



# Motivations to Vaccinate Among Hesitant Adopters of the COVID-19 Vaccine

Ramey Moore<sup>1</sup> · Rachel S. Purvis<sup>1</sup> · Emily Hallgren<sup>1</sup> · Don E. Willis<sup>1</sup> · Spencer Hall<sup>2</sup> · Sharon Reece<sup>1</sup> · Sheena CarlLee<sup>1</sup> · Hunter Judkins<sup>1</sup> · Pearl A. McElfish<sup>1</sup>

Accepted: 30 September 2021 / Published online: 23 October 2021

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

## Abstract

Vaccination is a critical means for mitigating the worst effects of the COVID-19 pandemic in the United States (US). However, the initial high demand for COVID-19 vaccines has not persisted, and the rate of vaccination slowed significantly in the summer of 2021. This study seeks to understand the motivations to receive the COVID-19 vaccine among hesitant adopters. Hesitant adopters are individuals who express some level of hesitancy about the vaccine but have also received at least one dose of the vaccine. Using a qualitative descriptive design, three loci for motivation emerged during analysis: extrinsic motivators, intrinsic motivators, and structural motivators. Extrinsic motivations, such as protecting one's community, family, and friends, were reported as driving vaccination behavior. Among intrinsic motivators, the desire to protect themselves from COVID-19 was the most frequently reported. Structural motivators were also identified, indicating that vaccine mandates also serve to motivate hesitant adopters of the COVID-19 vaccine. These findings have important implications in ongoing efforts to increase COVID-19 vaccine uptake in the US and highlight the multi-dimensional motivations for vaccination among hesitant adopters. Additionally, we provide recommendations for practice based on our findings.

**Keywords** COVID-19 vaccines · Hesitant adopters · Health behavior · Vaccine hesitancy

## Introduction

More than 37 million cases of COVID-19 have been documented in the United States (US) since the beginning of the pandemic [1]. Vaccination remains a critical means for mitigating the worst effects of the pandemic in the US [2, 3]. COVID-19 vaccines became available in December 2020 [4] and initially had high demand; however, the rate of vaccination slowed during the summer of 2021 [5].

Vaccine hesitancy is multi-dimensional and acts as a barrier to vaccine uptake in the US [6, 7]. Recent studies have focused on quantitative analysis of sociodemographic and other predictive factors of vaccine hesitancy [7, 8]. These

studies have documented that vaccine hesitancy is higher among Black Americans, residents in rural areas, women, younger individuals, and those with lower educational attainment and lower income [3, 7, 8]. Qualitative work on vaccine hesitancy has likewise focused primarily on reasons for vaccine refusal [9, 10], documenting concerns with the speed of vaccine development [11], lower trust in medical professionals, researchers, and government [12], and fears related to the safety and efficacy of COVID-19 vaccines [13]. However, these studies have provided little information about what motivates those who are hesitant to become vaccinated, and in doing so, they have overlooked many of the processes which may be key to increasing vaccination uptake and provided little information that can be used to increase vaccination rates.

While most literature conflates the concepts of vaccine hesitancy and vaccine behavior, other scholars recognize vaccine hesitancy is an attitude that is related to, but not synonymous with, vaccine behavior [10, 14, 15]. Emerging research points to hesitant individuals who also receive vaccination [10]. Little is understood about individuals who report hesitancy but still get vaccinated [15, 16]. These

✉ Pearl A. McElfish  
pamcelfish@uams.edu

<sup>1</sup> College of Medicine, University of Arkansas for Medical Sciences Northwest, 1125 N. College Avenue, Fayetteville, AR 72701, USA

<sup>2</sup> Office of Community Health and Research, University of Arkansas for Medical Sciences Northwest, 1125 N. College Avenue, Fayetteville, AR 72701, USA

‘hesitant adopters,’ people who are both vaccinated and report some degree of hesitancy, represent a crucial subject for analysis to inform current vaccination efforts [9, 17]. Brewer (2021) states that “motivation to vaccinate...is one of the strongest predictors of health behaviors, including vaccine uptake” [18]. Therefore, this study seeks to understand the motivations to get the COVID-19 vaccination among hesitant adopters.

## Methods

### Study Approach and Design

This study uses a qualitative descriptive design [19] to understand motivations to get a COVID-19 vaccine among hesitant adopters. All study materials and procedures were approved by the University of Arkansas for Medical Sciences Institutional Review Board (IRB# 262645).

### Participant Recruitment, Consent, and Remuneration

Potential participants were recruited between 22 April 2021 and 6 July 2021 while they received a COVID-19 vaccine at churches, clinics, and community events in Arkansas. Vaccination was provided to all regardless of the decision to participate in this study. Individuals over the age of 18 who spoke English, Marshallese, or Spanish and were present at the COVID-19 vaccination events were invited to participate. Consent information was provided in English, Spanish, or Marshallese. All respondents had the option to access the survey via a sterilized iPad or on their own electronic devices through a QR code provided on location and were assisted with taking the survey if needed. Research Electronic Data Capture (REDCap) was used to record participant consent [20, 21]. Respondents who took part in the study and provided contact information were entered into a raffle to win a gift card (\$100.00).

### Data Collection

Respondents were invited to complete the survey during the 15-min waiting period after taking the COVID-19 vaccine. Respondents could complete the survey in English, Spanish, or Marshallese. Bilingual study staff translated all text responses from Spanish and Marshallese into English prior to analysis.

### Instrument

Quantitative survey items were selected from validated sources such as the PhenX Toolkit [22]. The survey

collected demographic information, vaccine hesitancy, and motivations to receive the COVID-19 vaccine. Sociodemographic factors were assessed using questions from the Behavioral Risk Factor Survey [23]. To assess COVID-19 vaccine hesitancy, we modified a single-item measure of general vaccine hesitancy [15, 24]. To understand individual motivations to vaccinate among hesitant adopters, participants were asked the open-ended question, “What are your reasons for getting the COVID-19 vaccine?”.

### Study Sample

A total of 1475 valid responses to the survey were collected between 22 April 2021 and 6 July 2021. Of valid responses, 867 respondents reported some level of hesitancy about being vaccinated: “a little hesitant” (n = 448), “somewhat hesitant” (n = 269), or “very hesitant” (n = 150). These 867 respondents comprise the study sample.

### Qualitative Data Analysis

Analysis was conducted using MAXQDA 2020 [25]. Three qualitative researchers read and analyzed all responses and created a codebook with emergent primary themes. Segments of text were coded by the first author, with confirmation-coding analysis performed by two additional qualitative researchers. Initial codes were refined, and the codebook was revised four times to reach consensus on codebook structure and emergent themes and to verify data saturation. Any differences in interpretation of data were discussed by the research team and resolved using a consensus model. Illustrative quotes were identified to describe and elaborate thematic domains. Respondents often indicated several motivating factors within a single answer; however, all quotes are presented within the themes they best represent. The research team critically reviewed the data, analysis summaries, codebook, and coded segments to ensure analytic rigor, reliability, and full data saturation [26]. After the coding period, MAXQDA was used to generate code frequencies to calculate the frequencies of each coded segment across the entire study sample of 867 responses. Individual responses often included segments with multiple codes in the same answer, generating a total of 1152 coded segments. Frequency percentages were calculated to highlight the prevalence of themes among coded segments. MAXQDA was used to create counts of co-occurring codes for individuals mentioning multiple motivations in the same answer. Descriptive sociodemographic statistics were calculated for the study sample to show frequencies and percentages.

## Results

Sociodemographics of the sample are presented in Table 1. Hesitant adopters in the sample included individuals with an average age of 37. Women made up a majority of hesitant adopters (60.21%). There was broad racial/ethnic diversity in the sample, with 44.54% of respondents identifying as non-Hispanic white, 32.55% as Hispanic/Latinx, 8.46% as Native Hawaiian or Pacific Islander, 6.46% as Black/African American, 4.70% as Asian, and 2.35% as multiracial. Slightly more than half of respondents were employed full time (50.61%). Hesitant adopters reported a wide range of

educational attainment, with 37.86% holding a four-year degree or more, 23.81% reporting some college, 25.24% holding a high school diploma or GED, and 13.10% reporting completing less than a high school education. A narrow majority of hesitant adopters (52.63%) were not married. The sample represents individuals reporting some level of hesitancy about the COVID-19 vaccine despite receiving at least one dose. Slightly over half (51.67%) reported being a little hesitant about the COVID-19 vaccine. Nearly a third (31.03%) reported being somewhat hesitant, and 17.30% of respondents reported being very hesitant about the COVID-19 vaccine.

Hesitant adopters of the COVID-19 vaccine reported a range of motivations leading to vaccination. These themes and their prevalence are presented in Table 2. Three loci for motivation emerged during analysis: *extrinsic motivators* (44.91%), *intrinsic motivators* (39.15%), and *structural motivators* (15.63%). Intrinsic motivators were motivators that acted at the level of the individual respondent. Within this primary theme, two secondary themes emerged. The most prevalent was a motivation to protect themselves from COVID-19 and a motivation for a return to normal life. Extrinsic motivators were motivators that acted externally to the respondent, such as a desire to protect one's community or family. Within extrinsic motivators, five secondary themes emerged that included: prosocial motivation, family/loved ones, comfortable social contact, social pressure to vaccinate, and friends. Structural motivators were motivators that acted at the level of social structures. Within structural motivators, four secondary themes emerged. Travel, work, school, and general structural motivators were all reported by respondents as providing motivation to vaccinate. Co-occurring codes are shown in Table 3, indicating counts of co-occurrence among coded segments and presented as a heat map to indicate the prevalence of co-occurrence between each secondary code.

**Table 1** Sociodemographics of hesitant adopters

	Frequency	% or $\bar{x}$ <sup>a</sup>
<i>Age</i>	867	37.21
18–24	178	20.53%
25–34	219	25.26%
35–44	227	26.18%
45–54	136	15.69%
55–64	84	9.69%
65 +	23	2.65%
<i>Sex</i>	862	
Female	519	60.21%
Male	343	39.79%
<i>Race/ethnicity</i>	851	
American Indian/Alaska Native	8	0.94%
Asian	40	4.70%
Black/African American	55	6.46%
Native Hawaiian or Pacific Islander	72	8.46%
White	379	44.54%
Hispanic/Latinx	277	32.55%
Multiracial	20	2.35%
<i>Education</i>	840	
Less than high school	110	13.10%
High school or GED	212	25.24%
Some college	200	23.81%
Four-year degree or more	318	37.86%
<i>Marital status</i>	838	
Married	397	47.37%
Not married	441	52.63%
<i>Employment status</i>	816	
Full time	413	50.61%
Part time	82	10.05%
Other	321	39.34%
<i>COVID-19 vaccine hesitancy</i>	867	
A little hesitant	448	51.67%
Somewhat hesitant	269	31.03%
Very hesitant	150	17.30%

<sup>a</sup>Percentages may not equal 100% due to rounding

### Extrinsic Motivators

Extrinsic motivators were reported as the single largest category of vaccine motivations among hesitant adopters at 44.91% of all coded segments. The largest secondary theme reported was the broad prosocial motivation to protect other individuals. Respondents stated that they were motivated to “protect others” (#70) or to “help the community” (#87). Respondents frequently stated a motivation to “do my part to eliminate the virus” (#116). The concept of herd immunity was also a recurrent theme for respondents; one respondent stated, “I want to protect other people, and I want to help reach herd immunity so things can get back to normal” (#696). Other respondents identified a motivation related to protecting the wider communities to which they belong,

**Table 2** Prevalence of emergent themes among hesitant adopters

Primary emergent themes	Total coded segments	Percentage (%) coded segments <sup>a</sup>	Secondary emergent themes	Total coded segments	Percentage (%) of coded segments <sup>a</sup>
Extrinsic motivators	521	44.91	Prosocial motivation	266	22.09
			Family/loved ones	160	13.89
			Comfortable social contact	40	3.47
			Social pressure to vaccinate	38	3.30
			Friends	17	1.48
Intrinsic motivators	451	39.15	Protect self	395	34.29
			Return to normal	56	4.86
Structural motivators	180	15.63	Travel	102	8.85
			Work	54	4.69
			School	12	1.04
			General	12	1.04
			Total	1152	

<sup>a</sup>Percentages may not equal 100% due to rounding

**Table 3** Code co-occurrence count and heat map

Secondary Emergent Codes	Intrinsic-Protect Self	Intrinsic-Return to normal	Extrinsic-People around me	Extrinsic-Comfortable social contact	Extrinsic-Prosocial motivation	Extrinsic-Family/Loved ones	Extrinsic-Friends	Structural-Travel	Structural-Work	Structural-School	Structural-General
Intrinsic-Protect Self	0	9	1	9	109	57	2	9	5	3	1
Intrinsic-Return to normal	9	0	3	2	15	4	1	4	2	0	1
Extrinsic-People around me	1	3	0	0	0	1	0	0	2	0	0
Extrinsic-Comfortable social contact	9	2	0	0	8	4	1	10	0	0	1
Extrinsic-Prosocial motivation	109	15	0	8	0	35	2	20	7	2	0
Extrinsic-Family/Loved ones	57	4	1	4	35	0	13	5	6	0	0
Extrinsic-Friends	2	1	0	1	2	13	0	2	1	0	0
Structural-Travel	9	4	0	10	20	5	2	0	6	3	0
Structural-Work	5	2	2	0	7	6	1	6	0	0	0
Structural-School	3	0	0	0	2	0	0	3	0	0	0
Structural-General	1	1	0	1	0	0	0	0	0	0	0

one respondent articulating, “I am healthy and want to be responsible to my community” (#1623).

Family was also a recurrent extrinsic motivator. Many participants related motivations to “protect my family from the virus” (#1774) or “for my family safety” (#1770). Respondents also noted specific family members as being the primary locus for their motivation. One respondent stated, “I don’t want my kids to get sick. I do it for my family and my love ones” (#2). Other responses focused on elderly relatives, parents, or grandparents or on relatives who were high-risk, wives, or their children. One respondent stated, “I have family with health issues and wanted to protect them.” Echoing this, a respondent described their

motivation “to protect others in my family” and clarified specifically “Elderly parents with health issues” (#1154). Another recurrent concept was culpability for bringing COVID-19 to their family. As one respondent recounted

my family and loved ones could be affected if I give them Covid so I had to protect myself so I could protect others around me. I didn't want to get it at all ever!!! However thinking of my family was the reason because I believed I could social distance enough to avoid [COVID-19] without vaccinations. (#271)

Comfortable social contact also emerged as an extrinsic locus of motivation. Respondents noted a desire for social

contact as a motivation: “[I] want to be able to move forward with community—personally and professionally” (#763). Being able to spend time around others was another concept described by respondents, and one respondent described this motivation “To be able to spend time with others” (#585). Other respondents note that others in close social proximity will be less hesitant and more comfortable. One respondent described their motivation as “the peace of mind for my friends and family, and to see them with little worry” (#1026). Another similar response focused on the comfort of others, “though there is no concrete evidence this vaccine helps to prevent spreading covid, others seem to be more comfortable around those open to vaccinating so I got it” (#796).

Social pressure to vaccinate was an emergent secondary theme among extrinsic motivators to vaccinate. Some respondents stated, “my family convinced me to get it” (#584), or “pressure by loved ones” (#1453). Others noted specific family members who provided pressure as motivation, such as a respondent who stated, “my children did so I felt like I should too,” (#1329) or “my wife is adamant about getting the vaccine so I did it bc I love her” (#145). Critically, these respondents often distinguished their motivation as not being to protect family but instead that family members served as the persuasive and motivating force. For example, one respondent stated, “my 16 yr old wanted to get it and because she did I felt obligated to.” (#1127).

Protecting friends was another emergent theme within extrinsic motivators. Respondents noted that vaccination was motivated by a desire to “protect my friends” (#301). This theme rarely occurred in isolation; respondents often echoed the motivation, stating, “my reason of me getting a covid shot is to protect my friends and family” (#819). Another respondent wrote that they were motivated to protect “the long term health and safety of my family and friends. I don’t want to put them at risk to exposure” (#1160). Another co-occurring code with prosocial motivators was this response, which notes three different motivations spanning family, friends, and her students, alongside broad prosocial motivations: “I want to protect my friends and family. I am an educator, so my students safety is important. I am doing my part to stop the spread” (#1868).

### Intrinsic Motivators

The second most recurrent (39.15%) locus for motivation to vaccinate was the individual. This primary theme includes two emergent secondary themes. The most common intrinsic motivator reported was to protect themselves. Respondents frequently cited motivation to vaccinate “to be safe and not die” (#1450), “to protect myself” (#284), or simply “to prevent getting the covid” (#276). Another important motivation was among individuals noting that they had already

experienced COVID-19 infection and that they were motivated to get vaccinated to prevent re-infection. One respondent stated, “all ready had covid once don’t want it again” (#203). Respondents also noted a desire to protect themselves from complications related to COVID-19 infection. One respondent stated that their motivation was to “protect from serious complications due to infection” (#352). Other respondents noted that fear of COVID-19 symptoms motivated them. One respondent stated, “I am more afraid of the symptoms of covid so that is why I’m getting vaccinated” (#350). Another common response focused on the role of the vaccine to lessen the severity of a potential COVID-19 infection. As respondents stated, they were being vaccinated to “prevent hospitalization and severe symptoms” (#187), or “less sever symptoms for myself if I do contract covid” (#462).

Among intrinsic motivations to vaccinate, the second most common emergent theme focused on a return to normal for the individual. A common statement concerned the motivation to “return to normalcy” (#15), or “in order to get back to normal” (#65). Mask wearing was a frequently noted feature that motivated respondents. One respondent described their motivation to “stop wearing a mask, to get back to a ‘normal’ life” (#19). Another respondent described one aspect of their motivation and stated, “that if receiving this vaccine means getting away from these stupid masks...fantastic” (#862). Another respondent who stated a motivation to “stop the use of masks” (#1019). Others noted a desire to “live life again” (#310). One respondent encompassed this theme by writing, “I want to get out of this pandemic and back to how life was before” (#673).

### Structural Motivators

Structural motivations were the minority (15.63%) of responses and varied across several structural motivators, although responses falling into this category often lacked broad context or were only a single word. Of structural motivations, the most commonly presented motivation was related to travel, followed by work, with an equal number of responses for school and for general structural motivations.

Respondents stated that travel was an important motivation to vaccinate, often simply stating “travel” (#262) or “to be able to travel again” (#829). Some respondents indicated tourism specifically as a motivator; one respondent wrote, “Going on Vacation over the summer” (#109). Other respondents expected some form of vaccine mandates for travel. This respondent described their motivation, citing international travel: “I enjoy international travel and I believe at some point we will need this vaccination to travel to certain countries” (#734).

Work was also frequently noted as a motivating factor for hesitant adopters. One participant stated, “employer

is requiring” (#572). Another participant simply noted, “because of my work” (#846). Other respondents identified work in health care settings. One respondent stated, “I am a Health care professional” (#1234). Another respondent noted that their position as a caregiver was their only motivation: “Because I’m a [...] caregiver other than that I would’ve never taken a shot” (#1033). Work requirements for healthcare professionals also created internal conflict regarding vaccination. One respondent explained her motivation

I am an RN and my work required me to be vaccinated. I may have waited a while longer had I not needed to be vaccinated now. Simply because I have a pharmacist friend who participated in studies with the COVID vaccine and he told me to wait until it had been out a while longer. I believe in the power of science and vaccines, but I do feel the COVID vaccine was rushed through production and that is a bit scary to me when it comes to long term effects/reactions to the vaccine itself. It’s simply unknown how people may have late effects from it. I had COVID in December 2020 and it was absolutely awful, but the effects after the first vaccine were almost worse. (#1501)

Structural motivations were also reported for school, with some participants reporting that it was required: “college requires immunization” (#1859). Some participants merely noted their motivation as “school” (#816). Another respondent stated their motivation as “Medical program. Figured I was going to have to get it anyway” (#321). Another respondent described their motivation as pre-emptive: “I am assuming I will need it for my doctorate program in the fall” (#658).

Within structural motivators, some respondents focused on broad structural issues, such as one respondent who stated, “cause [vaccination is] required almost everywhere” (#75), and some focused on specific contexts, such as, “I needed the vaccine in order to volunteer at the Fayetteville Animal Shelter” (#1292). Similarly, another reported motivation to vaccinate was “So I can go to church” (#790). Other contexts were infrequently identified, such as one respondent who stated, “Dr required it before coming to see her” (#1735).

### Co-occurring Codes

Most respondents reported multiple motivators in their answers. See Table 3 for a matrix and heat map of co-occurring emergent secondary themes. The greatest number of co-occurring codes bridged intrinsic and extrinsic motivations. The motivation to vaccinate to protect oneself co-occurred with prosocial motivators 109 times. Protecting oneself also co-occurred 57 times with protecting one’s family and loved

ones. Prosocial motivators and motivators located in familial connections co-occurred 35 times.

## Discussion

The results demonstrate hesitant adopters were motivated by a wide range of intrinsic, extrinsic, and structural factors. Frequently, motivations were multi-dimensional, including both intrinsic and extrinsic factors. The most frequently identified motivations to vaccinate for hesitant adopters were extrinsic motivations. Among hesitant adopters, extrinsic motivations, such as protecting one’s community, family, and friends, were a critically important factor driving vaccination behavior. This is in contrast with literature that emphasizes health as an individual motivator, grounded in a patients-as-consumers ideology, as a critical reason for vaccine hesitancy among parents [27].

Among extrinsic motivators, the most commonly identified emergent theme was a desire to protect the wider community. This finding is consistent with some research that shows an association of prosociality with vaccine uptake [28–30]; however, the dynamics of extrinsic and intrinsic motivations among hesitant adopters were not specifically explored in the prior literature.

Family and loved ones were also cited as an extrinsic motivator to get the COVID-19 vaccination. Other scholars have identified the important role of family in decisions to vaccinate [31], and our findings expand on the role that family and loved ones play in vaccination behavior. We find that family and loved ones can serve as a passive motivator for hesitant adopters, consistent with the impact of social context on individual thoughts and feelings in the Increasing Vaccination Model [18]. Thus, this is a novel finding indicating that protecting family members and people in similarly close social proximity may be an important driver for vaccination among hesitant adopters.

Comfortable social contact was also reported by hesitant adopters as a motivator to vaccinate. It is a novel finding, although this finding does support studies which have found a role for social networks in other aspects of vaccine behaviors [32, 33]. Social pressure from friends and family was reported by hesitant adopters, and this confirms findings that one’s social network represents a powerful motivator for vaccination [32]. The specific motivation to protect one’s friends from infection was also reported as an extrinsic motivator. This finding is consistent with research with Australian healthcare workers [34], but this is the first study to highlight this motivation amongst a sample of hesitant adopters in the US.

For hesitant adopters, the second most common primary theme identified were intrinsic motivators, and this was most often articulated as a motivation to protect themselves from

COVID-19. The desire to protect oneself is consistent with the wider literature on hesitancy showing that assessments of personal risk are critical in decision-making about vaccination [35, 36]. A desire to return to ‘normal’ was also found to be an important intrinsic motivator. This is consistent with other qualitative studies, such as that conducted by the Kaiser Family Foundation, showing that a desire for normalcy was reported by vaccinated individuals in the US [31]. Respondents also reported that masking was a motivator to get vaccinated. This finding may be affected by then-current Centers for Disease Control and Prevention (CDC) recommendations advising that mask-wearing no longer be required for vaccinated individuals, which has since been revised by the CDC [37].

Structural motivators were also identified as important, indicating that vaccine mandates for travel, and mandates implemented by employers, schools, and other institutions, work to increase vaccine-seeking behaviors and may be effective. The most commonly reported motivation was related to travel, with hesitant adopters noting that vaccinations are frequently required for international travel. The motivation to vaccinate in order to travel more freely has not been documented in the literature. Workplace mandates were also reported as motivation to vaccinate. The low numbers of hesitant adopters mentioning work-based motivations may be affected by the fact that fewer employers had enacted mandates for employees during the data collection period. This motivation may be more impactful as more businesses implement COVID-19 vaccine mandates [38] and will require further study to explore the dynamics of employer mandates.

Some hesitant adopters stated that vaccination mandates in schools motivated their decision to seek vaccination. As with vaccination mandates tied to employment, this motivation may have increased salience as more educational institutions implement vaccination requirements for students. Overall, hesitant adopters reporting structural motivations is supported by the literature indicating the power of vaccine mandates, but these findings must be understood in light of possible perverse effects of mandates potentially reducing vaccine uptake [39, 40].

Extrinsic and intrinsic motivations were frequently co-occurring in reported motivations to vaccinate for hesitant adopters. This association may indicate that vaccination as a source of protection extends across different social contexts, from micro-level individual to broad macro-level community. Other studies have considered prosociality and proself motivations to be in dyadic opposition [41]. In contrast, we find that hesitant adopters often report combined motivations to protect themselves and others. While more research is needed to understand the implications of this finding, it is a promising area of research for understanding motivations of hesitant adopters, especially in expanding understandings of how

self-protection is framed in social context. This is consistent with sociological literature on self-interest that argues that self-interest and community interests are not in opposition in practice [42]. Further research is necessary to determine the overlap between individual thoughts and feelings and social structures, especially concerning the effects of social pressure in contexts that amplify anti-vaccine discourses and social norms. This finding may also be useful for interventions designed to increase vaccine uptake among the vaccine hesitant.

## Strengths and Limitations

This study is not without limitations. Survey respondents were recruited while under observation after receiving a dose of the COVID-19 vaccine, and only those who reported some degree of hesitancy were selected for this analysis, so this non-random sample may not be representative of the general population in Arkansas or in the US. The large and socioeconomically and racially diverse sample of hesitant adopters does improve generalizability. Open-ended questions allowed respondents to provide anonymous responses in their own words but did not allow for clarification or elaboration. Despite these limitations, this study contributes to knowledge on vaccine hesitancy as the first qualitative study to explore motivations to vaccinate among hesitant adopters of the COVID-19 vaccine.

## Implications for Practice

The findings of this study demonstrate the diversity of reasons patients choose to receive a COVID-19 vaccine. These findings provide important information for health care providers as they address vaccine-hesitancy using a patient-centered approach focused on patients’ own pre-existing motivations. This may be especially useful for providers who need to address hesitancy in time-limited clinical settings. These findings can also inform public health messaging to address hesitancy.

## Conclusion

These findings have important implications in ongoing efforts to increase COVID-19 vaccine uptake in the US and highlight the multi-dimensional motivations for vaccination among hesitant adopters. Additionally, this study demonstrates that hesitancy towards vaccination can co-occur with vaccine uptake [10, 43]. Interventions that focus on hesitant adopters may be bundled with other efforts to improve vaccine uptake in the US and ultimately to end the COVID-19 pandemic.

**Author Contribution** Conceptualization, PAM; formal analysis, RM; methodology, RM; validation, RSP and EH; writing—original draft, RM, DEW, SH, and PAM; writing—review and editing, RSP, EH, DEW, SH, SR, SC, and HJ. All authors have read and agreed to the published version of the manuscript.

**Funding** This research was supported by the University of Arkansas for Medical Sciences Translational Research Institute (TRI) [UL1 TR003107] through the National Center for Advancing Translational Sciences of the National Institutes of Health (NIH), an award from NIH Community Engagement Alliance (CEAL) Against COVID-19 Disparities [1OT2HL161580–01], and a supplemental award from the Centers for Disease Control and Prevention (CDC) [NU58DP006595]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the CDC.

**Data Availability** The deidentified data underlying the results presented in this study may be made available upon request from the corresponding author Dr. Pearl A. McElfish, at pamcelfish@uams.edu. The data are not publicly available in accordance with funding requirements and participant privacy.

**Code Availability** Analysis was conducted using MAXQDA 2020.

## Declarations

**Conflict of interest** No conflicts of interest are reported by the authors.

**Ethical Approval** All study materials and procedures were approved by the University of Arkansas for Medical Sciences Institutional Review Board (IRB# 262645).

**Consent to Participate** Consent information was provided in English, Spanish, or Marshallese. REDCap was used to record participant consent.

**Consent for Publication** Not applicable.

## References

- Centers for Disease Control and Prevention. (2020). COVID-19 cases, deaths, and trends in the US | CDC COVID data tracker. Centers for Disease Control and Prevention.
- Pogue, K., Jensen, J. L., Stancil, C. K., Ferguson, D. G., Hughes, S. J., Mello, E. J., Burgess, R., Berges, B. K., Quayle, A., & Poole, B. D. (2020). Influences on attitudes regarding potential COVID-19 vaccination in the United States. *Vaccines*, 8(4), 582. <https://doi.org/10.3390/vaccines8040582>
- Yang, Y., Dobalian, A., & Ward, K. D. (2021). COVID-19 vaccine hesitancy and its determinants among adults with a history of tobacco or marijuana use. *Journal of Community Health*. <https://doi.org/10.1007/s10900-021-00993-2>
- Hughes, M. M., Wang, A., Grossman, M. K., Pun, E., White-man, A., Deng, L., Hallisey, E., Sharpe, J. D., Ussery, E. N., Stokley, S., Musial, T., Weller, D. L., Murthy, B. P., Reynolds, L., Gibbs-Scharf, L., Harris, L., Ritchey, M. D., & Toblin, R. L. (2021). County-level COVID-19 vaccination coverage and social vulnerability—United States, December 14, 2020–March 1, 2021. *Morbidity and Mortality Weekly Report*, 70(12), 431–436. <https://doi.org/10.15585/mmwr.mm7012e1>
- Volpp, K. G., & Cannuscio, C. C. (2021). Incentives for immunity—Strategies for increasing Covid-19 vaccine uptake. *New England Journal of Medicine*, 385(1), e1. <https://doi.org/10.1056/NEJMp2107719>
- Coustasse, A., Kimble, C., & Maxik, K. (2021). COVID-19 and vaccine hesitancy: A challenge the United States must overcome. *Journal of Ambulatory Care Management*, 44(1), 71–75. <https://doi.org/10.1097/JAC.0000000000000360>
- Khubchandani, J., Sharma, S., Price, J. H., Wiblehauser, M. J., Sharma, M., & Webb, F. J. (2021). COVID-19 vaccination hesitancy in the United States: A rapid national assessment. *Journal of Community Health*, 46(2), 270–277. <https://doi.org/10.1007/s10900-020-00958-x>
- Willis, D. E., Andersen, J. A., Bryant-Moore, K., Selig, J. P., Long, C. R., Felix, H. C., Curran, G. M., & McElfish, P. A. (2021). COVID-19 vaccine hesitancy: Race/ethnicity, trust, and fear. *Clinical and Translational Science*. <https://doi.org/10.1111/cts.13077>
- Attwell, K., Lake, J., Sneddon, J., Gerrans, P., Blyth, C., & Lee, J. (2021). Converting the maybes: Crucial for a successful COVID-19 vaccination strategy. *PLoS ONE*, 16(1), e0245907. <https://doi.org/10.1371/journal.pone.0245907>
- Dubé, E., Gagnon, D., MacDonald, N., Bocquier, A., Peretti-Watel, P., & Verger, P. (2018). Underlying factors impacting vaccine hesitancy in high income countries: A review of qualitative studies. *Expert Review of Vaccines*, 17(11), 989–1004.
- Latkin, C. A., Dayton, L., Yi, G., Konstantopoulos, A., & Boodram, B. (2021). Trust in a COVID-19 vaccine in the US: A social-ecological perspective. *Social Science & Medicine* (1982), 270, 113684. <https://doi.org/10.1016/j.socscimed.2021.113684>
- Attwell, K., Leask, J., Meyer, S. B., Rokkas, P., & Ward, P. (2017). Vaccine rejecting parents' engagement with expert systems that inform vaccination programs. *Journal of Bioethical Inquiry*, 14(1), 65–76. <https://doi.org/10.1007/s11673-016-9756-7>
- Benham, J. L., Lang, R., Burns, K. K., MacKean, G., Léveillé, T., McCormack, B., Sheikh, H., Fullerton, M. M., Tang, T., Boucher, J. C., Constantinescu, C., Mourali, M., Oxoby, R. J., Manns, B. J., Hu, J., & Marshall, D. A. (2021). Attitudes, current behaviours and barriers to public health measures that reduce COVID-19 transmission: A qualitative study to inform public health messaging. *PLoS ONE*, 16(2), e0246941. <https://doi.org/10.1371/journal.pone.0246941>
- Salmon, D. A., Dudley, M. Z., Glanz, J. M., & Omer, S. B. (2015). Vaccine hesitancy: Causes, consequences, and a call to action. *Vaccine*, 33, D66–D71. <https://doi.org/10.1016/j.vaccine.2015.09.035> (Advancing vaccines and immunization).
- Quinn, S. C., Jamison, A. M., An, J., Hancock, G. R., & Freimuth, V. S. (2019). Measuring vaccine hesitancy, confidence, trust and flu vaccine uptake: Results of a national survey of White and African American adults. *Vaccine*, 37(9), 1168–1173.
- Enkel, S. L., Attwell, K., Snelling, T. L., & Christian, H. E. (2018). 'Hesitant compliers': Qualitative analysis of concerned fully-vaccinating parents. *Vaccine*, 36(44), 6459–6463. <https://doi.org/10.1016/j.vaccine.2017.09.088> (Vaccine hesitancy: Towards a better understanding of drivers and barriers to awareness, acceptance and activation).
- Gagneur, A., Lemaître, T., Gosselin, V., Farrands, A., Carrier, N., Petit, G., Valiquette, L., & De Wals, P. (2018). A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: PromoVac study. *BMC Public Health*, 18(1), 811. <https://doi.org/10.1186/s12889-018-5724-y>



18. Brewer, N. T. (2021). What works to increase vaccination uptake. *Academic Pediatrics*, 21(4), S9–S16. <https://doi.org/10.1016/j.acap.2021.01.017>
19. Colorafi, K. J., & Evans, B. (2016). Qualitative descriptive methods in health science research. *HERD: Health Environments Research & Design Journal*, 9(4), 16–25. <https://doi.org/10.1177/1937586715614171>
20. Harris, P., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. <https://doi.org/10.1016/j.jbi.2008.08.010>
21. Harris, P. A., Taylor, R., Minor, B. L., Elliott, V., Fernandez, M., O'Neal, L., McLeod, L., Delacqua, G., Delacqua, F., Kirby, J., Duda, S. N., & REDCap Consortium. (2019). The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*, 95, 103208. <https://doi.org/10.1016/j.jbi.2019.103208>
22. Hamilton, C. M., Strader, L. C., Pratt, J. G., Maiese, D., Hendershot, T., Kwok, R. K., Hammond, J. A., Huggins, W., Jackman, D., Pan, H., Nettles, D. S., Beaty, T. H., Farrer, L. A., Kraft, P., Marazita, M. L., Ordovas, J. M., Pato, C. N., Spitz, M. R., Wagener, D., Williams, M., Junkins, H. A., Harlan, W. R., Ramos, E. M., & Haines, J. (2011). The PhenX toolkit: Get the most from your measures. *American Journal of Epidemiology*, 174(3), 253–260. <https://doi.org/10.1093/aje/kwr193>
23. Centers for Disease Control and Prevention. (2020a). Behavioral risk factor surveillance system prevalence & trends data. Centers for Disease Control and Prevention. Retrieved June 19, 2020, from <https://www.cdc.gov/brfss/brfssprevalence/index.html>
24. Quinn, S. C., Jamison, A., Freimuth, V. S., An, J., Hancock, G. R., & Musa, D. (2017). Exploring racial influences on flu vaccine attitudes and behavior: Results of a national survey of White and African American adults. *Vaccine*, 35(8), 1167–1174. <https://doi.org/10.1016/j.vaccine.2016.12.046>
25. MAXQDA. (1989–2015). MAXQDA, software for qualitative data analysis. In *VERBI software*. <http://www.maxqda.com/>
26. Hennink, M. M., Kaiser, B. N., & Marconi, V. C. (2017). Code saturation versus meaning saturation: How many interviews are enough? *Qualitative Health Research*, 27(4), 591–608. <https://doi.org/10.1177/1049732316665344>
27. Reich, J. (2021, 2021). If we want people to take the coronavirus vaccine, we need to treat them like consumers. *The Washington Post*. <https://www.washingtonpost.com/outlook/2021/01/16/vaccine-resistance-skepticism-consumer-thinking/files/5813/vaccine-resistance-skepticism-consumer-thinking.html>
28. Böhm, R., & Betsch, C. (2021). Prosocial vaccination. *Current Opinion in Psychology*. <https://doi.org/10.1016/j.copsyc.2021.08.010>
29. Jung, H., & Albarracín, D. (2021). Concerns for others increase the likelihood of vaccination against influenza and COVID-19 more in sparsely rather than densely populated areas. *Proceedings of the National Academy of Sciences*. <https://doi.org/10.1073/pnas.2007538118>
30. Thielmann, I., Spadaro, G., & Balliet, D. (2020). Personality and prosocial behavior: A theoretical framework and meta-analysis. *Psychological Bulletin*, 146(1), 30–90. <https://doi.org/10.1037/bul0000217>
31. Kirzinger, A., Sparks, G., & Brodie, M. (2021). KFF COVID-19 vaccine monitor: In their own words, six months later. *KFF*. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-in-their-own-words-six-months-later/files/5794/kff-covid-19-vaccine-monitor-in-their-own-words-six-months-later.html>
32. Brewer, N. T., Chapman, G. B., Rothman, A. J., Leask, J., & Kempe, A. (2017). Increasing vaccination: Putting psychological science into action. *Psychological Science in the Public Interest*, 18(3), 149–207. <https://doi.org/10.1177/1529100618760521>
33. Altman, D. (2021). Seeing others vaccinated may be the best cure for vaccine hesitancy. *KFF*. <https://www.kff.org/coronavirus-covid-19/perspective/seeing-others-vaccinated-may-be-the-best-cure-for-vaccine-hesitancy/files/5811/seeing-others-vaccinated-may-be-the-best-cure-for-vaccine-hesitancy.html>
34. Bolsewicz, K. T., Steffens, M. S., Bullivant, B., King, C., & Beard, F. (2021). “To protect myself, my friends, family, workmates and patients ... and to play my part”: COVID-19 Vaccination perceptions among health and aged care workers in New South Wales, Australia. *International Journal of Environmental Research and Public Health*, 18(17), 8954. <https://doi.org/10.3390/ijerph18178954>
35. Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology*, 26(2), 136–145. <https://doi.org/10.1037/0278-6133.26.2.136>
36. Marinthe, G., Brown, G., Delouée, S., & Jolley, D. (2020). Looking out for myself: Exploring the relationship between conspiracy mentality, perceived personal risk, and COVID-19 prevention measures. *British journal of health psychology*, 25(4), 957–980. <https://doi.org/10.1111/bjhp.12449>
37. Howard, J. (2021, 2021/07/27/). CDC updates guidance, recommends vaccinated people wear masks indoors in certain areas. *CNN*. <https://www.cnn.com/2021/07/27/health/cdc-mask-guidance-vaccinated-people-bn/index.html/files/5855/index.html>
38. Mulligan, K., & Harris, J. E. (2021). COVID-19 vaccination mandates for school and work are sound public policy.
39. Gostin, L. O., Salmon, D. A., & Larson, H. J. (2021). Mandating COVID-19 Vaccines. *JAMA*, 325(6), 532–533. <https://doi.org/10.1001/jama.2020.26553>
40. Rothstein, M. A., Parmet, W. E., & Reiss, D. R. (2021). Employer-mandated vaccination for COVID-19. *American Journal of Public Health*, 111(6), 1061–1064. <https://doi.org/10.2105/AJPH.2020.306166>
41. Böhm, R., Betsch, C., & Korn, L. (2016). Selfish-rational non-vaccination: Experimental evidence from an interactive vaccination game. *Journal of Economic Behavior & Organization*, 131, 183–195. <https://doi.org/10.1016/j.jebo.2015.11.008> (Experimental and behavioral economics of healthcare).
42. Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon and Schuster.
43. MacDonald, N. E. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine*, 33(34), 4161–4164. <https://doi.org/10.1016/j.vaccine.2015.04.036>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.