vaccination behaviors are also identified. The findings of this study provide valuable insights for the development of effective health communication strategies for preventive health behaviors.*

**Keywords:** *Risk Information Seeking and Processing, RISP, Health Preventive Behaviors, Risk Susceptibility, Political Identity, Health Communication*

## INTRODUCTION

As the world grappled with the COVID-19 era, the pandemic not only posed a significant public health risk but also presented immense challenges for countries globally [1-2]. This crisis necessitated a shift in public health prevention behaviors, with cooperative efforts being essential to mitigate severe illness and prevent a

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Manuscript Received: August. 10, 2023 / Revised: August. 16, 2023 / Accepted: August. 21, 2023

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resurgence of the virus. In such circumstances, vaccines emerged as a primary defense, considered the most potent tool in halting the virus's spread and effectively combating the pandemic [3]. The CDC underscores their critical role in mitigating various risks associated with the disease [4]. However, vaccine hesitancy remains a challenge [5], making it essential to explore factors influencing health preventive behaviors, including vaccination uptake.

Prior research points to individual psychological factors in predicting health behaviors (i.e., vaccination). To fully capture psychological drivers of health behaviors in risk situations, scholars proposed the Model of Risk Information Seeking and Processing (RISP; [6]). RISP posited that an individual's experiences with risk influences how the individual perceives future risks; and theorized that certain factors would influence the extent to which individuals seek out risk information, possibly resulting in health behavior change. With the pandemic as a highly risk situation, we argue that individuals' varying levels of risk perceptions, triggered from the RISP-related variables, impact on their vaccination behaviors.

Considering that promoting vaccination behaviors also requires collective efforts and change, sociopolitical factors need to be studied. Past work argues vaccination behaviors are impacted by social identification and political orientation [3, 7]. Hence, in the backdrop of the recent COVID-19 pandemic, this study contends that people's vaccination behaviors that contribute to the spread of COVID-19 are fundamentally shaped by not only their perceived risk susceptibility, but also their political identification.

To address the aforementioned arguments, we explored whether, and how individuals' COVID-19 vaccination behaviors are predicted by RISP-related variables (i.e., information insufficiency, affective responses, perceived information gathering capacity, subjective norms) and one's political identity. Specifically, this study examined the effects of one's risk information insufficiency on his or her information seeking and affective response regarding the pandemic, which is also related to their risk susceptibility perceptions. Lastly, the impact of political identity on one's perceived risk susceptibility, and its association with COVID-19 vaccination behaviors are also tested from a survey of 705 adult participants in the U.S. The findings could provide theoretical and practical implications by providing an understanding of what RISP factors significantly influence people to develop health prevention intention regarding a global health risk.

## **LITERATURE REVIEW**

### **COVID-19 Infodemic and the Risk Information Seeking and Processing Model**

Since the beginning of the pandemic, the volume of information disseminated has been tremendous. The rise of information surrounding the COVID-19 from various sources, such as government and health agencies, news organizations, and social media-based opinions and commentary, led to the phenomenon of "infodemic", referring to rapid, far-reaching spread of information about the pandemic [8].

Especially during the early stages of COVID-19, the public encountered inaccurate information that flooded online sources. [1] evaluated public health literacy (i.e., an individual's ability to access, understand, assess, and apply health related information) regarding the COVID-19 infodemic from an online survey of 1,037 adults in Germany. Noteworthy, the study found that while 49.9% participants felt sufficiently informed about the coronavirus, yet a significant number of participants (47.8%) had difficulties in making sense of- and judging COVID-19 information: whether the information from the media was trustworthy. With the ever-changing nature of the pandemic, the deluge of information makes people more skeptical in terms of judging COVID-19 information. This in turn, will encourage assessment of public risk information seeking and processing, which would be important for the development of preventive behaviors [9].

As a part of infodemic management, understanding individuals' psychological factors that affect their risk information seeking and processing is crucial. Thus, as a theoretical background, we adopted the Model of Risk Information Seeking and Processing (RISP; [6] Griffin et al., 1999) to understand social psychological motivators of seeking and processing risk information ([10] Yang, Aloe et al., 2014; [11] Kim et al., 2020).

This model has been applied to various health contexts, such as H1N1 vaccine [12], cancer [13], and sexual aggression [14].

Considering of the model's wide application and strong predictive validity in health-risk contexts, the current study is primarily grounded by the RISP model ([6] Griffin et al., 1999) to understand how individuals seek out, and deal with risk information about the pandemic, and how it affects individuals' subsequent risk-related behaviors. While several studies have been published that attempt to understand the predictors of prevention behavior within a pandemic context (e.g., [9, 15 - 17], COVID-19 continues to circulate globally and scientific knowledge is still limited about its long-term effects. Therefore, it is still critical to understand the mechanism that makes people take preventive actions.

### **Application of RISP Model to COVID-19 Information-Seeking: Information Insufficiency and Antecedent Variables**

In risk contexts, the motivation to reduce uncertainty results in risk information processing and seeking [11]. The RISP model proposed Information insufficiency as a primary motivation for information processing, which implies the greater the insufficiency, the more likely people are to seek risk information to achieve accuracy and confidence in their judgments [6,18]. As the central concept of the RISP model, "information insufficiency" refers to one's subjective assessment of the gap between their perceived current knowledge level about a risk and the information sufficiency threshold one needs to reach to feel sufficiently confident in addressing that risk [6, 11].

Given that uncertainty can be reduced only when individuals achieve the desired judgmental confidence [11,19], information insufficiency is a primary motivator to respond to and evaluate the risk properly. Guided by the RISP model, therefore, this study explores whether information insufficiency predicts subsequent information seeking, as well as how people respond to the information (affective response). Considering the unfamiliarity of the novel COVID-19 outbreak during the early stage of COVID-19, it is reasonable to assume that information insufficiency will serve as the foremost factor that affects people's information seeking and processing [20].

According to the RISP model, information seeking refers to a volitional process of searching for desired risk-related information to reduce the uncertainty of health risk [21-22]. It has been known that information seeking is primarily driven by perception of information insufficiency to achieve sufficient confidence, and respond adequately to a given risk [6, 23-25]. Numerous studies have shown the positive relationship between information insufficiency and risk information seeking in various health contexts (e.g., [12, 13]). Applying it to the context of the pandemic, individuals had little existing knowledge/information about the COVID-19 when it started. Furthermore, when restrictions were at their height, with people living under directions ranging from "shelter in place" to "stay at home", they may have experienced information insufficiency and thus may have been more likely to engage in information seeking behaviors. Empirical evidence also supports the positive relationship between information insufficiency and risk information seeking in health contexts [12-13]. For better protection of oneself and others, and avoiding infection, the information insufficiency would stimulate an individual's demand for adequate information to control the risk, leading to motivate individuals to seek relevant information. Thus, the first hypothesis (H1) is posited as follows:

**H1:** Information insufficiency will be positively associated with online risk information seeking.

The RISP model also considers affective responses to risk, and posits that information insufficiency may affect how individuals respond to a given risk such as anxiety and fear [9,11,20,26]. The model posits that information insufficiency can trigger affective responses as individuals' risk information response [24,27-28]. Concerning the detrimental nature of the pandemic that arouses negative emotional responses, negative emotions about COVID-19 could be activated by information deficiency. In other words, when people think that they do not have sufficient information about the risk, they are more likely to display negative affective responses in the presence of a particular risk as coping strategies [20,29] Thus, the second hypothesis (H2) is

proposed as follows:

**H2:** In the Covid-19 context, information insufficiency will be positively associated with affective response.

Rendering a judgment of the risk is essentially a process of forming one's attitude toward the risk situation or toward one's health behavior change [9]. Thus, this study proposes that information seeking and affective responses would influence one's perceived risk susceptibility, which is one of the important determinants of individuals' perception of a risky situation [10]. Risk susceptibility describes the probability of an individual who will be involved in the risk [20]. Empirical evidence has supported that risk perceptions are significantly associated with information seeking behavior and emotional responses to a risk [6,9,17,30-31]. When the COVID-19 outbreak, individuals are more likely to perceive it as a greater risk than a well-known threat [20, 32]. Informational needs and emotional responses might be associated with public worry related to the likelihood of catching the virus and its associated damaging consequences. Thus, this study proposes information seeking and affective response as risk perception indicators and explores how individuals' risk perception (risk susceptibility) is associated with negative emotions and information needs (information seeking behavior).

**H3:** Risk susceptibility will be positively associated with information seeking.

**H4:** Risk susceptibility will be positively associated with affective responses.

### **Expansion of the RISP model: The Role of Political Party Identification**

Amid the infodemic onslaught, the pandemic has become an extremely politicized issue [8,33]. From the early stage of the pandemic, each political party has distributed opposing partisan messages about the severity of COVID-19 risks, and about proper actions to mitigate the risks [33, 34]. For instance, Republicans have contended that the impacts of COVID-19's are overstated, while Democrats have cautioned about the detrimental outcomes of the virus [34-35]. On this basis, increased political partisanship in the United States has placed a stronger focus on the role of political identity in shaping social behavior [36]. Since political outlooks influence the way people seek information and evaluate information [37,38], a person's political outlook has a strong influence on how they think and behave in many contexts, even in non-political contexts [39]. For example, "pro-environmental behavior" in the realm of climate change can be explained by political partisanship [40]. In addition, a person's intention to get a vaccine also can be predicted by their partisan ideology [41]. More importantly, much evidence has shown that political identity has impacted people's preventive behaviors and responses to the COVID-19 pandemic (e.g., [33, 42, 43]). This way, individuals' political orientation is more likely to lead to biased information processing and seeking, resulting in polarized beliefs and risk perception with regard to the pandemic [34].

Accordingly, it is meaningful to examine how the growing divergence of partisan outlooks in the U.S. translate into differences in how partisans perceive risks associated with health-related decisions. Thus, we proposed that individuals' political identification could be combined to extend the current RISP model. The current study explores how individuals' political identification could impact on risk perception of COVID-19, which can ultimately affect people's preventive behavioral intention. This study posits that individuals' political identification, as an important shaper of public perceptions of risk, have a great impact on their perceived risk susceptibility in terms of the pandemic. Therefore, the following hypothesis is proposed:

**H5:** Perceived risk susceptibility will be affected by political identification.

### **The Application of RISP on COVID-19 Vaccination**

Even though the RISP framework proposes several aspects regarding how individuals seek and process risk information, the theory does not fully explicate individuals' subsequent risk-related behaviors or risk-mitigating actions they may take as a consequence of their information behaviors [17]. Given the politicization of the pandemic in the U.S., people's behavioral intentions can be influenced by their perception about the virus, and work in tandem with perceived risks to affect their intention to conduct recommended behaviors

that can mitigate risks. Furthermore, due to the limited knowledge of the effects of the COVID-19 as an emerging risk, how individuals characterize the risk would greatly influence their coping behaviors.

Therefore, it can be presumed that perceived risk susceptibility has a great impact on a people's intention to take some precautionary measures to prevent the virus (e.g., vaccination). Considering the importance of the vaccination to reduce the risk of people spreading the virus that causes severe illness, hospitalization and death, it is imperative to examine how individuals develop their intention to receive a COVID-19 vaccine. To provide empirical evidence to predict how the relations among RISP-related variables affect preventive behavior intention, this study proposes risk susceptibility as an important antecedent to preventive behaviors (i.e., COVID-19 vaccination). It is crucial for practitioners to focus on its antecedents in order to achieve better outcomes (i.e., leading to more people getting fully vaccinated)

**H6:** Risk susceptibility will be related with vaccination behavior.

## METHODS

### Sample

A total of 705 participants conducted an online survey via Amazon Mechanical Turk. Respondents who resided in the United States were invited, and they received \$0.80 as compensation for participating in the survey. Due to the ongoing debates about the quality of MTurk responses we have applied several steps of the data cleaning process to achieve certain level of validity: we deleted responses from a) one who failed to provide a correct answer to the attention check question, b) one who finished the survey too shortly or c) ones who did not complete the survey. After the three steps, survey data from 544 remained for the main analysis. Majority of sample are Caucasian (n = 414, 76%), followed by African American (n = 59, 10.8%), Hispanic (n = 33, 6.1%), Asian (n = 23, 4.3%) and others (n = 15, 3%) while 63% of participants completed college or a higher degree (n = 296). Male participants accounted for 51% of the participants (n = 280) while 7 people did not want to reveal their gender (1.3%).

### Variables

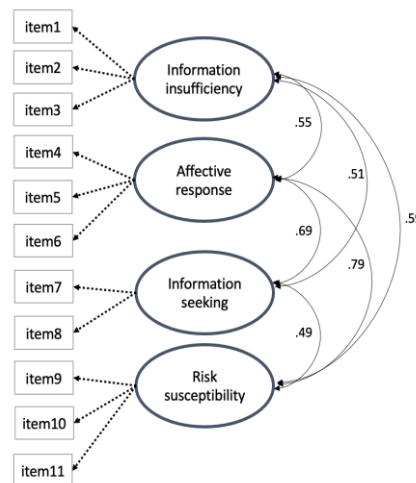
After the participants completed informed consent forms, they were asked to provide demographic information such as gender, age, ethnicity, and education. The participants were then asked whether they had been diagnosed with COVID-19. Those who responded that they had contracted COVID-19 were thanked and directed to the end of the questionnaire. Qualified respondents were then asked to provide their political identity and RISP-related variables. Then, respondents reported their level of preventive behaviors and intention to receive the COVID-19 vaccine. Information insufficiency was measured by three items [12,27,44] such as "I need to find out as much as possible about COVID 19," "I need a lot of information about COVID 19" on a 5-point Likert scale (1 = not at all, 5 = strongly agree). Cronbach's alpha was .93. Affective responses were measured by asking about the expected negative affective responses that participants may experience if they contract COVID-19, such as fear, worry, and anxiety [45]. On a 5-point Likert scale (1 = not at all, 5 = very much), participants were asked to rate their feelings toward COVID-19 based on the following emotions: afraid, anxious, and worried (Cronbach's  $\alpha = .91$ ). Perceived information seeking was assessed with three items (1 = strongly disagree, 5 = strongly agree; [12]) with .93 of Cronbach's  $\alpha$ . Examples included "I feel quite capable of finding information I need about COVID 19," and "It is hard for me to get useful information about COVID 19 (reversed item)." Political identity was assessed with one question on a 5-point Likert-type scale (1 = extremely conservative, 5 = extremely liberal; [46]). The question asked "Thinking about your political ideology, where would you place yourself on the following scale?" Vaccination was measured by asking how likely participants will get vaccinated against COVID-19 (1 = never/definitely not, 5 = always/definitely yes; [47]). Table 1 shows a correlation analysis of the variables.

**Table 1. Correlation among variables**

	Information Insufficiency	Affective response	Information Seeking	Risk Susceptibility	Political Identity	Vaccination
Information Insufficiency	1	.55**	.73**	.59**	-.31**	.02
Affective response	.55**	1	.47**	.79**	-.34**	-.03
Information Seeking	.73**	.47**	1	.53**	-.29**	-.08
Risk Susceptibility	.59**	.79**	.53**	1	-.40**	-.10*
Political Identity	-.31**	-.34**	-.29**	-.40**	1	.11*
Vaccination	.02	-.03	-.08	-.10*	.11*	1

## Results

In this study, we followed the two-step approach of Anderson and Gerbing (1988). In this approach, the estimation of a confirmatory factor analysis (CFA) precedes the estimation of the structural model. First, a confirmatory factor analysis was built with four latent constructs and was tested with maximum likelihood method using AMOS. Based on [48], the Confirmatory Factor Analysis was conducted before the main analysis. The data-model fit was high enough to suggest a final model fit: CFI=.98, RMSEA=.05, and SRMR=.05 while all loadings were significant at  $p < .001$ . Thus, we deemed the measurement model to be satisfactory.



**Figure 1. Measurement model using Confirmatory Factor Analysis (CFA)**

As a second step, a new research model was tested with Structural Equation Modeling approach with 6 hypotheses (See Figure 2). Each of which was grounded in theories and findings of previous research proposing Risk Information Seeking and Processing (RISP) model is in nested relations in our extended model to predict vaccination behavior. To take into account the widely accepted recommendations, multiple indexes were used to assess the goodness of fit of the overall model: the chi-square statistic, the comparative fit index (CFI), the Tucker–Lewis index (TLI), Standardized Root Mean Square Residual (SRMR) and the standardized Root Mean Squared Error of Approximation (RMSEA) [49]. In a model with “good” fit, the chi-square statistic should not be significant at the 5% level; the values of the CFI, and TLI indexes should be between 0.95 and

1.0; and the RMSEA index should be close to 0 [48]. [50] also argued that in order the baseline model to be acceptable,  $\chi^2/df$  needs to be less than 3 for a sound model fit and CFI to be higher than .96, SRMR to be less than 1.0 or RMSEA to be less than .06 using general cutoff criteria.

In this regard, we conducted SEM applying five fit indexes that are broadly recognized as the most informative and prevalent:  $\chi^2/df$ , CFI, TLI, SRMR, and RMSEA [51-53]. The result indicates that the fit between the data and the proposed model (See Figure 2) is acceptable ( $\chi^2/df = 2.49$ , CFI = 0.987, TLI = 0.983, SRMR = .042 and RMSEA = .054). The proposed model predicting how factors in the RISP model are linked to vaccination interventions was statistically compelling and revealed an acceptable fit.

Hypotheses 1 and 2 predicted the positive effects of information sufficiency on information seeking and affective response. Results provided support for hypothesis 1 and 2. Particularly, perceived sufficiency about COVID 19 demonstrated a large positive effect on information seeking behavior ( $\beta = .819$ ,  $p < .001$ ) and affective response ( $\beta = .657$ ,  $p < .001$ ; Table 2).

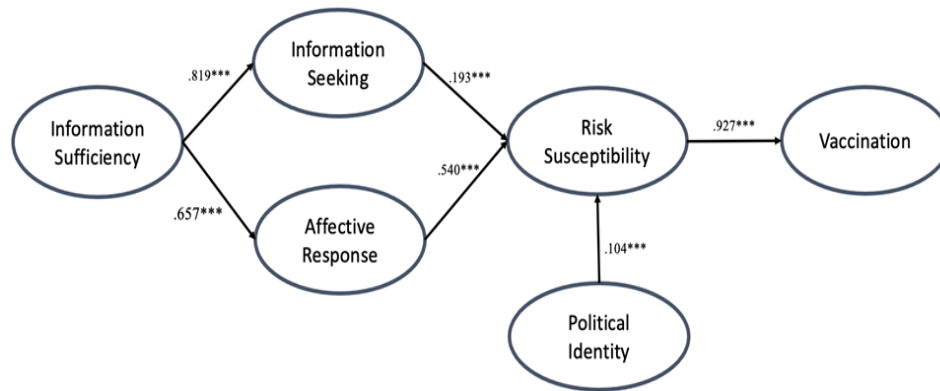
Hypotheses 3 and 4 proposed that information seeking and affective response as risk perception indicators affects the perceived risk susceptibility. Results provided support to both hypotheses. As expected, information seeking demonstrated significant effects on perceived risk toward COVID 19 ( $\beta = .193$ ,  $p < .001$ ; Table 2). Similarly, emotional response is positively related with risk perception ( $\beta = .540$ ,  $p < .001$ ; Table 2).

Hypothesis 5 predicted risk susceptibility was affected by political identification and was supported ( $\beta = .104$ ,  $p < .001$ ; Table 2). More liberal participants are more likely to perceive the risk toward COVID 19. This eventually supports hypothesis 6 proposing risk susceptibility to be related with vaccination behavior ( $\beta = .927$ ,  $p < .001$ ; Table 2).

**Table 2. Hypothesis results for each path**

Hypothesis	Paths	z values	Standardized coefficient	Test results
H1	Information Sufficiency → Information Seeking	20.643	.819	$p < .001$ , supported
H2	Information Sufficiency → Affective Response	14.320	.657	$p < .001$ , supported
H3	Information seeking → Risk Susceptibility	.193	6.817	$p < .001$ , supported
H4	Affective Response → Risk Susceptibility	.540	19.460	$p < .001$ , supported
H5	Political Identification → Risk Susceptibility	.104	4.709	$p < .001$ , supported
H6	Risk Susceptibility → Vaccination Intention	.927	13.344	$p < .001$ , supported

\*Chi-Square testing:  $\chi^2 = 122.1113$  ( $df = 49$ ),  $p < 0.001$



**Figure 2. Final model with coefficients**

## Discussion

After weathering the COVID-19 crisis, the world now faces the potential of future global pandemics. Thus, gaining insights into the mechanisms that motivate individuals to adopt preventive measures remains crucial to mitigate a resurgence of global pandemic. This study represents not only a further test of RISP, but also extends the theory by integrating the concept of political stands as an additional determinant of vaccination. In order to encapsulate health information processing and preventive behaviors in a most recent pandemic (i.e., COVID-19) context, some RISP related variables are chosen particularly for a novel pandemic health risk. From our investigation of the relationships among different variables and their impacts on vaccination, information insufficiency significantly predicts information seeking and affective response all of which are positively associated with risk susceptibility. The risk susceptibility is also affected by political identity before it relates to vaccination. These findings significantly help untangle some contradictory results from previous study that political identity may be unnecessary to consider in regard to health intervention (e.g., [54-56]).

Political identity is of utmost importance, as we add new insight to the RISP model by showing a critical association between political identity and health preventive behavior. To reiterate, a participant's individual political identification impacts the relationship between RISP predictors and risk susceptibility which eventually predicts intention to receive a vaccination. It is also consistent with the current research stream supporting that political identity influences health behavior [57]. One survey study of 1,971 respondents found that Democratic political partisans were significantly more willing to receive a vaccination than those who indicated Republican political partisanship, or who were independent [57]. One possible explanation can be traced back to a social identity model of health risk [58]: the theoretical model articulates a linkage from individuals' shared group membership (i.e., partisan identity regarding the COVID-19 vaccination) to their decreased or intensified health risk perception and subsequently changed health behavior. Relatedly, previous studies have discovered that shared group membership contributes to how to perceive risk and develop related preventive behaviors in various risky situations [58, 59].

Going along the same topic, by associating political identification with RISP-related variables, this study makes an interesting theoretical contribution to the health and risk communication literature. The current study elucidates how individuals develop their prevention behavior intentions, especially during a highly politicized health crisis, the COVID-19 pandemic crisis. Findings show that risk averse behavior is not simply promoted by increasing risk susceptibility, especially when a risk is highly politicized. In other words, political partisanship is intertwined with risk susceptibility, resulting in different impacts on individuals who may or may not get vaccination. Considering the role of shared group membership as a strong predictor of disease risk perception [58], future research is needed to consider political partisanship, when it comes to understanding public health risk perception and health behaviors in a pandemic crisis.

Furthermore, under the infodemic umbrella, the result of the current study will be particularly relevant for understanding how information seeking and processing would influence vaccination intention. Scholars and



practitioners called for empirical research about COVID-19 that would promote interventions to translate knowledge into actionable behavior-change messages to all individuals [60]. From a practical standpoint, our proposed model will help practitioners better understand factors that might increase actionable behavior-change to prevent health risks such as COVID-19. Our suggested model indicated that information insufficiency, information seeking and affective responses were the most significant factors that are related to perceived risk susceptibility. This means health communicators should consider the dynamics of the public's political perception as well as how the three RISP factors (i.e., information insufficiency, information seeking and affective responses) can influence their risk perception in order to successfully promote health behaviors. For instance, the health communication strategies during a pandemic should aim to stimulate individuals' information seeking and promote emotional responses, leading to increased risk susceptibility perceptions and boost up their vaccination intentions. Similarly, our findings suggest that public health campaigns and health messages should alert the public through messaging that all are liable to be harmed by a pandemic, which in turn, increase their perceived risk susceptibility and activate preventive behaviors.

This research has several limitations that provide potential guidance for future research. First, since COVID-19 is a prolonged health risk, which is still ongoing, a longitudinal study is needed to test the proposed model in different phases and to examine whether other variables should be considered or added to address the different ongoing phases of COVID-19. To extend the generalizability of our results, it is also recommended to conduct experiments testing the impacts of key RISP variables on health behaviors in other contexts and different types of health risks. Further, while this research builds a new model by selecting, reorganizing and adding key elements of the RISP, a more comprehensive investigation might be needed to explain whether other RISP variables such as norms or channel belief would affect risk perception and health behaviors. Lastly, considering the global magnitude of the COVID-19 health crisis, future research should apply this framework to other countries or during other global pandemic to confirm the generalizability of findings of the current study.

These limitations are offset to some extent by new insights from the extended RISP model. In conclusion, our results suggest promotion of health preventive behaviors such as the COVID-19 vaccination, requires a multifaceted perspective that considers political partisanship, as well as individual risk information seeking and processing.

## Acknowledgement

This work was supported by Rowan University (Ric Edelman College of Communication & Creative Arts' STORI (Support for Teaching, Outreach and Research Innovations) Fund) in 2022.

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