

An Exploration of the Relationship Between Vaccine Knowledge and Vaccine Willingness

Leo Thom Kawile, Keli Fisher, and Mia Noergaard

Saddleback College

Jennifer Czerniawski, Faculty Advisor

Author Note

We have no conflict of interest to disclose. Correspondence concerning this article should be addressed to one of the following: Leo Thom Kawile (email: leothomk@gmail.com), Keli Fisher (email: kzf10@aol.com), Mia Noergaard (email: miact-noergaard@gmail.com), Jennifer Czerniawski (email: jczerniawski@saddleback.edu)

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Abstract

The ongoing COVID-19 pandemic has lasted nearly three years, costing millions of lives worldwide. However, increased availability of COVID-19 vaccines has provided an opportunity to increase survival rates. Willingness to receive a COVID-19 vaccine has seen fluctuations in the United States. Key pivotal shifts have been due to increasing accessibility of COVID-19 vaccines and public knowledge of how COVID-19 vaccines work, largely influenced by both the spread of information and misinformation. This study examined patterns between COVID-19 vaccine knowledge and willingness to receive a COVID-19 vaccine in southern California residents over 18. Responding to an online survey, participants ($n = 77$) reported demographic information (including vaccine status), rated their willingness to receive the vaccine based on social pressures and perceived safety. Participants also answered questions about their individual and perceived vaccine knowledge. Data were analyzed using Pearson's r . In support of the hypotheses, participants with higher levels of vaccine knowledge and greater perceived threat of COVID-19 were more willing to receive a vaccine. However, perception of vaccine knowledge was not significantly correlated with vaccine willingness or actual vaccine knowledge. Our findings add further understanding of factors that influence willingness to receive the COVID-19 vaccine. The results can inform researchers, policy makers, and the general public, furthering progress toward sufficiently immunizing the American population against COVID-19.

Keywords: community college, COVID-19, vaccine knowledge, vaccine willingness, perceived vaccine knowledge

The ongoing COVID-19 pandemic has lasted nearly three years, and it has cost millions of lives worldwide, but an increased availability of COVID-19 vaccines has provided an opportunity to increase survival rates (World Health

Organization, 2021). However, the willingness to receive a COVID-19 vaccine has seen fluctuations in the United States (Piltch-Loeb et al., 2022). Key pivotal shifts have been due to an increasing accessibility of COVID-19 vaccines and public

knowledge of how COVID-19 vaccines work, both of which are largely influenced by the spread of information and misinformation (Piltch-Loeb et al., 2022). It is important to understand factors that may relate to people's willingness to receive a vaccine, especially in regard to the COVID-19 vaccine and its boosters. Such factors include vaccine knowledge, perceived threat of COVID-19, and confidence in one's own knowledge. This research can help further the understanding of factors that influence willingness to receive the COVID-19 vaccine. In addition, this research can inform researchers, policy makers, and the general public, and thereby further progress in sufficiently immunizing the American population against COVID-19.

Various behaviors and social factors predict low vaccine willingness, or "vaccine hesitancy" as some studies refer to it. Different studies have identified predictors such as social trust, educational level, vaccine accessibility, and vaccine knowledge (Gerretsen et al., 2021; Okamoto et al., 2022; Piltch-Loeb et al., 2022; Roberts et al., 2022). Research on influenza has indicated that vaccine knowledge positively correlates with vaccine willingness (Muñoz-Miralles et al., 2022; Schmid et al., 2017). Similarly, recent studies on COVID-19 have also identified vaccine knowledge as a powerful predictor of vaccine willingness (Gerretsen et al., 2021; Okamoto et al., 2022; Piltch-Loeb et al., 2022; Roberts et al., 2022). Therefore, these studies suggest that vaccine willingness might be influenced largely by knowledge of vaccines.

The present study examined patterns between COVID-19 vaccine knowledge and willingness to receive a COVID-19 vaccine in a sample of Southern California residents. In addition, we measured the perceived threat of COVID-19, as well as perceived knowledge of vaccines in order to determine which factors are correlated with vaccine willingness. We hypothesized that our research survey would show a positive correlation between vaccine knowledge and vaccine willingness.

Method

Participants

The study consisted of 77 participants (14 males, 62 females, and 1 non-binary individual) in Orange County, California. The average age of participants was 32 (ages ranged from 18 to 67). This sample participants consisted of 13% Asian/Pacific Islander, 2.4% Black/African Origin, 16.9% Latinx/Hispanic, 5.2% Middle Eastern, 49.4% White/European Origin, and 13% mixed race. Just over 83% of participants were students, 5.2% were faculty, 1.3% were staff, and 10.4% were not affiliated with an institution. Participants were recruited through social media and through Saddleback College, San Diego State University, and California State University Fullerton. Participants accessed the survey through an electronic link.

Materials and Design

A Google Forms survey was created to conduct this study. We used a correlational study design in which the independent variable was vaccine knowledge, and the dependent variable was vaccine willingness. We defined vaccine knowledge as the knowledge about the COVID-19 vaccine and other vaccines. Moreover, we defined vaccine willingness as the willingness to receive a COVID-19 vaccine. We also measured the variables of perceived threat of COVID-19 and COVID-19 knowledge perception. The perceived threat of COVID-19 was defined as how much participants viewed the COVID-19 virus as a threat. Knowledge perception was defined as how much participants thought they knew about the COVID-19 virus and the COVID-19 vaccine. Our vaccine knowledge measure was based on COVID-19 and COVID-19 vaccine information from the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2023). We created original measures for vaccine willingness, perceived threat of COVID-19, and knowledge perception.

The survey collected demographic information including age, ethnicity, gender, college (if applicable), academic status, and COVID-19

vaccine and booster status. Aside from demographic items, the survey included a total of 32 questions — 10 questions measured vaccine willingness, 7 questions measured perceived threat of COVID-19, and 15 questions measured vaccine knowledge. Questions measuring vaccine willingness and perceived threat of COVID-19 used a Likert scale of 1 to 7 (Strongly Disagree to Strongly Agree). The last question that was a part of the vaccine willingness section measured knowledge perception about COVID-19. For vaccine willingness, the lowest possible score was 7 and the highest possible score was 70. For perceived threat of COVID-19, the lowest possible score was 7 and the highest possible score was 49. Vaccine knowledge was measured through 11 true-or-false questions and 4 checkbox questions; the lowest possible score was 0 and the highest possible score was 15.

Procedure

Prior to collecting data, the researchers completed CITI IRB training and acquired IRB approval for the study. Additionally, we pilot tested the study to evaluate our measures' efficacy and validity. Following the pilot, we recruited participants by distributing the survey to professors who shared the survey links with their students. We also distributed the research survey to Saddleback Community College's Psi Beta and Psychology Club, and over social media.

Participants read and gave informed consent, provided demographics information, and completed the survey items. Finally, participants were given a debriefing.

Results

Using JASP for all statistical analyses. First we computed descriptive statistics on vaccine knowledge, vaccine willingness, covid knowledge perception, and perceived COVID-19 threat (See Table 1). Next, Pearson's r correlations were computed between vaccine knowledge and vaccine willingness. There was a significant positive correlation between vaccine knowledge and vaccine willingness (see Figure 1). Participants with higher levels of vaccine knowledge had a higher

willingness to receive a vaccine, $r(75) = 0.67, p < 0.001$. Participants with higher levels of vaccine knowledge perceived COVID-19 as a higher threat, $r(75) = 0.46, p < 0.001$. Participants with higher levels of vaccine willingness perceived COVID-19 as a higher threat, $r(75) = 0.49, p < 0.001$. There was not a significant correlation between vaccine willingness and COVID-19 knowledge perception, $r(75) = 0.04, p = 0.727$. There was not a significant correlation between vaccine knowledge and COVID-19 knowledge perception, $r(75) = 0.05, p = 0.663$. There was not a significant correlation between perceived COVID-19 threat and COVID-19 knowledge perception, $r(75) = 0.09, p = 0.431$.

Discussion

Results of this study supported our hypothesis that there would be a positive correlation between vaccine knowledge and vaccine willingness. We found a significant correlation between vaccine willingness and vaccine knowledge scores. In addition, we found a significant positive correlation between vaccine knowledge and perceived threat of COVID-19, as well as between vaccine willingness and perceived threat of COVID-19. However, we did not find significant correlations between knowledge perception and vaccine willingness, knowledge perception and vaccine knowledge, and knowledge perception and perceived threat of COVID-19.

The results of our study were consistent with previous findings regarding the positive correlation between vaccine knowledge and vaccine willingness (Muñoz-Miralles et al., 2022; Okamoto et al., 2022; Roberts et al., 2022). This suggests that knowledge of vaccines might be one of the strongest determining factors for people to get vaccinated. Moreover, the finding that perceived knowledge of vaccines was not correlated with vaccine knowledge indicates that one's perceived knowledge of vaccines might not be a reliable determining factor for one's actual vaccine knowledge. In our study, there were participants who rated themselves low on perceived vaccine knowledge but scored high on actual vaccine

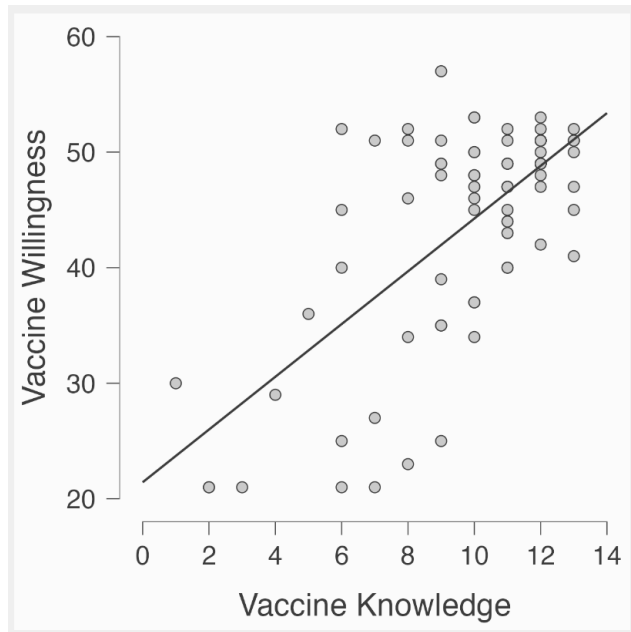
knowledge, and vice-versa. Additionally, our finding that perceived vaccine knowledge also did not correlate with vaccine willingness or perceived

threat of COVID-19 indicates that perceived vaccine knowledge might not be a reliable indicator or measure of these variables.

Table 1. Descriptive Statistics for the Various COVID Measures

	Vaccine Knowledge	Vaccine Willingness	Covid Knowledge Perception	Perceived COVID-19 Threat
Valid	77	77	77	77
Missing	0	0	0	0
Mean	9.662	43.481	5.779	22.416
Std. Deviation	2.765	9.486	1.344	8.721
Range	12.000	36.000	5.000	38.000
Minimum	1.000	21.000	2.000	7.000
Maximum	13.000	57.000	7.000	45.000

Figure 1. Scatterplot Depicting the Correlation between Vaccine Willingness and Vaccine Knowledge



However, this study had limitations, including a small sample size composed primarily of participants of White/European origin, females, vaccinated participants, and students. This suggests that the results lacked diversity and may only represent a specific part of the population. Additionally, our study was conducted entirely online, so, given the possibility of looking up vaccine information, the online format may have influenced the efficacy and consistency of our vaccine knowledge measure.

In order to expand on the results of this study and address its limitations, future research should

be conducted that more carefully explores the relationships between our variables. We found that vaccine knowledge is strongly correlated with vaccine willingness. Logically, the next step should be to understand how vaccine knowledge affects vaccine willingness. Additionally, future research should focus on the variables of perceived threat of COVID-19 and knowledge perception to clarify their relation to vaccine knowledge and vaccine willingness. Moreover, future research should include more participants and greater participant diversity.

References

- Gerretsen, P., Kim, J., Caravaggio, F., Quilty, L., Sanches, M., Wells, S., Brown, E. E., Agic, B., Pollock, B. G., & Graff-Guerrero, A. (2021). Individual determinants of COVID-19 vaccine hesitancy. *PLoS ONE*, *16*(11). doi.org/10.1371/journal.pone.0258462
- Muñoz-Miralles, R., Nadeu, S. B., Masoliver, C. S., Gallego, A. M., del Canto, J. G., Peña, J. M., & Esteve, A. M. B. (2022). Effectiveness of a brief intervention for acceptance of influenza vaccine in reluctant primary care patients. *Gaceta Sanitaria*, *36*(5), 446–451. doi.org/10.1016/j.gaceta.2021.01.002
- Okamoto, S., Kamimura, K., & Komamura, K. (2022). COVID-19 vaccine hesitancy and vaccine passports: A cross-sectional conjoint experiment in Japan. *BMJ Open*, *12*(6). doi.org/10.1136/bmjopen-2022-060829
- Payne, J. R., Bose, S., Kubiak, R. W., & Nolen, L. D. (2023). Evaluation of mortality risk after COVID-19 vaccination, Utah 2021. *Vaccine*, *41*(18), 2996–3002. doi.org/10.1016/j.vaccine.2023.03.072
- Piltch-Loeb, R., Silver, D. R., Kim, Y., Norris, H., McNeill, E., & Abramson, D. M. (2022). Determinants of the COVID-19 vaccine hesitancy spectrum. *PLoS ONE*, *17*(6). doi.org/10.1371/journal.pone.0267734
- Roberts, H. A., Clark, D. A., Kalina, C., Sherman, C., Brislin, S., Heitzeg, M. M., & Hicks, B. M. (2022). To vax or not to vax: Predictors of anti-vax attitudes and COVID-19 vaccine hesitancy prior to widespread vaccine availability. *PLoS ONE*, *17*(2). doi.org/10.1371/journal.pone.0264019
- Schmid, P., Rauber, D., Betsch, C., Lidolt, G., & Denker, M-L. (2017). Barriers of influenza vaccination intention and behavior - A systematic review of influenza vaccine hesitancy, 2005-2016. *PLoS ONE*, *12*(1). doi.org/10.1371/journal.pone.0170550
- World Health Organization. (2021). *The true death toll of COVID-19 estimating global excess mortality*. www.who.int/data/stories/the-true-death-toll-of-covid-19-estimating-global-excess-mortality