Potential Influencers of COVID-19 Vaccine Acceptance Among Adults Living in the United States Who Have Accepted or Plan to Accept the Vaccine: An Online Survey

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Abstract

Purpose: The purpose of this study was to 1) determine the demographic differences between adults who have accepted, or plan to accept, the COVID-19 vaccine and those who will not accept the COVID-19 vaccine and 2) describe the potential influencers in deciding to accept the COVID-19 vaccine among adults living in the United States who have accepted or plan to accept the vaccine.

Design: A cross-sectional design utilizing an online survey was deployed using social media and a crowdsourcing platform.

Setting: United States.

Subjects: One thousand three hundred ninety-five (1395) adults completed the survey. The majority were white, male, between the ages of 25 and 45, and with representation from 50 states and Puerto Rico.

Measures: A two-branched survey was used to assess demographic information, vaccination intention, and 19 potential influencers of COVID-19 vaccine acceptance.

Analysis: Analysis included descriptive statistics and Chi-square tests to determine differences between groups.

Results: A higher proportion of male ($P < .001$), married ($P < .001$), and college-educated ($P < .001$) participants reported acceptance of the vaccine. The factors with the highest mean score of reported level of influence were duty to protect the vulnerable and contribution to move society back to a sense of normalcy.

Conclusion: Understanding the potential influencers of vaccine acceptance may provide insight into strategies that could increase vaccination uptake.

Keywords

COVID-19, vaccine, influencers, health communications, disease control and prevention

Purpose

The deployment of the COVID-19 vaccine provides hope for controlling and reducing the global burden of the ever-present pandemic. For this public health strategy to be effective, vaccine uptake efforts must be successful. Effective vaccine deployment strategies can be measured by adoption of the vaccine in a majority of the population. According to the Centers for Disease Control and Prevention,[1] in June of 2021, 47% of the United States population had been fully vaccinated. The timeline of COVID-19 vaccine availability among all ages and subgroups is projected to extend through 2021. Ongoing efforts to reach a greater number of the United States population are underway; however, understanding factors that influence vaccine acceptance is critical in executing existing vaccination programs.

Public confidence and acceptance of the COVID-19 vaccine are unclear and changing.[2,3] To date, a convergence of

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uncertainties and social trends has likely undermined the success of vaccination acceptance.[4] In a nationally representative survey in the United States, the self-reported likelihood of getting the vaccine declined from 74% in early April 2020 to 56% in early December 2020.[5] Despite the decline in self-reported rates in 2020, as noted earlier, 47% of the United States population has been fully vaccinated. Thus, there is encouragement in repositioning views towards accepting the COVID-19 vaccine. Understanding the potential influencers of vaccine acceptance can guide the development of effective strategies to improve COVID-19 vaccination uptake, thereby promoting health in communities across the nation. To date, there is limited knowledge of influencers of COVID-19 vaccination acceptance since its deployment in December of 2020. Therefore, the purpose of this study was to 1) determine the demographic differences between adults who have accepted, or plan to accept, the COVID-19 vaccine and those who will not accept the COVID-19 vaccine and 2) describe the potential influencers in deciding to accept the COVID-19 vaccine, among adults living in the United States who have accepted or plan to accept the vaccine.

Methods

Design

A cross-sectional design utilizing an online survey was deployed in May of 2021. Amazon's Mechanical Turk (MTurk) and Facebook were the web-based recruitment platforms used in this study. Recent literature supports the use of web-based participant recruitment platforms to collect national data associated with COVID-19.[6,7] Amazon's MTurk, a crowd-sourcing web-based platform, is growing in popularity as an efficient, reliable, cost-effective tool for generating sample responses that are broadly comparable to those collected in a more conventional method.[8] Facebook, a popular social media platform, offers advantages to online surveys because it is used by 69% of United States adults.[9] Purchased Facebook advertisements were used to enhance recruitment across the United States. The Facebook advertisements incorporated a single image of adults of diverse ages and races/ethnicity. The MTurk and Facebook advertisements included a call to action heading using the key study terms, COVID-19 vaccine, influencers. Also included was a statement "the results of the study may assist nurses, and other health professionals develop interventions to improve vaccine acceptance."

Sample and Setting

Individuals 18 years and older and residing in the United States, including Puerto Rico, were eligible to participate. The institutional review board reviewed the study prior to implementation, and a waiver of signed informed consent was obtained. Thus, eligibility and consent to participate were obtained electronically via a REDCap[TM] study information page. Assumptions of this study are the participants understand the questions and provide honest responses to the inclusion criteria and survey questions.

An a priori sample size estimate, to collect data representative of the United States population, yielded a total of 1383 study participants needed for the study, with a 99% confidence level and 3% margin of error, and statistical significance at < .05. Survey participation was completed in approximately 4 weeks when adequate sampling was obtained. Most survey responses were generated from MTurk (n ≈ 84%). A final sample of 1395 yielded a majority male (60%), white (79.7%), and between the ages of 25 and 45 (73.8%). Approximately 75% percent of the participants were married, and 94% had some college education or a degree. All 50 states and Puerto Rico were represented in the sample. The Southern region of the United States represented the largest group (44.6%), followed by the Western region at 25.8%.

Measures

A survey was created based on literature findings using the term vaccine acceptance. Synonymous terms such as confidence, receptivity, and uptake were also used in the literature search to identify potential influencers in vaccine acceptance.[2-5] In addition to the literature findings, research team members and community representatives provided suggestions for potential influencers. The concepts were analyzed and collapsed into nineteen potential influencers (Figure 1). The research team developed a preliminary survey in English. Each research team member identified community representatives, for example, pastor, educator, older adult, to evaluate face validity. An electronic link to the survey was distributed to each community member and pilot tested (n = 10) for survey functionality and feasibility. Feedback from the face validity assessment, including additional potential influencers, was received through email or verbal communication and incorporated into the survey instrument. This also provided the research team with an estimated time frame for completion (≈10 minutes). Piloted data was not included in the final data analysis.

The first section of the survey assessed demographic information (Table 1). In the second section of the survey, previous flu vaccination and COVID-19 vaccination were assessed. Based on the response provided for the COVID-19 vaccination, 2 survey branches were deployed. This two-branched survey design technique allowed the questionnaire to be tailored to participant responses. Branch 1 was for those who would not accept the COVID-19 vaccine. After completing the demographic information, participants indicating the vaccine would not be accepted finished the survey at this point. Participants who had accepted or planned to accept the vaccine were directed to the second branch, and nineteen potential influencers were assessed. The survey question

Figure 1. Mean score of reported level of influence.

stated, "how much of each factor has influenced you to get the COVID-19 vaccine?" Participants provided a 5-point Likert scale (1 - definitely not to 5 - definitely, including a not applicable response) response to each potential influencer listed on Figure 1.

Analysis

The Statistical Package for Social Sciences (SPSS; Version 27) was used for data analysis. Descriptive statistics were used to describe the sample characteristics and potential influencers. The mean score of the reported level of influence was calculated (Figure 1). The research team placed the potential influencers into 3 groups of similar components to simplify reporting. Chi-square tests were used to determine demographic differences between those participants who have

accepted or plan to accept the COVID-19 vaccine and those who will not accept the vaccine (Table 1).

Results

Demographic Results

A total of 1395 participants completed the online survey. The descriptive results are presented in Table 1. In the sample, there were a total of 1327 (95%) participants who have accepted, or plan to accept, the COVID-19 vaccine and 68 (5%) who indicated they would not accept the COVID-19 vaccine. In the total sample, the majority were male (60.3%), white (79.4%), married (75.1%), from the Southern region of the United States (44.6%), and between the ages of 18 and 44 (76.7%), with 94% reporting some college or college degree. Demographic Differences: Acceptance and Non-Acceptance.

Table 1. Demographics: Participants that have Accepted, Plan to Accept, or Will Not Accept the COVID-19 Vaccine.

		No. (%) of Participants		
		Total Sample (n = 1395)	Accepted, Plan to Accept Vaccine (n = 1327)	Will Not Accept Vaccine (n = 68)
Gender[a]	Male	837 (60.3)	812 (61.5)	25 (36.8)
	Female	552 (39.7)	509 (38.5)	43 (63.2)
Race	White	1107 (79.4)	1050 (79.5)	57 (83.8)
	Black/African American	185 (13.3)	179 (13.6)	6 (8.8)
	Other	103 (7.4)	92 (7)	5 (7.4)
Age	<35	603 (43.2)	581 (43.8)	22 (32.8)
	35–44	467 (33.5)	441 (33.3)	26 (38.8)
	45–54	176 (12.6)	167 (12.6)	9 (13.4)
	55–64	108 (7.7)	101 (7.6)	7 (10.4)
	65+	41 (2.9)	36 (2.7)	3 (4.5)
Education[a]	High school graduate or less	80 (5.7)	68 (5.1)	12 (17.6)
	Some college	175 (12.5)	164 (12.4)	11 (16.2)
	College graduate	705 (50.5)	671 (50.6)	34 (50)
	Graduate degree	435 (31.2)	424 (32)	11 (16.2)
Marital status[a]	Married	1047 (75.1)	1010 (76.6)	37 (55.2)
	Single	282 (20.2)	258 (19.6)	24 (35.8)
	Other	66 (4.7)	51 (3.9)	6 (9)
Flu shot in past 24 Months[a]	Yes	877 (64)	858 (65)	19 (27.9)
	No	493 (36)	444 (33.6)	49 (72.1)
US region	Northeast	200 (14.3)	191 (14.4)	9 (13.2)
	Midwest	212 (15.2)	205 (15.5)	7 (10.3)
	South	622 (44.6)	581 (43.8)	41 (60.3)
	West	360 (25.8)	349 (26.3)	11 (16.2)

[a]$P < .001$.

Demographic differences were noted between the participants who have accepted or plan to accept the COVID-19 vaccine and those who indicated they would not accept the COVID-19 vaccine. A higher proportion of males ($P < .001$), married participants ($P < .001$), college-educated ($P < .001$), and participants reporting previous acceptance of the flu vaccine ($P < .001$), indicated acceptance or plans to accept the COVID-19 vaccine (Table 1).

Among the participants (n = 68) who indicated they would not accept the COVID-19 vaccine, the majority were female (63%), white (83.8%), married (55.2%), from the Southern region of the United States (60.3%), and between the ages of 18 and 44 (71.6%), with 72% not accepting the flu vaccine in the past 24 months. The females indicating they would not accept the COVID-19 vaccine were majority white (88.4%), between the ages of 18 and 44 (65%), married (73%), and had some college or a college degree (86%).

Potential Influencers in Deciding to Accept the COVID-19 Vaccine

The nineteen potential influencers of COVID-19 vaccine acceptance were placed into 3 groups of similar components and labeled as 1) public figure influence, 2) healthcare influence, and 3) societal influence (Figure 1). Among the 19

potential influencers in deciding to accept the COVID-19 vaccine, the factors with the highest mean score of reported level of influence (on a scale of 1–5) were duty to protect the vulnerable ($\overline{X} = 4.1$) and contribution to move society back to a sense of normalcy ($\overline{X} = 4.08$), both labeled by the research team as societal influencers. The factor with the lowest mean score of reported level of influence was celebrities ($\overline{X} = 2.94$), labeled by the research team as public figure influences.

Discussion

In this study, 1395 adults completed the online survey. This was approximately 6 months after vaccine deployment in the United States, thus offering contemporaneous insight necessary to propel ongoing vaccine acceptance efforts across the nation. Among the participants in this study, 79.4% identified as white, thus aligning very closely to the United States Census population report of 76.3%.[11] A slight variation of gender identification was noted between this sample of 60.3% male, as opposed to the United States Census report of 49.2% males in the country.[11] Other sample characteristics, education, and age are under representative of the population. Fifty-eight percent of the United States population over 18 reported at least some college education, whereas; this study sample yielded 94%. In 2019, 27% of the United States population

were between the ages of 25 and 44, and in this sample, 74% were in this age group.[10] Furthermore, the United States population of adults age 65 and over is approximately 15%, and this sample includes only 2.9% older adults.[10] One possible contributing factor to such variations is likely related to the online platforms, which are not always feasible in reaching each age group, for example, older adults. Additionally, 64% of the participants reported receiving the influenza vaccine within the past 2 years while the estimated flu vaccination coverage for the United States population during the 2020–2021 flu season was 59%.[11]

A purpose of this study was to determine the demographic differences between adults who have accepted or plan to accept the COVID-19 vaccine and those who will not accept the COVID-19 vaccine. In this study sample, the percentage of males accepting the vaccine was statistically higher than females, supporting previous findings in the literature.[12,13] The role of gender in these findings is notable. Females tend to be greatly impacted by this pandemic, both for reasons such as biological vulnerability and their role as primary caregivers and frontline healthcare workers.[14] The majority of the female participants in this study were of reproductive age, making up a considerable portion of our population with unique concerns.[15] Further gender analyses are needed to inform the development of effective health promotion strategies.

A higher proportion of individuals receiving the vaccine identify as white, married, and having at least some college or a college degree. Similar findings were noted by Guidry et al[16] while determining willingness to get the vaccine. This study was prior to the distribution of the vaccine. Notably, limited information is available to compare this data post-vaccine distribution in the United States. To date, most studies describing vaccine acceptance and similar concepts report data collection prior to vaccine deployment using terms describing pre-vaccination deployment such as hypothesized vaccine, anticipation, and before.[17-21]

A second purpose of this study was to describe the potential influencers in deciding to accept the COVID-19 vaccine among adults living in the United States who have accepted or plan to accept the vaccine. Participants in this study frequently indicated a desire to move society back to a sense of normalcy and a duty to protect the vulnerable as potential influencers to vaccine acceptance. Commonalities of values and beliefs often exist within communities. One of the greatest strengths of a healthy community is its people and their relationships.[22] During the pandemic, events lead to crusades for unity, togetherness, and strength. Individuals were encouraged to do their part, and vaccination was one way of promoting stronger relationships and healthier communities, thus individuals taking responsibility. Healthy communities, and relationships to each other, support the recently made popular phrase stronger together. These altruistic societal elements are notable and may be incorporated into effective community-based strategies to improve vaccine acceptance.

Building on the influential strength of healthy community relationships, opportunities exist for the healthcare team, another frequently reported potential influencer of COVID-19 vaccine acceptance, to collaborate with communities to deliver accurate vaccination information. Research demonstrates trust-building, borne of effective and respectful communication, can influence communities and individuals to participate in immunization.[23] In addition to community-based approaches, the healthcare team can deliver accurate and informed messaging about the COVID-19 vaccine in healthcare provision. As the COVID-19 vaccine offers hope in recovering from the pandemic, in-person access to healthcare continues to increase, thus, offering excellent opportunities to discuss the risks and benefits of the COVID-19 vaccine in the vast landscape of healthcare delivery. Furthermore, individuals making medically informed decisions about the COVID-19 vaccine have the potential to influence family and friends, those sharing the same values and beliefs. Public figure influencers, specifically media and workplace leadership, should be recognized as having the potential to influence vaccine acceptance. Notably, people and communities do not respond uniformly to interventions.[4] Therefore, for optimal and accurate health promotion, the development of mutual partnerships between communities, the healthcare team, and public figures and media are essential to educate and build vaccine confidence.

A strength of this study is the sample size. Additionally, the research team developed, conducted face validity, and piloted an instrument that was not otherwise available in the literature due to the novel COVID-19 virus and expedient development of the vaccine. To the best of our knowledge, this is the first study to identify potential COVID-19 vaccine influencers among adults living in the United States, with minimal exclusion criteria, and conducted after the distribution of the vaccine.

This study inherently has several limitations. A non-randomized sample without a comprehensive sampling frame should be used cautiously with result interpretation. The survey instrument was administered in English only, thus yielding under-representation of non–English speaking participants. Furthermore, the online survey deployment limits individuals without access to the platforms. Additional studies are needed to include underrepresented populations by expanding the language, and recruitment methods, such as face-to-face distribution or phone call surveys.

The percentage of participants in the total sample reporting actual or planned acceptance of the vaccine was 95.1%, much greater than the 47% of United States adults receiving the vaccine as of June 2021.[1] Notably, the study title and recruitment advertisements stated influencers of COVID-19 vaccine acceptance, explaining the high percentage of vaccine acceptance in this study. This was purposively titled to reach participants who have accepted or plan to accept the COVID-19 vaccine, thereby aiding in the recruitment of participants needed to identify the potential influencers. However, future implications indicate modifications to survey design to include expansion of the first branch (adults who will

not accept the COVID-19 vaccine) to identify potential influential factors associated with a declination of vaccination, thus, offering inferential statistical analysis between groups of acceptance and non-acceptance.

Additional modifications to survey design include further exploratory analysis of potential influencers. The potential vaccine acceptance influencers were collapsed to minimize survey fatigue, possibly abbreviating or omitting some potential influencers. Additional analysis may include an exploration of potential influencers among individuals who initially indicated they would not receive the COVID-19 vaccine but changed their minds and accepted the vaccine. Further psychometric analysis of the survey instrument is also indicated to expand the use of the survey as a valid instrument to measure the concept of vaccine acceptance.

The COVID-19 vaccine is an effective strategy for reducing the burden of COVID-19. After more than a year into the pandemic, ongoing vaccine efforts are underway. The results of this study contribute to the understanding of factors that could potentially influence COVID-19 vaccine acceptance. Additionally, the results of this study may be used to identify groups that could be targeted for behavioral interventions to increase vaccination uptake. The healthcare team and communities can be empowered with knowledge of potential influencers that may effectively promote COVID-19 vaccine acceptance in the communities where they live and practice, thus, spearheading the crusade to make us stronger together.

So What?

What Is Already Known on This Topic?

While COVID-19 vaccination efforts and resources are abundant, the willingness to accept the vaccine remains a challenge.

What Does This Article Add?

In the face of suboptimal vaccination rates, potential influencers in deciding to accept the COVID-19 vaccine among United States adults who have accepted or plan to accept the vaccine are presented.

What Are the Implications for Health Promotion and Practice or Research?

Understanding the potential influencers of vaccine acceptance may guide the development of effective strategies that could be used to increase vaccination uptake.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval

The study was reviewed and approved by the University of Mississippi Medical Center Institutional Review Board (IRB # 2021V0507). A waiver of signed informed consent was obtained. Thus, eligibility and consent to participate was obtained electronically via a REDCap™ study information page.

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