





BRIEF REPORT

Hesitant adopters: An examination of hesitancy among adults in Arkansas who have taken the COVID-19 vaccine

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Funding information

Community Engagement Alliance (CEAL) Against COVID-19 Disparities, Grant/Award Number: NIH 10T2HL156812-01; National Institutes of Health, Grant/Award Number: UL1 TR003107; National Center for Research Resources; Rapid Acceleration of Diagnostics (RADx), Grant/Award Number: 211 V2-53667-03 and NIH 3 R01MD013852-02S3

Abstract

Recent research suggests people who report vaccine hesitancy may still get vaccinated; however, little is known about hesitancy among those who chose to vaccinate. The current study focused on individuals who received the coronavirus disease 2019 (COVID-19) vaccine despite their hesitancy, whom we refer to as “hesitant adopters.” With the understanding that vaccine attitudes and vaccine behaviors may or may not be correlated, we examined the prevalence of COVID-19 vaccine hesitancy among those who have been vaccinated, how COVID-19 vaccine hesitancy varies across sociodemographic groups, and how COVID-19 vaccine hesitancy relates to other factors (prior health care access and influenza vaccination behavior over the past 5 years). Random digit dialing of telephone landlines and cell phones was used to contact potential survey respondents, rendering a sample of 1500 Arkansan adults. Approximately one-third of those who received a COVID-19 vaccine also reported some level of hesitancy. Among hesitant adopters, 5.3% said they were “very hesitant,” 8.8% said they were “somewhat hesitant,” and 17.1% said they were “a little hesitant.” Black/African American and Hispanic/Latinx respondents reported more hesitancy than White respondents, and female respondents reported greater hesitancy compared to male respondents. Greater hesitancy was associated with non-metro/rural residence, forgoing health care due to cost, and lower influenza vaccination rates over the past 5 years. Findings suggest those who are hesitant may get vaccinated despite their hesitancy, illustrating the complexity of vaccination behaviors. Prevalence of hesitancy among the vaccinated has implications for communication strategies in vaccine outreach programs and may help to reduce stigmatization of hesitant adopters.

Study Highlights**WHAT IS THE CURRENT KNOWLEDGE ON THE TOPIC?**

Recent research suggests people who report vaccine hesitancy may still get vaccinated; however, little is known about hesitancy among those who chose to

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vaccinate. A small body of research has found high rates of vaccine hesitancy (e.g., over half) even among the recently vaccinated. Research on vaccine hesitancy has often overlooked those who are already vaccinated, which may be due to inconsistent definitions of vaccine hesitancy.

WHAT QUESTION DID THIS STUDY ADDRESS?

This study focused on individuals who have chosen to be vaccinated despite their hesitancy, whom we refer to as “hesitant adopters.” With the understanding that vaccine attitudes and vaccination status may or may not be correlated, we asked: (1) How prevalent is hesitancy toward the coronavirus disease 2019 (COVID-19) vaccine among those who have been vaccinated? (2) How does COVID-19 vaccine hesitancy vary across sociodemographic groups? (3) How does COVID-19 vaccine hesitancy relate to other factors, such as prior health care access and influenza vaccination behavior over the past 5 years?

WHAT DOES THIS STUDY ADD TO OUR KNOWLEDGE?

Although hesitant adopters have been overlooked in the literature, understanding the nuanced relationship between vaccine hesitancy and vaccination behaviors is critical to vaccine uptake. Prevalence of hesitancy among the vaccinated in this sample has implications for vaccine outreach programs, demonstrating that those who choose to be vaccinated may not be fully confident in their decision.

HOW MIGHT THIS CHANGE CLINICAL PHARMACOLOGY OR TRANSLATIONAL SCIENCE?

Communications efforts within outreach programs should be structured to ease concerns and answer questions up to, during, and after the time of vaccination. Furthermore, findings represent the complexity of vaccination behaviors, aiding to reduce the stigmatization of hesitant adopters.

INTRODUCTION

Vaccine hesitancy was identified by the World Health Organization (WHO) as a major global health threat in 2019.¹ Vaccine hesitancy is often described as a continuum ranging from complete refusal to active demand.² Describing vaccine hesitancy as a behavior, however, confuses the definition and conflates issues, such as vaccine access with the attitude of vaccine hesitancy.^{3,4} A person’s vaccination status may or may not reflect their level of vaccine hesitancy.² The assumption that people who are vaccinated cannot also be vaccine hesitant poses several potential problems: (1) inaccurate estimates, limiting the understanding of hesitancy in general; (2) further stigmatization of the vaccine hesitant; and (3) reduced opportunities for addressing vaccine hesitancy for those who may have received their first, or even second, shot but have concerns about receiving additional booster doses if needed.

Recent research suggests people who report vaccine hesitancy may still choose to get vaccinated^{3,5-7}; however, little is known about hesitancy among those who chose to vaccinate. A small body of research has found high rates of vaccine hesitancy (e.g., over half) even

among the recently vaccinated.³ Research on vaccine hesitancy has often overlooked those who are already vaccinated, which may be due to inconsistent definitions of vaccine hesitancy.² In this study, vaccine hesitancy is defined as an attitude,⁸ and vaccination status is defined as a behavior.

This study focused on coronavirus disease 2019 (COVID-19) vaccine hesitancy among vaccinated adults and examined correlates of those individuals who have chosen to be vaccinated despite their hesitancy, whom we refer to as “hesitant adopters.” With the understanding that vaccine attitudes and vaccination status may or may not be correlated,² we asked: (1) How prevalent is hesitancy toward the COVID-19 vaccine among those who have been vaccinated? (2) How does COVID-19 vaccine hesitancy among vaccinated adults vary across sociodemographic groups? (3) How does COVID-19 vaccine hesitancy among vaccinated adults relate to other factors, such as prior health care access and influenza vaccination behavior over the past 5 years? Although hesitant adopters have been overlooked in the literature, understanding the nuanced relationship between vaccine hesitancy and vaccination behaviors is critical to vaccine uptake.

METHODS

Procedures

Between July 12 and July 30, 2021, trained research staff surveyed adults in Arkansas. Random digit dialing of telephone landlines and cell phones was used to contact potential respondents. Black/African American and Hispanic/Latinx residents of Arkansas were oversampled to ensure adequate representation. A Spanish translation of the survey was administered by Spanish-speaking staff to Spanish-speaking respondents. The survey took 11 min on average to complete.

Inclusion criteria required respondents to be at least 18 years of age and a current resident of the state of Arkansas. The study was explained to potential respondents, and verbal consent was obtained prior to administering the survey. Respondents could refuse to answer any survey question or state “I don’t know.” These response options were recorded when offered by the respondent; however, they were not read aloud.

This study was approved by the Institutional Review Board at the University of Arkansas for Medical Sciences (IRB #262907).

Measures

COVID-19 vaccine hesitancy

The dependent variable was an established ordinal measure of COVID-19 vaccine hesitancy.⁴ Respondents who reported being vaccinated against COVID-19 were asked, “Thinking specifically about the COVID-19 vaccines, how hesitant were you about getting vaccinated?” Response options included: “not at all hesitant,” “a little hesitant,” “somewhat hesitant,” and “very hesitant.” Those who answered “a little hesitant,” “somewhat hesitant,” or “very hesitant” are considered hesitant adopters.

Sociodemographic characteristics

Age, gender, race/ethnicity, education, marital status, and metro (urban)/non-metro (rural) residency were collected. Age was estimated from respondents’ self-reported year of birth. Gender is reported as either male or female. Although third and fourth options of “non-binary” and “prefer to self-describe” were available, too few individuals selected either of these options ($N = 3$) to be included in the final analysis. Respondents reported their highest level of education attained. Responses were grouped into: high school degree/graduate equivalency degree

or lower, some college/associate degree, and bachelor’s degree or higher. Residency was designated as urban or rural based on the county where the respondent resided. Determination of urban or rural status was based on US Department of Agriculture Rural–Urban Continuum Codes.⁹

Healthcare access

Healthcare access was captured using the following four survey items: (1) “Do you have any kind of health care coverage, including health insurance, prepaid plans, such as HMOs, government plans such as Medicare, or Indian Health Service?” (Yes/No); (2) “Do you have one person you think of as your personal doctor or healthcare provider?” (Yes/No); (3) “About how long has it been since you last visited a doctor for a routine checkup?” Response options included: in the past year, in the past 2 years, in the past 5 years, 5 or more years ago, and never. Due to changes in health care seeking behaviors as a result of the COVID-19 pandemic, responses were collapsed into two categories: in the past 2 years or less and more than 2 years ago; and (4) “Was there a time in the past 12 months when you needed a doctor but could not see one because of the cost?” (Yes/No).

Statistical analyses

Data were analyzed using SAS 9.4. Weights were generated using raking ratio estimation to ensure the sample was representative of the 2019 Arkansas census estimates for age (18–29, 30–39, 40–49, 50–59, 60–69, 70–79, and 80+), gender (male or female), and race/ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic other or multiracial, and Hispanic or Latino any race). Weighted descriptive statistics are provided, and a weighted ordinal logistic regression was conducted to answer the research questions. The Brant test indicated the assumption of proportional odds was met ($p = 0.1295$). All predictors were set to use a reference group that produced odds above 1.00 for ease of interpretation.

Analytic sample

The full sample of respondents included 1500 adults in Arkansas. In order to answer the research questions, the sample was first limited to those with valid responses to the question about prior COVID-19 vaccination status ($N = 1491$; 99.4%). Next, those who answered “No” to the COVID-19 vaccination item were

TABLE 1 Sociodemographic characteristics, health care access, vaccine behaviors, and vaccine hesitancy among respondents vaccinated for COVID-19 (*N* = 1055)

| Measures | Weighted, % | Unweighted, <i>n</i> |
|-------------------------------|-------------|----------------------|
| Age (mean ± SD) | 51.9 ± 18.3 | 1055 |
| Gender | | |
| Male | 46.6 | 397 |
| Female | 53.4 | 658 |
| Race/ethnicity | | |
| White | 72.2 | 549 |
| Black/African American | 16.4 | 276 |
| Hispanic/Latinx | 7.2 | 156 |
| Multiracial | 1.5 | 27 |
| Other | 2.7 | 47 |
| Education | | |
| HS degree/GED or lower | 24.6 | 292 |
| Some college/associate degree | 31.0 | 338 |
| Bachelor's degree or higher | 44.4 | 425 |
| Marital status | | |
| Married/cohabitating | 57.8 | 554 |
| Unmarried/single | 42.2 | 501 |
| Location | | |
| Metro (urban) | 71.1 | 733 |
| Non-metro (rural) | 28.9 | 322 |
| Healthcare coverage | | |
| Yes | 91.5 | 962 |
| No | 8.5 | 93 |
| Primary care provider | | |
| Yes | 87.0 | 938 |
| No | 13.0 | 117 |
| No health care due to cost | | |
| Yes | 11.7 | 116 |
| No | 88.3 | 939 |
| Routine checkup | | |
| In the past 2 years or less | 89.4 | 964 |
| More than 2 years ago | 10.6 | 91 |
| 5-Year influenza vaccination | | |
| Never | 17.5 | 172 |
| 1–2 years | 11.4 | 119 |
| 3–4 years | 11.8 | 110 |
| Every year | 59.2 | 654 |
| COVID-19 vaccine hesitancy | | |
| Not at all hesitant | 68.8 | 712 |
| A little hesitant | 17.1 | 172 |

TABLE 1 (Continued)

| Measures | Weighted, % | Unweighted, <i>n</i> |
|-------------------|-------------|----------------------|
| Somewhat hesitant | 8.8 | 102 |
| Very hesitant | 5.3 | 69 |

Note: Percentages may not total 100 due to rounding.

Abbreviations: COVID-19, coronavirus disease 2019; GED, graduate equivalency degree; HS, high school; SD, standard deviation.

removed from the sample (*n* = 355; 23.8%). Of the remaining 1136 respondents who reported they had been vaccinated, those with incomplete responses to other items of interest were omitted from analyses (*n* = 81; 7.1%). The most frequent missing responses were date of birth (*n* = 40), influenza vaccination status (*n* = 13), routine doctor check-up (*n* = 8), gender (*n* = 6), and healthcare coverage (*n* = 6). An additional eight variables were each missing one response. The final analytic sample included 1055 respondents who had been vaccinated against COVID-19.

RESULTS

Descriptives

Table 1 provides descriptive statistics (weighted means/percentages and unweighted *N*s) for respondents vaccinated against COVID-19 with complete responses. Approximately one-third (31.2%) of vaccinated adults reported some degree of hesitancy toward getting the COVID-19 vaccine. Weighted mean age of respondents was 51.9 (±18.3) years. The majority reported they had some form of healthcare coverage (91.5%), had a primary care provider (87.0%), did not have to forgo health care due to cost (88.3%), and had a routine checkup in the past 2 years or less (89.4%). Over half had elected to be vaccinated against influenza every year over the past 5 years (59.2%).

Weighted ordinal logistic regression

Table 2 provides the results of the weighted ordinal logistic regression. Age, race/ethnicity, gender, and rural residency were significant sociodemographic predictors of COVID-19 vaccine hesitancy. For every year increase in age, there was a 1.4% decrease in the odds of reporting greater vaccine hesitancy (odds ratio = 0.986). Black/African American and Hispanic/Latinx respondents had 1.69 and 1.83 times greater odds, respectively, than

(Continues)

| | <i>B</i> | <i>SE</i> | <i>p</i> Value | OR (95% CI) |
|-------------------------------|----------|-----------|----------------|--------------------|
| Age | -0.01 | 0.004 | <0.001 | 0.986 (0.98, 0.99) |
| Gender | | | | |
| Female | 0.55 | 0.143 | <0.001 | 1.73 (1.31, 2.30) |
| Male | - | - | - | - |
| Race/ethnicity | | | | |
| Black/African American | 0.52 | 0.179 | 0.004 | 1.69 (1.19, 2.40) |
| Hispanic/Latinx | 0.60 | 0.265 | 0.023 | 1.83 (1.09, 3.07) |
| Multiracial | 0.48 | 0.518 | 0.359 | 1.61 (0.58, 4.43) |
| Other | 0.73 | 0.387 | 0.059 | 2.08 (0.97, 4.44) |
| White | - | - | - | - |
| Education | | | | |
| HS degree/GED or lower | 0.30 | 0.181 | 0.101 | 1.35 (0.94, 1.92) |
| Some college/associate degree | 0.28 | 0.162 | 0.083 | 1.32 (0.96, 1.82) |
| Bachelor's degree or higher | - | - | - | - |
| Marital status | | | | |
| Unmarried/single | 0.06 | 0.141 | 0.648 | 1.07 (0.81, 1.41) |
| Married/cohabitating | - | - | - | - |
| Location | | | | |
| Non-metro (rural) | 0.34 | 0.152 | 0.023 | 1.41 (1.05, 1.90) |
| Metro (urban) | - | - | - | - |
| Health care coverage | | | | |
| No | 0.24 | 0.240 | 0.321 | 1.27 (0.79, 2.03) |
| Yes | - | - | - | - |
| Primary care provider | | | | |
| Yes | 0.29 | 0.238 | 0.215 | 1.34 (0.84, 2.14) |
| No | - | - | - | - |
| No health care due to cost | | | | |
| Yes | 0.47 | 0.201 | 0.020 | 1.60 (1.08, 2.36) |
| No | - | - | - | - |
| Routine checkup | | | | |
| In the past 2 years or less | 0.45 | 0.263 | 0.090 | 1.56 (0.93, 2.62) |
| More than 2 years ago | - | - | - | - |
| 5-Year influenza vaccination | | | | |
| Never | 0.95 | 0.183 | <0.001 | 2.60 (1.81, 3.71) |
| 1-2 years | 0.77 | 0.213 | <0.001 | 2.17 (1.43, 3.29) |
| 3-4 years | 0.52 | 0.216 | 0.016 | 1.68 (1.10, 2.57) |
| Every year | - | - | - | - |

TABLE 2 Weighted ordinal logistic regression—COVID-19 vaccine hesitancy (*N* = 1055)

Note: Bolded *p* values indicate statistical significance.

Abbreviations: *B*, Beta coefficient; CI, confidence intervals; COVID-19, coronavirus disease 2019; GED, graduate equivalency degree; HS, high school; OR, odds ratio; SE, standard error.

White respondents of being more COVID-19 vaccine hesitant. Female respondents had 1.73 times greater odds of being COVID-19 vaccine hesitant than male respondents. Respondents residing in rural locations had 1.41

times greater odds than urban respondents of being more COVID-19 vaccine hesitant.

Forgoing needed health care due to cost, as well as the frequency of influenza vaccination, were significant

health care-related predictors of COVID-19 vaccine hesitancy among the vaccinated. Respondents who had to forgo health care due to cost had 1.60 times greater odds of being more COVID-19 vaccine hesitant than those who did not have to forgo health care due to cost. Respondents who had received the influenza vaccine never, 1–2 years, and 3–4 years had 2.60, 2.17, and 1.68 times greater odds of being more hesitant toward the COVID-19 vaccine, respectively, than respondents who received the influenza vaccine every year of the past 5 years.

DISCUSSION

Approximately one-third of those who reported receiving a COVID-19 vaccine also reported some level of hesitancy. Among the hesitant adopters, 5.3% said they were “very hesitant,” 8.8% said they were “somewhat hesitant,” and 17.1% said they were “a little hesitant.” The co-manifestation of vaccine hesitancy and the behavior of vaccination demonstrates individuals can be hesitant and choose to vaccinate despite their hesitancy. Among hesitant adopters, Black/African American and Hispanic/Latinx respondents reported more hesitancy than White respondents. This finding is consistent with the one article reporting a higher prevalence of hesitancy among Black/African American community members who had already been vaccinated.³ Among hesitant adopters, female respondents reported greater hesitancy compared to male respondents. This finding is consistent with research showing that females tend to report greater COVID-19 vaccine hesitancy.^{3,10,11} Among hesitant adopters, greater hesitancy was associated with rural residence, forgoing health care due to cost, and lower influenza vaccination rates over the past 5 years. A state-wide study of COVID-19 vaccine hesitancy among adults in Rhode Island found a similar relationship between influenza vaccination and reduced COVID-19 vaccine hesitancy.¹²

These findings are encouraging because they suggest that those who are hesitant, including communities of color, may get vaccinated despite their remaining hesitancy. Although prior studies have documented hesitancy among minority communities, females, rural residents, and those facing social ecological barriers,^{13–16} most have conflated vaccine attitudes with vaccine behaviors.^{2,4} The prevalence of hesitancy among the vaccinated has implications for vaccine outreach programs, demonstrating that those who choose to be vaccinated may not be fully confident in their decision. Therefore, communication efforts within outreach programs should be structured to ease concerns and answer questions up to, during, and

after the time of vaccination. Furthermore, these findings represent the complexity of vaccination behaviors, aiding to reduce the stigmatization of hesitant adopters. It is unclear to what extent the findings are specific only to COVID-19 vaccines or if the findings may be generalized to other vaccines. It is likely that hesitancy will be experienced and reported differently for other types of vaccines. Future research should examine hesitancy and hesitant adopters for other vaccines, such as the human papillomavirus vaccine.

Strengths and limitations

This study used a large, diverse random sample with data collection in English and Spanish languages, which are significant strengths and improve generalizability. However, the study used cross-sectional and self-reported data. These are limitations because self-reported data is subject to recall or social desirability bias, and cross-sectional data does not allow for causal analysis.

CONCLUSION

This is the first population-based, random sample study reporting on hesitant adopters. Despite its limitations, this study makes a significant contribution to a limited but expanding body of literature which demonstrates that vaccination hesitancy should not be conflated with vaccine behavior.^{3,4,17} Further research on hesitant adopters is critical to provide insights into how and why people overcome vaccine hesitancy to become vaccinated.^{5,6,18}

AUTHOR CONTRIBUTIONS

P.A.M., B.R., A.J.S., J.A.A., S.C., J.C.M., S.R., S.M.M.-N., M.D.M., M.G.-H., and D.E.W. wrote the manuscript. P.A.M., B.R., and D.E.W. designed the research. P.A.M., B.R., J.A.A., S.C., J.C.M., S.R., S.M.M.-N., M.D.M., M.G.-H., and D.E.W. performed the research. A.J.S. analyzed the data.

FUNDING INFORMATION

Support was provided by the Rapid Acceleration of Diagnostics (RADx; NIH 3 R01MD013852-02S3 and 211 V2-53667-03); University of Arkansas for Medical Sciences Translational Research Institute funding awarded through the National Center for Research Resources and National Center for Advancing Translational Sciences of the National Institutes of Health (NIH; UL1 TR003107); and Community Engagement Alliance (CEAL) Against COVID-19 Disparities (NIH 10T2HL156812-01). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funders.

CONFLICT OF INTEREST

S.C. reports owning Pfizer stock. All other authors declared no competing interests for this work.

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How to cite this article: McElfish PA, Rowland B, Scott AJ, et al. Hesitant adopters: An examination of hesitancy among adults in Arkansas who have taken the COVID-19 vaccine. *Clin Transl Sci.* 2022;15:2316-2322. doi:10.1111/cts.13367