THE ROLE OF FELT AMBIVALENCE ON COVID-19 VACCINATION AND INFORMATION SEEKING: THREADING THE NEEDLE IN RISK COMMUNICATION

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Abstract

College-aged youth has the highest vaccination hesitancy among the adult population, the health decisions formed during this transitional period would inform their future parental decisions related to vaccination. Integrating the extant literature on ambivalence and the Risk Perception Attitude Framework (RPA), this project examined the role of felt ambivalence and perceived risk on COVID-19 vaccination attitude and behavior among college-aged young adults. This project used a survey with a sample of college-aged young adults ($n = 379$). Findings indicated that response efficacy mediated the relationship between risk perception and vaccination intention. Moreover, the influence of risk perception on vaccination intention was serially mediated by perceived vaccine efficacy and felt ambivalence. This study expands the RPA's efficacy in predicting persuasive outcomes to a new health communication domain. It also lends support for considering ambivalence as a key factor in risk communication, particularly regarding vaccination. Practical implications and limitations have also been outlined.

Keywords: COVID-19, Risk Perception Attitude Framework (RPA), ambivalence, vaccination hesitancy

The Role of Felt Ambivalence on COVID-19 Vaccination and Information Seeking: Threading the Needle in Risk Communication

Declared by the World Health Organization (WHO, 2020) as a pandemic and an international emergency in March 2020, the Coronavirus disease 2019 (COVID-19) has struck the globe on an unprecedented scale as a major global public health threat with far-reaching implications. Vaccination is considered one of the most successful public health interventions with tremendous impact against the outbreak of various infectious diseases (Schiavo, 2020). Even though relatively high rates of immunization have been maintained, concerns about vaccines persist, presenting grave challenges to communication efforts combatting vaccination hesitancy (Kim et al., 2019). The WHO (2020) has declared vaccine hesitancy one of the top threats to global health. Some even warned that there might be an "information war" regarding "vaccination communication in the age of COVID-19" (Schiavo, 2020, p. 73).

One of the key target audiences for health interventions is the population of 18- to 25-year-old individuals who are transforming from adolescence to full adulthood (Arnett, 2007). At a phase of self-discovery with independent living and decision-making, college-aged youth are vulnerable to impulsiveness and often have trouble with restraint (Blevins et al., 2019). Growing evidence indicates that college-aged youth are prone to downplay the harmfulness associated with risky behaviors (Aldeis & Afifi, 2013). In the meantime, they are a particularly important population regarding establishing beliefs about vaccines during later adulthood (Volkman et al., 2021). Unfortunately, latest survey data indicate that about a quarter of young adults have doubts on COVID-19 vaccination, they would take the "wait and see" approach, higher than any other adult age group (Diesel et al., 2021). The negative health beliefs about vaccines are likely to prolong during college years, especially among those who had vaccination waivers (Jadhav et al., 2018). They are the next potential parental generation. A Pew Internet and American Life study found that many college-aged young adults regard vaccination as a parental decision, which should not be mandated (Perrin & Anderson, 2019). Their current perception on vaccination may sway the decision on whether to vaccinate their future children as recommended.

Recent research e.g. Volkman et al. (2021) pointed out that for college-age students, vaccine information should focus on issues related to their risk perception. College also represents an environment in which people are particularly likely to develop ambivalence toward health-related issues (Zhao & Cai, 2008). This is a transitional period in which some previously held beliefs are challenged. Accordingly, college students' perceptions and attitudes might be reshaped due to new information, new social networks, and newly obtained independence and freedom (Zhao & Cai, 2008). Taking as a whole and integrating the extant literature on ambivalence and the Risk Perception Attitude Framework (RPA), this project seeks to examine the role of felt ambivalence and perceived risk on COVID-19 vaccination attitude and behavior among college students.

The Risk Perception Attitude (PRA) Framework: Risk Perception and Response Efficacy

Risk perception and efficacy beliefs are the key focus of several theoretical frameworks in health communication and persuasion research (Rimal & Juon, 2010), one of which is the Risk Perception Attitude Framework (RPA). RPA posits that perceived risk functions in tandem with efficacy beliefs to influence an individual's motivation and behavior in health decisions (Rimal & Real, 2003). The RPA has been examined in a variety of health domains; this study will extend the purview of the framework by testing the predictions of the RPA in the context of COVID-19 epidemic.

Self-protective behavior (e.g., wearing a mask or getting vaccinated) safeguards an individual's psychological and physical well-being in dangerous situations (Rains et al., 2019). Extant literature has documented that heightened risk perception encourages engagement in proactive and self-protective actions. For example, during the avian influenza outbreak, Hong Kong citizens with higher perceived risk and personal experience with influenza-like symptoms were more likely to use masks (Lau et al., 2008). Low perceived risk of acquiring a certain disease may lead to rejecting vaccination (Cohen & Head, 2013). During the H1N1 pandemic, as perceived risk increased, vaccine acceptance in the United States increased (Freimuth et al., 2017). In the Netherlands, individuals were more inclined to accept an H1N1 vaccine with high levels of perceived vulnerability and emotional concerns (van der Weerd et al., 2011). Perceived anxiety and effectiveness of recommended preventative measures predicted actions countering H1N1 (Bish & Michie, 2010). Among college-age students, high risk perception was associated with the HPV vaccine uptake (Nan & Daily, 2015). Meta-analytic evidence indicates that risk perception has a significant, albeit small, association with both intention and behavior (Brewer et al., 2007). Hence, we propose:

H1: There will be a positive association between risk perception and vaccine intention.

Another important self-protective behavior under the RPA framework is information seeking. The contemporary communication environment is marked by the presence of multiple information sources and constant conflicting messaging. Information seeking countering uncertainty may serve to mitigate a health-related threat or perceived risk (Rimal & Turner, 2009). Accordingly, we predict:

H2: There will be a positive association between risk perception and information seeking.

Response efficacy refers to the belief about the effectiveness of a recommended action (Rimal & Real, 2003). A meta-analysis found that the increase in response efficacy shaped behavioral intention (Floyd et al., 2000). An individual's belief in the effectiveness of a vaccine exemplifies response efficacy (Kim et al., 2020). Perceived vaccine efficacy has been a primary predictor of vaccination intention (Kim et al., 2019). Individuals with higher levels of perceived vaccine efficacy on flu and H1N1 influenza vaccine reported higher levels of vaccination intention (Wong & Sam, 2010). Kim et al. (2019) found that risk perception was associated with response efficacy. Moreover, extant literature has largely supported the proposition that efficacy conditions the relationship between risk perception and behavioral outcomes (e.g., Rimal et al., 2009; Rimal & Juon, 2010). Ferguson and Gallagher (2007) reported that the impact of message features on the intention to take the influenza vaccination was mediated via perceived vaccine effectiveness. Hence, we propose:

H3: Response efficacy will mediate the association between risk perception and vaccine intention.

Relatedly, Rimal and Real (2003) argued that the motivation of information seeking is affected by the interplay of risk and efficacy perceptions, which received limited support. For example, Zhao and Cai (2008) documented both significant and positive main effects of perceived risk and response efficacy on cancer information seeking, but the conditional effect of response efficacy was not supported. Given the limited empirical grounding, we ask:

RQ1: Will response efficacy mediate the association between risk perception and information seeking?

Felt Ambivalence and Vaccination Intention

Ambivalence, which refers to highly polarized attitudinal beliefs, is more common than univalent or apathetic views (Song & Ewoldsen, 2015). Ambivalence is a critical element for a more comprehensive approach to untangle the nature of people's attitudes and opinions. Understanding the genesis and consequences of ambivalence, therefore, is an important endeavor in health communication research. The relevance of ambivalence varies across situations. The information environment with abundant conflicting health messages is a contributing factor on ambivalence (Conner & Armitage, 2008). Ambivalence related to COVID vaccination seems to be unavoidable given the inescapably mixed messages involving discussions of both benefits and side effects.

Ambivalence research is not a homogeneous body of literature (Baek, 2010). Song and Ewoldsen (2015) reviewed subjective (felt) versus objective (potential) ambivalence, implicitly measured versus explicitly measured ambivalence, and vertical versus horizontal ambivalence. Zhao (2005) identified three forms of ambivalence: potential ambivalence, felt ambivalence, and affective-cognitive ambivalence, measured by both self-report and formula. Extant evidence suggests that each facet of this construct and corresponding measure is unique and not easily interchangeable. Affective-cognitive ambivalence has not been studied extensively yet (Zhao & Cai, 2009).

Two major streams of research address how and why people with ambivalent attitudes might respond to information differently compared to those with univalent attitudes (Chang, 2012). The first stream suggests motivated processing. Because ambivalent attitudes are associated with discomfort, ambivalent people are more pliable to persuasion effects (Zhao & Cappella, 2008). This discomfort makes them eager to change their attitudes in directions consistent with the new information they receive, and such motivated processing generates response amplification effects (Cornelis et al., 2020). Instead, the second stream indicates that because ambivalent people are less confident in their attitudes, they are motivated to engage in systematic processing and change their attitude only when message arguments are strong (Conner & Armitage, 2008). The first perspective connects ambivalence with a state of vulnerability to persuasion. The second perspective relates attitudinal ambivalence to information processing. The findings are mixed. Yan (2015) found that ambivalent individuals reported a higher level of cognitive elaboration than did univalent individuals. Chang (2012) found that ambivalent attitudes encourage systematic processing, and identification with the ambivalent attitude object further contributes to motivated processing.

Ambivalence has been shown to impede the formation of attitudes, behavioral intentions, and behavior (Baek, 2010). Prior research has demonstrated that ambivalence about specific behaviors likely generates hesitancy and deters individuals from carrying out behaviors (Hanze, 2001). In cancer prevention, ambivalence was positively linked to perceived risk (Han et al., 2006). Lipkus et al. (2003) found that perceived risk lowered felt ambivalence towards screening intentions for fecal occult blood test/sigmoidoscopy.

Ambivalence indicates low attitude strength, because stronger attitudes are more capable of predicting behaviors than weak attitudes, ambivalence is less able to predict and guide behaviors (Krosnick & Petty, 1995). Although there is no conclusive evidence regarding which type of ambivalence has better explanatory or predictive power in various scenarios (e.g., moderating the relation between attitude and behavioral intention), latest empirical data pointed to the salience of felt ambivalence, which refers to "psychologically uncomfortable feelings individuals experience as a result of inconsistent evaluations toward an object" (Ran & Yamamoto, 2015, p. 895). It taps a conflicted, mixed mental state that makes a global evaluation toward an object unstable regarding valence (positive or negative). Ran and Yamamoto (2015) revealed that the association between perception and behavioral intention was conditional upon felt ambivalence. Consequently, we predict:

H4: Felt ambivalence toward COVID-19 vaccination will mediate the relationship between perceived risk and intention to receive the COVID-19 vaccination.

Information seeking is considered as a coping mechanism to reduce negative reactions to ambivalence (Lambert & Loiselle, 2007). People who are ambivalent tend to engage in increased information seeking with respect to the attitude object, presumably to resolve their ambivalence (Petty

et al., 2006). For example, Zhao and Cai (2008) found that among college nonsmokers, ambivalence was a positive predictor of seeking new antismoking information. Weeks et al. (2012) reported that conflicting information of the mammography recommendation strongly predicted online seeking for mammogram related information. Shi et al. (2021) found that women's ambivalence about getting a mammogram was associated with mammogram-related information seeking from online sources. Given the association between ambivalence and information seeking, in tandem of its role in tempering the connection between attitude and behavior, we propose:

H5: Felt ambivalence toward COVID-19 vaccination will mediate the relationship between perceived risk and seeking of information related to COVID-19 vaccination.

Felt ambivalence may also serve a mediating role in the relationship that includes perceived vaccine efficacy. For example, Kim et al. (2019) found that the association between the exposure to influenza vaccination messages and intention to receive the flu vaccine was mediated by both perceived vaccine efficacy and felt ambivalence. To further investigate the underlying processes behind the relationship between risk perception and vaccination intention, this study investigates the role of perceived vaccine efficacy and felt ambivalence as potential serial mediators. People's risk perception about COVID-19 in general is likely to be associated with their perceived vaccine efficacy, which presumably may cause felt ambivalence to vary, and finally to affect behavioral outcomes such as vaccination intention and information seeking. Last, we ask:

RQ2: Will the influence of risk perception on vaccination intention be serially mediated by response efficacy and felt ambivalence?

RQ3: Will the influence of risk perception on information seeking be serially mediated by response efficacy and felt ambivalence?

Methodology

Overview and Sample

Given that college students represent an appropriate and important population for examining our hypotheses and research questions, a 10-min online survey on Qualtrics (an online survey software) was developed and conducted among 478 respondents recruited from undergraduate classes at a midsize Northeastern University in the United States. Of the 478 respondents, 379 completed the survey, yielding a completion rate of 72.9%. The age of the 379 respondents included in the data analysis ranged from 18 to 29 ($M = 20.90$, $SD = 1.57$); 64.4% were female ($n = 244$); 85% were White ($n = 322$), 13% Black ($n = 13$), 3.2% Hispanic/Latino ($n = 12$), and 3.2% Asian ($n = 12$). Data analyses were done using SPSS v28 with the add-on program PROCESS macro (Hayes, 2022).

Measures

Scales for key variables were measured on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) unless otherwise specified.

Risk perception was measured with a 4-item scale modified from (Dryhurst et al., 2020). The items were: "I will be personally affected by COVID-19 in the next 6 months"; "My friends and family will be directly affected by COVID-19 in the next 6 months"; "I will probably get sick with COVID-19"; and "Getting sick with COVID-19 can be serious." ($M = 5.18$, $SD = 1.21$, $\alpha = .75$).

Vaccine intention was measured with a 2-item scale adapted from (Gerend & Shepherd, 2007). The items were: "I will consider received the COVID vaccine once it becomes available"; "I will actually get the COVID vaccine once it becomes available" ($M = 5.15$, $SD = 1.79$, $\alpha = .94$).

Perceived vaccine efficacy was measured 2 items adapted from (Witte et al., 2001). The items were: "When becoming available, I believe the vaccine will be effective in preventing COVID-19"; "When becoming available, I believe the vaccine will work in preventing COVID-19" ($M = 5.78$, $SD = 1.35$, $\alpha = .94$).

Felt ambivalence was assessed by 3 items adapted from previous research (Lipkus et al., 2003). The items were "I have strong feelings both for and against COVID-19 vaccination", "I have conflicting thoughts about COVID-19 vaccination" and "I find myself feeling torn between wanting and not wanting to get vaccinated against COVID-19" (Cronbach's $\alpha = .90$, $M = 3.35$, $SD = 1.42$).

Information seeking was measured by asking the participants "How often have you sought information about COVID-19 vaccination from the following sources in the past week? - Traditional news media (e.g., newspaper, TV), social media (e.g., Twitter, Facebook), the government, scientists or medical professionals, and family and friends ($M = 5.78$, $SD = 1.35$, $\alpha = .74$).

COVID history was assessed by asking the participants "Have you ever had, or thought you might have, contracted COVID-19?", to which 43.8% ($n = 163$) answered yes and 54.2% answered no ($n = 213$).

Results

Table 1 presents summary statistics including means, standard deviations, and correlations among the key study variables. There was a noticeable gender difference on risk perception, ambivalence and information seeking. Female students reported higher risk perception ($M = 5.43$, $SD = 1.41$) than male students ($M = 4.76$, $SD = 1.01$), $t = 5.31$, $p < .001$. They had higher felt ambivalence ($M = 4.11$, $SD = 1.37$) compared to their male peers ($M = 3.71$, $SD = 1.51$), $t = 2.65$, $p < .05$. Female participants also sought information related to COVID vaccine more frequently ($M = 2.50$, $SD = 1.04$) than did male participants ($M = 2.06$, $SD = .84$), $t = 4.26$, $p < .001$. Intriguingly, personal COVID history did not make any noticeable difference on all key outcome measures. Consequently, in the following main analysis, gender was included as a covariate unless specified otherwise.

Table 1: Correlations ($N = 379$)

	M	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Gender	__	__	__							
2. Age	20.29	1.58	.01							
3. Race	__	__	.05	-.02						
4. COVID history	__	__	-.03	-.02	-.02					
5. Risk perception	5.19	1.21	-.26**	-.01	-.09	-.06				
6. Vaccine intention	5.16	1.75	.03	-.08	.13**	.03	.25**			
7. Vaccine efficacy	5.18	1.36	.07	-.01	.18**	.01	.14**	.66**		
8. Ambivalence	3.97	1.43	-.13**	-.05	.01	.01	.15**	-.16**	-.13*	
9. Information seeking	2.34	.99	-.21**	-.03	-.13*	.01	.16**	.06	.02	.14**

Notes: Gender (1 = male, 0 = female), Race (1 = Caucasian, 0 = other), COVID history (1 = no, 0 = yes);
*$p <.05$; **$p <.001$

There was significant correlation between risk perception and vaccination intention for both females ($r = .30$, $p < .001$) and males ($r = .23$, $p < .001$), which supported H1. The association between risk perception and information was significant among females ($r = .24$, $p < .001$), but insignificant among males ($r = .09$, $p = .33$). Therefore, H2 was partially supported. To test whether response efficacy mediated the relationship between risk perception and behavioral outcomes related to COVID vaccination (H3 and RQ1), we employed the PROCESS macro ($n = 5,000$, model 4) by Hayes (2022). The first model tested the mediation effect of response efficacy on the relationship between risk perception and intention to receive a COVID-19 vaccine (risk perception→ perceived vaccine efficacy → vaccination intention). Controlling for gender difference, the overall model was significant, $R^2 = .03$, $F(2, 376) = 6.38$, $p < .01$. The results revealed significant indirect effect of response efficacy linking risk perception and vaccination intention ($\beta = .16$, $SE = .06$, 95% CI = [.03, .29]). Therefore, H3 was supported, with details illustrated in Figure 1. Next, we used the same procedure to assess the possible mediation effect of response efficacy on the relationship between risk perception and seeking information related to the COVID-19 vaccination (risk perception→ perceived vaccine efficacy → information seeking). The overall model was significant, $R^2 = .03$, $F(2, 376) = 6.37$, $p < .01$. There was a significant indirect effect of felt ambivalence connecting risk perception and information seeking ($\beta = .02$, $SE = .01$, 95% CI = [.0004, .048]), with details illustrated in Figure 2.
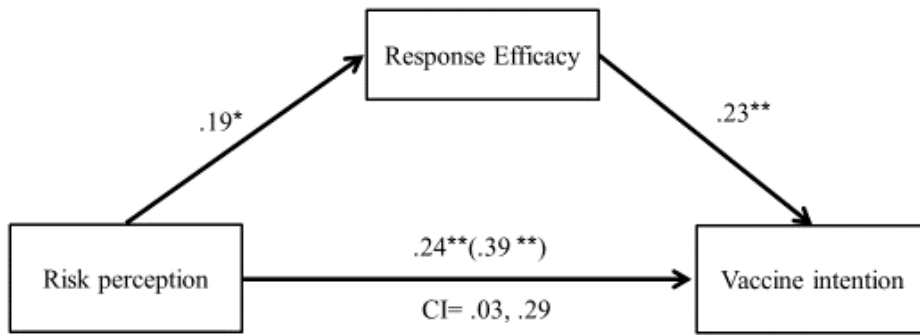
Figure 1. Model depicting the mediating role of response efficacy (i.e. perceived vaccine effectiveness) on the relationship between risk perception and behavioral intention to receive the Covid-19 vaccine. Coefficients were unstandardized regression coefficients, value in the parentheses indicated the total effect. *p <.05; **p <.001.
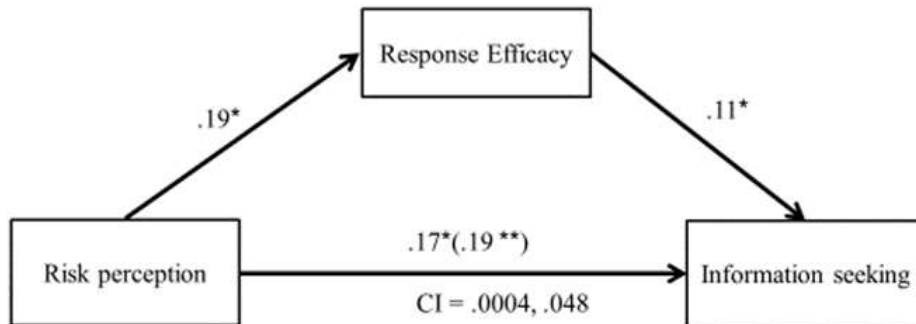

Figure 2. Model depicting the mediating role of response efficacy on the relationship between risk perception and intention to seek information related to the Covid-19 vaccine. Coefficients were unstandardized regression coefficients, value in the parentheses indicated the total effect. *p <.05; **p <.001.

To reveal the underlying mechanisms for the effects of felt ambivalence on outcomes related to COVID vaccination (H4 and H5), a series of mediation analyses were conducted. The first model tested the mediation effect of felt ambivalence on the relationship between risk perception and intention to receive a COVID-19 vaccine (risk perception → felt ambivalence → vaccination intention). We employed the PROCESS macro (n = 5,000, model 4) by Hayes (2022). Based on the bootstrapping upper and lower confidence intervals that did not include zero values, the results revealed the significant indirect effect of felt ambivalence linking risk perception and vaccination intention ($\beta = -.04$, $SE = .02$, 95% CI = [$-.08$, $-.002$]). The overall model was significant, $R^2 = .03$, $F(2, 376) = 6.44$, $p < .01$. Therefore, H4 was supported, with details illustrated in Figure 3. Next, we used the same procedure to assess the proposed mediation effect of felt ambivalence on the relationship between risk perception and seeking information related to the COVID-19 vaccination (risk perception → felt ambivalence → information seeking). The bootstrapping upper and lower confidence intervals in this case straddled the zero mark, indicating there was no significant indirect effect of felt ambivalence connecting risk perception and information seeking ($\beta = .01$, $SE = .008$, 95% CI = [$-.002$, $.03$]). Therefore, H5 was not supported.
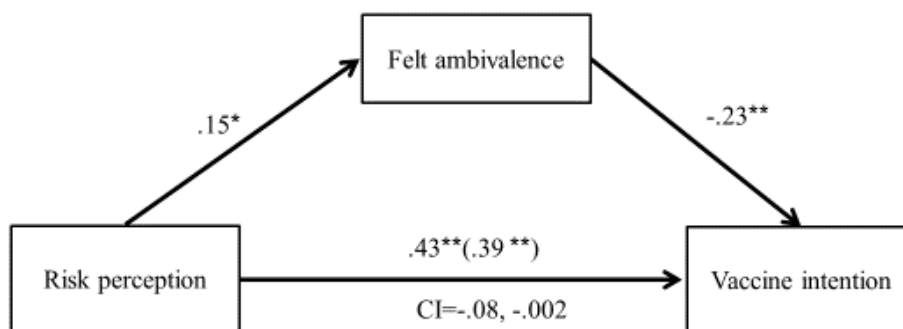
Figure 3. Model depicting the mediating role of felt ambivalence on the relationship between risk perception and behavioral intention to receive the Covid-19 vaccine. Coefficients were unstandardized regression coefficients, value in the parentheses indicated the total effect. *p <.05; **p <.001.

To investigate the underlying mechanism of felt ambivalence on vaccination intention more in-depth (RQ2 and RQ3), a serial mediation model was conducted. We employed the PROCESS macro (*n* = 5,000, model 6) by (Hayes, 2022). Risk perception of COVID-19 was entered as the independent variable, perceived vaccine efficacy, and felt ambivalence as the two serial mediators, and vaccination intention as the dependent variable (risk perception → perceived vaccine efficacy → felt ambivalence → vaccination intention). A serial mediation was found significant (*β* = .01, *SE* = .01, 95% CI = [.001, .011]) as the bootstrapping CI did not straddle zero. Details were presented in Figure 4. To further examine the causal order of mediators, an alternative mediation model was also tested (risk perception → felt ambivalence → perceived vaccine efficacy → vaccination intention). The significance of both models was similar (R^2 = .03, *F*(2, 376) = 6.38, *p* < .01). However, the serial indirect effect in the alternative model was insignificant (*β* = –.02, *SE* = .01, 95% CI = [–.04, .001]), which indicated that statistically the previous serial mediation model had better explanatory value. Next, the serial mediation was testing treating information seeking as the dependent variable (risk perception → perceived vaccine efficacy → felt ambivalence → information seeking). Although the model was significant (R^2 = .03, *F*(2, 376) = 6.00, *p* < .01), the mediation was not (*β* = –.002, *SE* = .002, 95% CI = [–.007, .001]). The alternative mediation model was also tested (risk perception → felt ambivalence → perceived vaccine efficacy → information seeking), yielding similarly non-significant results (*β* = –.002, *SE* = .002, 95% CI = [–.007, .0001]).
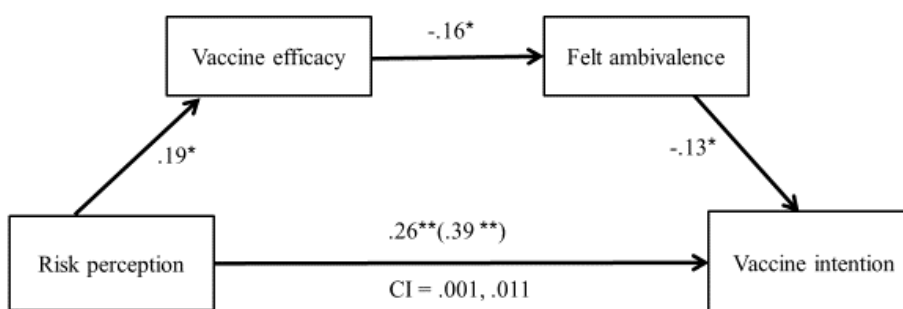

Figure 4. Model depicting the mediating role of perceived vaccine efficacy and felt ambivalence as serial mediators on the relationship between risk perception and behavioral intention to receive the Covid-19 vaccine. Coefficients were unstandardized regression coefficients, value in the parentheses indicated the total effect. *p <.05; **p <.001.

Discussion

To summarize, the study found that there was a positive association between risk perception and vaccine intention (H1) and information seeking (H2). Response efficacy mediated the relationship between risk perception and vaccination intention (H3), and risk perception and information seeking (RQ1). Felt ambivalence toward COVID-19 vaccination mediated the relationship between perceived risk and intention to receive the COVID-19 vaccination (H4). Felt ambivalence did not mediate the relationship between perceived risk and seeking of information related to COVID-19 vaccination (H5). The influence of risk perception on vaccination intention was serially mediated by perceived vaccine efficacy and felt ambivalence (RQ2). There was no serial mediation on information seeking (RQ3).

The recent uptick in vaccine hesitancy and anti-vaccine movements suggest further research is needed to understand why these persist, particularly for urgent health issues such as COVID-19. This study expands the RPA's efficacy in predicting behavioral outcomes in the extant health communication contexts to a new domain. We focused on the college-age sample as this is a unique audience with the highest vaccination hesitancy, one that is often studied in the context of different vaccines (e.g., flu, HPV, etc.). Additionally, health decisions formed during this transitional period could be life-long, which would inform future parental decisions related to vaccination.

While several studies have explored risk characteristics for various health issues, there are still some theoretical and empirical gaps to fill. The sparse literature in the ambivalence area is marked by inconsistency. In this research, we take a step toward filling that gap by assessing the mediating role of felt ambivalence. These findings provide strong evidence to understand the impact of risk perceptions and felt ambivalence on vaccination intention and information seeking. This study adds to theoretical understanding by detailing the influence of efficacy and ambivalence on behavioral outcomes relating to COVID-19 vaccination. Supporting this line of reasoning, our findings can aid future researchers who hope to understand vaccine hesitancy more thoroughly.

This paper adds to extant literature in three ways. We test the central proposition of the RPA framework to investigate whether, and if so how, the relation between risk perception and information seeking can be better understood by considering efficacy beliefs. Our findings lent support to the RPA's propositions by showing that risk perception and response efficacy were important determinants of vaccine intention. The findings indicate that individuals who consider COVID-19 as less risky and have less confidence in their abilities to take the vaccine are less likely to engage in the behavior than those who perceive more risk and possess more confidence. The results showed that the relationship between perceived harm and vaccine intention was serially mediated by efficacy and ambivalence, which corroborates the central argument of the RPA – that is, response efficacy plays a significant role between risk perception and behavior.

These results lend additional support for research that suggests that ambivalence is a key factor to consider in heath communication. The study demonstrates that ambivalence affects information exposure, a finding that adds to other consequences of ambivalence gleaned in literature. Ambivalent attitudes and their implications represent critical topics in persuasion literature but have not drawn equal attention. Understanding the role of ambivalence and the factors that drive people toward this conundrum appears a fruitful path. This study revealed an important mechanism through which ambivalence affects persuasion. People may experience ambivalence about a topic after exposure to conflicting information, and in response they may seek information. The connection between ambivalence and information seeking was substantiated. This finding is particularly important because it offers empirical evidence to support a key tenet of information seeking motivation.

These results have several important practical implications and highlight a major and largely untried direction for future research. We must put more efforts in strategizing communicative strategies involving the irreducibly challenging topic of vaccination. These results highlight the complex and varied risk perceptions that young adults can hold related to COVID-19. A communicative strategy that could ease felt ambivalence seems to be particularly promising in combatting vaccination hesitancy.

This study has some limitations that need to be addressed. First, our findings are not generalizable due to the nonrandom nature of the sample, which was skewed toward female, White, and middle-class American students. Future studies may use a representative sample of college students both nationally and internationally. Second, by using an online survey, we relied on respondents' self-reports, which might be subject to human error, memory bias, or impression management. Third, several measures

used by this study might be less than ideal. For instance, the efficacy belief measure focused solely on response efficacy. Last, although the relatively low mean level of ambivalence in our sample was not the ground for dismissing the importance of ambivalence among college students, it should be noted.

Despite the limitations, we had the novel opportunity to examine the role of felt ambivalence on COVID-19 vaccination perceptions and behaviors, using a sample of the highest hesitancy tendency (i.e., college students). This study attempted to serve as a steppingstone for future researchers who hope to understand health communication more thoroughly, specifically in the context of vaccination. Still, intriguing research questions remain. It is important to continue to monitor various trends in public health, particularly in the emerging adults' population.

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