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A false sense of security: The perceptions of threat and efficacy contributing to vaccine hesitancy in the Gulf States

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Abstract

Background: Since the release of the COVID-19 vaccine, vaccine hesitancy has remained high in the southeastern states. As a result, public health officials and communication experts have been tasked with creating messages to reduce vaccine hesitancy. *Purpose:* The purpose of this study was to identify which perceptions regarding threat and efficacy are contributing to vaccine hesitancy in the Gulf States: Texas, Louisiana, Mississippi, Alabama, and Florida. *Method:* 226 participants from two groups, including the Gulf States and remaining U.S. states, responded to a survey measuring threat and efficacy perceptions and vaccination status. Binary logistic regression was used to identify differences between the two groups' responses. *Results:* Significant differences were detected between the two models regarding self-efficacy, susceptibility, system-efficacy, and biological sex. *Conclusion:* This research brief recommends a variety of public health communication strategies specific to the Gulf States. Public health communicators should attempt to increase perceptions of self-efficacy and susceptibility. Messages successful in accomplishing this should increase vaccination rates. Second, two demographics should be targeted with this messaging, including men and those who may feel a false sense of security in their social support systems.

Keywords: vaccine hesitancy, self-efficacy, response-efficacy, system-efficacy, susceptibility

Introduction

The COVID-19 vaccine was released late in 2020, and it has been available to all individuals older than 12 since May 2021 (FDA, 2021). Since its release, vaccine hesitancy has remained high in the southeastern states, especially in Alabama and Mississippi, which are ranked 49th and 50th in rate of vaccination, respectively (Wright, 2021). The focus of this project emphasized the Gulf States, as defined by the Gulf States Health Policy Center (n.d.), which includes Texas, Louisiana, Mississippi, Alabama, and Florida. A poll measuring vaccine hesitancy by state (Gleeson, 2021) found Louisiana to have the fourth highest rate at 22.2% of the population. The remaining Gulf States ranked 10th (Alabama at 18.8%), 14th (Mississippi at 18.2%), 30th (Texas at 13.9%), and 33rd (Florida at 13.5%). Therefore, three Gulf States ranked in the top fifteen in vaccine hesitancy. Texas and Florida, the exceptions, still have far higher rates of hesitancy when compared to states with the lowest reports of hesitancy (Vermont reported just 5.9%). This is supported by recnet scientific research, which has found that the southeastern region of the U.S. is less engaged in preventative behaviors (Smail, et al., 2021).

Public health officials and communication experts have since been tasked with creating messages to reduce vaccine hesitancy (Boden-Albala, 2021). This is harder for public health practitioners in the Gulf States, where leaders must “educate people, develop equitable incentives and creatively market the vaccines to hesitant groups” (Wright, 2021, para. 6). The socio-economics of the Gulf States further complicate matters, where “the prevalence of [COVID-19] and the death rate are correlated with the local socio-economic conditions, often going beyond local population density distributions, especially in rural areas” (Paul, Englert, & Varga, 2021).

Public health communication theories, including the extended parallel process model (EPPM), should be used to inform the messages used by public health practitioners. Kim Witte (1994) developed the communication theory to better understand how fear appeals impact decision making. According to the main propositions of the theory, when four perceptions (threat susceptibility, threat severity, self-efficacy, and response-efficacy) are effectively stimulated concerning a threat and recommended action, an individual is likely to engage in a danger-control response, protecting themselves from the threat. The EPPM is one of the most prominent theories, if not the pinnacle theory, used at the intersection of public health and communication (Maloney, Lapinski, & Witte, 2011).

The definitions of self-efficacy, response-efficacy, severity, and susceptibility are used in this study for each of the four EPPM constructs (Zarghami, Allahverdipour & Jafarabadi, 2021). Self-efficacy is the individual’s “capacity to achieve the recommended behavior” (p.2). Response-efficacy is “how much the recommended behavior is effective in avoiding the threat” (p.2). Severity is “how much harm can be caused by the threat” (p.2). Susceptibility is the “possibility of the threat affecting the individual” (p.2).

A relatively new construct regarding efficacy has emerged and been used alongside the four constructs mentioned above, namely system-efficacy (Pyle, et al., 2021). System-efficacy is defined here as an individual's belief that the community they belong to can provide effective support and mitigate harm (blinded for peer review). Together, these five variables were measured in this study, along with vaccination status, to detect differences between a group of respondents in the Gulf States and respondents in the remaining states. Further, recent literature found that gender impacts vaccine hesitancy (Galasso, Profeta, Foucault, & Pons, 2021). The present study also measured responses by gender to identify if vaccine hesitancy along gendered lines is a factor specifically in the Gulf States.

This study aimed to identify which perceptions regarding threat and efficacy are contributing to vaccine hesitancy in the Gulf States. As prior evidence does not exist regarding COVID-19 EPPM-perception differences between the Gulf States and the rest of the U.S. the current study utilized the following research questions in lieu of hypotheses.

> RQ1: How have differences in threat and efficacy perceptions, as defined by the EPPM, between the Gulf States and the rest of the United States impacted COVID-19 vaccination rates?
> RQ2: How have differences in the perception of system-efficacy between the Gulf States and the rest of the United States impacted COVID-19 vaccination rates?
> RQ3: Are there any demographic predictors of likelihood to get vaccinated that are unique to the Gulf States?

Methods

Participants

After receiving IRB approval, participants for this study were recruited via Amazon Mechanical Turk (MTurk), a crowdsourcing platform gaining momentum in the field of public health (Chesley, Meier, Luo, Apchemengich & Davies, 2020). An incentive of $0.10 was offered to MTurk workers for completing a short 5-10-minute survey. Once workers accepted the request, they were taken to the survey in Qualtrics. After agreeing to the informed consent statement, they responded to the twenty-eight-question survey. Two separate requests were posted, including one for people living in the Gulf States of Texas, Louisiana, Mississippi, Alabama, and Florida. The second request included the remaining forty-five U.S. states.

With a confidence level of 90% and a margin of error of 5.5%, a sample size of 222 was needed. 226 MTurk workers responded to the survey. Of these, 90 were from the Gulf States, and 136 were from the remaining states. The respondents reported an average age of 38.8 years-old. The youngest respondent was 22 and the oldest was 87. 115 respondents reported male as their

biological sex, 106 identified as female, and 3 reported other or did not disclose. 149 respondents were White, 18 were African-American, 12 were Asian or Asian-American, 8 were Hispanic/Latino, and 4 reported either a different or mixed race. 45 respondents did not identify their race.

Data Collection

The survey measured one dependent variable and five independent variables. The dependent variable was vaccination status. Respondents were shown the item "My COVID-19 vaccination status is…", with the option to choose fully vaccinated, partially vaccinated, not vaccinated, or "I do not wish to disclose this information". 159 were fully vaccinated, 28 partially vaccinated, 32 not vaccinated, and 7 did not disclose. For analysis, fully vaccinated respondents were coded "1" and all others "0". It should be acknowledged that "fully vaccinated with a booster" was not an option on the survey. While there is certainly a separation between those who have been vaccinated and those who have had an additional booster, it is likely that neither group would be classified as "vaccine hesitant." Therefore, only the option "fully vaccinated" was included.

All items used for the independent variables were taken (and some modified) from a previous study utilizing the EPPM to study COVID-19 vaccination behavior (citation blinded for peer review). Each construct had four items and used a 5-point scale ranging from strongly disagree to strongly agree. The first four independent variables aligned with the main constructs of the EPPM (severity (α=.875), susceptibility (α=.857), self-efficacy (α=.744), and response-efficacy (α=.848)). The fifth variable was system-efficacy (α=.775).

Data Analysis

To address the research questions, binary logistic regression was performed in SPSS with "Fully Vaccinated" as the dependent variable. Two separate regressions were conducted for each group (Gulf States and remaining states). All five independent variables were included in both models. The demographics of age, race, and gender were initially included. Age and race were removed from the analysis after it was apparent that neither of the two variables had a significant impact in either model. Gender remained once it was apparent that it had a significant impact on the Gulf States group.

Results

This stdy found that respondents in the Gulf States sample had a lower vaccination rate (M=.678, SD=.470) than the those in the remaining states (M=.758, SD=.430). The results section attempts to address why this is the case. The following results section is organized by the independent variables (self-efficacy, severity, susceptibility, system efficacy, and gender), addressing the three research questions. Results for the Gulf States Model are found in Table 1, and results for the Remaining States Model are found in Table 2.

Self-Efficacy

In the Gulf States Model, self-efficacy was a significant predictor of being fully vaccinated (R^2=.349, β=1.157, S.E.=.544, p=.033). Specifically, those with a higher perception of self-efficacy were significantly more likely to be fully vaccinated. In the Remaining States Model, self-efficacy was not a significant predictor of being full vaccinated (R^2=.157, β=.514, S.E.=.369, p=.164). Therefore, self-efficacy was a predictor of vaccination in the Gulf States. However, the independent variable was less of a predictor in the remaining states.

Response-Efficacy

In the Gulf States Model, response-efficacy was a significant predictor of being fully vaccinated (R^2=.349, β=1.995, S.E.=.591, p=.001). Specifically, those with a higher perception of response-efficacy were significantly more likely to be fully vaccinated. In the Remaining States Model, response-efficacy was likewise a significant predictor of being full vaccinated (R^2=.157, β=.876, S.E.=.402, p=.029).

Severity

In the Gulf States Model, severity was not a significant predictor of being fully vaccinated (R^2=.349, β=731, S.E.=.468, p=.731). Similarly, severity was not a significant predictor of being full vaccinated in the Remaining States Model (R^2=.157, β=-.058, S.E.=.372, p=.877). Therefore, severity did not predict vaccination in either group.

Susceptibility

In the Gulf States Model, susceptibility was not significant as a predictor of being fully vaccinated (R^2=.349, β=.611, S.E.=.348, p=.079) In the Remaining States Model, susceptibility was also not a significant predictor of being fully vaccinated (R^2=.157, β=.088, S.E.=.298, p=.769). Therefore, susceptibility did not predict vaccination in either group.

System-Efficacy

In the Gulf States Model, system-efficacy was not significant as a predictor of being fully vaccinated (R^2=.349, β=-.979, S.E.=.529, p=.064). In the Remaining States Model, system-efficacy was also not a significant predictor of being fully vaccinated (R^2=.157, β=.136, S.E.=.482, p=.778). Therefore, system-efficacy did not significantly predict vaccination in either group.

Biological Sex

In the Gulf States Model**,** 41 (45.5%) of the participants identified as female, and in the Remaining States Movdel 65 (47.7%) of the participants identified as female. In the Gulf States Model, gender was a significant predictor of being fully vaccinated (R^2=.349, β=1.409, S.E.=.664, p=.034). Specifically, those who identified as female were significantly more likely to

be fully vaccinated. In the Remaining States Model, biological sex was not a significant predictor of being fully vaccinated (R^2=.157, β=-.102, S.E.=.507, p=.841). Therefore, gender was a predictor of vaccination in the Gulf States but not in the remaining states.

Table 1
Binary Logistic Regression Results for Gulf States

Predictor	β	SE	Sig.
Constant	-11.856	3.596	.000**
Self-Efficacy	1.157	.544	.033**
Response-Efficacy	1.995	.591	.001**
System-Efficacy	-.979	.529	.064
Severity	-.161	.468	.731
Susceptibility	.611	.348	.079
Gender	1.409	.664	.034**

Table 2
Binary Logistic Regression Results for Remaining States in the U.S.

Predictor	β	SE	Sig.
Constant	-4.825	2.073	.008**
Self-Efficacy	.514	.369	.164
Response-Efficacy	.876	.402	.029**
System-Efficacy	.136	.482	.778
Severity	-.058	.372	.877
Susceptibility	.088	.298	.769
Gender	-.102	.507	.841

Discussion

For the Remaining States Model, response-efficacy was the one predictor of respondents being fully vaccinated. As stated in the above literature review, response efficacy is defined as "how much the recommended behavior is effective in avoiding the threat" (Zarghami, Allahverdipour & Jafarabadi, 2021, p. 2). Essentially, the respondents of the remaining states sample needed to know that the vaccine worked, with all other perceptions appearing to be irrelevant. However, this was not the case for respondents from the Gulf States.

The Gulf States Model reveals that several variables, with varying degrees of importance, influenced the decision-making process, as it relates to the vaccine. One variable essential to decision making for the Gulf States sample was self-efficacy. Respondents from the five states along the Gulf Coast were less sure that they could achieve the recommended behavior of getting a vaccine, while respondents from other states perceived vaccine availability as a foregone

conclusion. A review of the items used to measure this construct are, 1) The COVID-19 vaccine is easily accessible to people in my state, 2) people in my state can get the COVID-19 vaccine, 3) nothing can prevent people in my state from getting the COVID-19 vaccine if they want it, and 4) people in my state have access to the COVID-19 vaccine. Pessimistic responses to these questions suggest that disparities in their respective state could prevent them from achieving the recommended behavior. This conclusion is supported by other studies showing disparities in COVID-19 outcomes and perceived resources in the southeastern states (Paul, Englert, & Varga, 2021).

The results for both susceptibility and system-efficacy were not significant. Nonetheless, the results merit further, as there appears to be a trend (albeit insignificant) that a low perception of susceptibility among Gulf States respondents led to lower likelihood of being vaccinated. If true, this would align with other research showing lower engagement in preventative health behavior among individuals in the American South (Smail, et al., 2021). Similarly, the results for system-efficacy in the Gulf States show hints toward a trend that may be worth further investigation. The previously discussed predictors both showed higher perceptions correlated with vaccination rates. However, in this study, low perceptions of system-efficacy trended toward higher rates of vaccination. Those who perceive less support from their system could be more likely to rely on outside recommendations. For example, a study on disaster recovery found that individuals that did not identify with certain community groups, such as religions communities, were more likely to seek support from government programs in their recovery (blinded for peer review). In this case, perhaps those with strong community ties are less likely to seek outside help, such as vaccination.

Women in the Gulf States Model were significantly more likely to get vaccinated than men. This gender disparity is supported by recent research, which concludes that women are more concerned about COVID-19 health consequences and more compliant with pandemic health rules when compared to men (Galasso, Profeta, Foucault, & Pons, 2021). However, in this study the gender disparity was found to a higher degree in the Gulf States Model, suggesting that this trend is more consequential in the five Gulf States.

Recommendations

While the current study measured respondents' perceptions of messaging on COVID-19 vaccines, a primary limitation of the study remains that no experiment was conducted to test actual message impact on EPPM perceptions and vaccine status. Future research on the subject should conduct an experiment using messages based off of the recommendations above. Other indicators such as political affiliation, socioeconomic status, or other demographic indicators not included in this study.

This research brief recommends a variety of public health communication strategies specific to the Gulf States. Public health communicators should attempt to increase perceptions of self-efficacy and susceptibility. For example, to increase the perception of self-efficacy, messaging could be tailored to communicate the ease and practical nature of the vaccination process. Similarly, messaging could communicate that COVID-19 is a risk to all, even those that are healthier or in age-brackets that many believe to be safer. Messaging successful in accomplishing this should increase vaccination rates. Second, men and those who may feel a false sense of security in their social support systems should be targeted with this messaging. For instance, marketing materials could feature more male spokespersons and speak to those with more traditional support systems, such as individuals with big families or those that belong to tight-knit communities such as schools or churches. As vaccine-hesitant individuals identify closer to the materials, they may be more likely to consider the vaccine.

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