


Determinants of COVID-19 vaccine acceptability among older adults living with HIV

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Abstract

Since the emergency approval of several therapeutic coronavirus disease 2019 (COVID-19) vaccines in the United States, >500 million doses have been administered. However, there have been disparities in vaccine acceptability and uptake. We examined demographic, human immunodeficiency virus (HIV) disease, and psychosocial factors associated with COVID-19 vaccine acceptability in older adults (≥50 years) living with HIV in the Coachella Valley, California.

Participants completed a 1-time anonymous online questionnaire assessing their demographic (i.e., age, race, education, etc), HIV disease (i.e., viral suppression, years living with HIV, acquired immunodeficiency syndrome diagnosis), psychosocial (i.e., HIV-related stigma, personal mastery, depression, etc) characteristics, and COVID-19 vaccine acceptability. Respondents were offered an electronic \$20 United States dollar (USD) gift card for survey completion. Descriptive, univariable, and multivariable tests were conducted to analyze the data.

Between September 2020 and February 2021, 114 surveys were completed. Eighty-six (75%) agreed/strongly agreed with the COVID-19 vaccine acceptability statement that they saw no problem with receiving a COVID-19 vaccine if one became available. Among those who agreed/strongly agreed, the mean age was 62.2 years (standard deviation = 7.20); 86% self-identified as White; 95% male; 91% with more than high school education; and 31% with annual income <\$20,000 USD. Among respondents who disagreed/strongly disagreed, the mean age was 59.9 years (standard deviation = 4.85); 50% self-identified as White; 50% male; 64% with more than high school education; and 4% with annual income <\$20,000 USD. In the univariable analyses, those who disagreed/strongly disagreed with the COVID-19 vaccine acceptability statement were significantly more likely to be living with HIV for fewer years, experiencing higher levels of HIV-related stigma and depression, and with lower levels of personal mastery. In the multivariable logistic regression model, self-identification as female vs male and unemployed vs employed was significantly associated with decreased COVID-19 vaccine acceptability (odds ratio = 0.09, 95% confidence interval: 0.01–0.71 and odds ratio = 0.08, 95% confidence interval: 0.01–0.70 respectively), adjusting for ethnicity, marital status, education, disability, years living with HIV, HIV-related stigma, and depression.

Additional studies are needed to understand vaccine-related decision-making among older adults living with HIV. Programmatic efforts may also be necessary to disseminate accurate information/resources about COVID-19 vaccines to those with more recent HIV diagnoses, experiencing HIV-related stigma and depression, with lower levels of personal mastery, and facing socioeconomic disparities.

Abbreviations: AIDS = acquired immunodeficiency syndrome, ARV = antiretroviral, COVID-19 = coronavirus disease 2019, HIV = human immunodeficiency virus, OALWH = older adults living with HIV, PLWH = people living with HIV, SARS-CoV-2 = severe acute respiratory syndrome coronavirus-2, SD = standard deviation, USD = United States dollar.

Keywords: COVID-19 vaccine, older adults living with HIV, vaccine acceptability

1. Introduction

In March of 2020, the World Health Organization declared the outbreak of a novel type of coronavirus, severe acute

respiratory syndrome coronavirus-2 (SARS-CoV-2), that causes the coronavirus disease 2019 (COVID-19) respiratory disease, a global pandemic. To date, >500 million people have been infected with SARS-CoV-2 worldwide and over 6 million

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have died.^[1] Since the advent of the pandemic, in excess of 80 million people have been infected with SARS-CoV-2 in the United States and >900,000 have died from COVID-19-related complications.^[2] Older age, chronic lung disease, diabetes, obesity, and human immunodeficiency virus (HIV) have been identified as some of the possible risk factors for severe COVID-19 illness.^[3] The specific contribution of HIV to COVID-19 is underexplored and data on the impact of COVID-19 disease on clinical outcomes among people living with HIV (PLWH) are limited.

Early pandemic data suggested that PLWH were not at an increased risk for SARS-CoV-2 infection and COVID-19 disease.^[4] However, most recent data indicate that PLWH may be at increased risk of contracting SARS-CoV-2, developing complications, and dying from severe COVID-19 disease. A systematic review and meta-analysis of 22 studies that included epidemiological data collected from across North America, Africa, Europe, and Asia revealed that PLWH were at higher risk for SARS-CoV-2 infection and mortality from COVID-19 disease.^[5] Similarly, a cohort study of COVID-19 outcomes among 2988 PLWH in New York State found that those living with HIV relative to those without an HIV diagnosis were more likely to receive a COVID-19 diagnosis, be hospitalized, and die in-hospital from the disease.^[6] In the same study, hospitalization risk increased with HIV disease progression and among those who were not virally suppressed.^[6]

To combat the current COVID-19 pandemic in the United States, the US Food and Drug Administration approved the distribution of several therapeutic vaccines, including Pfizer BioNTech, Moderna, and Johnson and Johnson. To date, >500 million vaccine doses have been administered and this number continues to climb.^[7] While increases in vaccine administration are encouraging, there have been significant disparities in the delivery and uptake of the COVID-19 vaccines in populations already facing inequalities. In California, 21% of vaccinations were administered to Latinx, even though they comprised 55% of cases, 46% of deaths, and 40% of the total state population.^[8] Similarly, African Americans received 31% of vaccinations in the District of Columbia even though they made up 36% of cases, 76% of deaths, and 46% of the total population.^[8] Latinx and African Americans have also demonstrated high levels of COVID-19 vaccine hesitancy. A national panel survey by the National Opinion Research Center of 1056 US adults found that African Americans and Latinx respondents were significantly less likely to report intention to receive the COVID-19 vaccine compared to other groups.^[9] COVID-19 vaccine hesitancy has been attributed to a variety of factors, including racial inequalities in healthcare, distrust in the government, and concerns about efficacy and side effects.^[10]

A very limited number of studies have reported on the factors associated with COVID-19 vaccine acceptability in the United States. A study of 672 US adults found that males, older adults, Asians, and college and/or graduate degree holders were more likely to accept the COVID-19 vaccines.^[11] A randomized controlled study of antiretroviral (ARV) medication adherence in 101 African Americans in Los Angeles County found that the vast majority (97%) endorsed at least 1 COVID-19 mistrust belief, and more than half endorsed at least 1 COVID-19 vaccine or treatment hesitancy belief.^[12]

To contribute to the existing COVID-19-related vaccine literature, as well as to the literature pertaining to PLWH, we analyzed data from a cross-sectional study of HIV-related stigma, social support, depression, personal mastery, mindfulness, and ageism, and COVID-19 vaccine acceptability among older adults living with HIV (OALWH) in Coachella Valley, California. Older adults (aged 50 years and older) comprise more than half of all people living with HIV in the United States.^[13] Moreover, Coachella Valley is home to a large proportion of PLWH in Riverside County, the fourth largest county in California, and nearly a quarter of PLWH who live in this region are older adults.^[14]

The aim of the current study was to estimate the prevalence of COVID-19 vaccine acceptability among OALWH in the Coachella Valley, California, and to examine the association of COVID-19 vaccine acceptability with demographic, HIV disease, and psychosocial factors in this segment of the population.

2. Methods

2.1. Ethical considerations

This study was approved by the Health Sciences Campus Institutional Review Board of the University of Southern California. Personal identifiable information was not collected, and each respondent was offered an electronic \$20 United States dollar gift card for participation.

2.2. Recruitment and data collection

To be eligible for the current study, prospective participants had to be at least 50 years of age, living with HIV, and residing in Coachella Valley, California. An electronic recruitment flyer was developed in collaboration with the Stakeholder Advisory Board of the HIV + Aging Research Project Palm Springs, a community-based organization located in Palm Springs, California, consisting of healthcare providers, PLWH, advocates, and academic researchers who work together to develop and implement strategies to assist OALWH to thrive despite their chronic HIV infection. The flyer was disseminated to locally acquired immunodeficiency syndrome (AIDS) service organizations and partners. It contained a link and a quick response code to an informed consent form explaining the purpose of the study, study procedures, compensation, volunteer nature of study participation, risks and benefits, privacy and confidentiality, and investigator and institutional review board contact information. If prospective participants concurred with the study requirements and clicked “agree” after reading and acknowledging the study informed consent form, they were directed to a 1-time anonymous online survey hosted by Qualtrics. Qualtrics is a web-based platform that supports the administration, management, and analysis of online questionnaires.

2.3. Explanatory variables

The online survey queried respondents on their demographic characteristics, including age, race, ethnicity, gender identity, sexual orientation, marital status, living arrangement, annual household income, education, employment status, and physical disability. HIV disease factors included in the survey were years living with HIV, history of AIDS diagnosis, and viral load. Psychosocial survey items encompassed social support, current depression, mindfulness (being present in the moment), HIV-related stigma, ageism (age-related discrimination), and personal mastery (perceived control over life events).

Social support was measured by the modified 8-item Medical Outcomes Study Social Support Survey, a validated scale that appraises emotional and instrumental social support.^[15] Response categories for each scale item were “none of the time,” “a little bit of the time,” “some of the time,” “most of the time,” and “all of the time” on a 5-point Likert scale. The score range for the Medical Outcomes Study Social Support Survey scale was 8 to 40, with higher scores indicating higher levels of emotional and instrumental social support. Depression was assessed with the 8-item Patient Health Questionnaire-8 depression scale, a widely utilized and validated diagnostic tool that appraises current depression.^[16] Response categories included “not at all,” “several days,” “more than half the days,” and “nearly every day” on a 4-point Likert scale. The score range of the Patient Health Questionnaire-8 scale was 0 to 24, with higher scores indicating higher levels of current depression.

Mindfulness was evaluated with the Mindful Attention Awareness Scale,¹¹⁷ a 15-item validated questionnaire designed to measure open/receptive awareness of and attention to what is taking place in the present. Response categories included “almost always,” “very frequently,” “somewhat frequently,” “somewhat infrequently,” “very infrequently,” and “almost never” on a 6-point Likert scale. The Mindful Attention Awareness Scale scores ranged between 1 and 6, with higher scores indicating higher levels of dispositional mindfulness (based on the mean of each scale item). HIV-related stigma was assessed with the 12-item psychometrically abridged version of the Berger HIV Scale, which appraises 4 domains of HIV-related stigma, including personalized stigma, disclosure concerns, concerns with public attitudes, and negative self-image.¹¹⁸ Response categories included “strongly disagree,” “disagree,” “agree,” and “strongly agree” on a 4-point Likert scale. The score range for the HIV-related stigma scale was 12 to 48, with higher scores indicating higher levels of stigma.

Ageism was assessed with the 20-item Palmore Ageism Survey, which appraises stereotypes, attitudes, and personal and institutional discrimination.¹¹⁹ Response categories included “never,” “once,” and “more than once” on a 3-point Likert scale. Scores for the ageism scale ranged from 0 to 40, with higher scores indicating higher levels of age-related discrimination. Personal mastery was assessed with the 7-item Pearlin Mastery Scale, which measures the extent to which a person views their life experiences as being under their personal control as opposed to acquiescently determined.¹²⁰ Response categories included “strongly disagree,” “disagree,” “agree,” and “strongly agree” on a 4-point Likert scale. The score range for the personal mastery scale was 7 to 28, with higher scores indicating higher levels of perceived control over life events.

2.4. Outcome variable

The outcome variable of interest was COVID-19 vaccine acceptability, and it was appraised with 1 survey item, which was developed in collaboration with the HIV + Aging Research Project Palm Springs Stakeholder Advisory Board. Participants were asked to indicate their level of agreement with the following statement: “I see no problem with receiving a COVID-19 vaccine if 1 became available.” Response categories included “strongly disagree,” “disagree,” “agree,” and “strongly agree” on a 4-point Likert scale.

2.5. Statistical analysis

To describe the characteristics of the study population, we used descriptive statistics including means, medians, standard deviations (SD), proportions, and frequencies. We then dichotomized the COVID-19 vaccine acceptability outcome variable with responses disagree/strongly disagree coded as “0” and responses agree/strongly agree coded as “1.” This dichotomization methodology was adapted from other investigators who utilized a similar COVID-19 vaccine acceptability survey item and the same 4-point Likert scale response categories.¹¹¹

To assess the univariable relationship between the COVID-19 vaccine acceptability outcome variable and demographic, HIV disease, and psychosocial explanatory variables, we used Fisher exact tests for categorical variables and *t* tests for continuous variables. Explanatory variables that showed statistical significance in the univariable analyses were considered for the multivariable logistic regression model. Analyses were then performed to evaluate the associations between some of the explanatory variables (i.e., sexual orientation and gender identity, race and ethnicity, marital status and living situation, employment status and income, HIV-related stigma and depression, HIV-related stigma and personal mastery, depression and personal mastery). Fisher exact tests were used to assess the

associations between categorical explanatory variables and linear regressions for the associations between continuous explanatory variables. Explanatory variables that were statistically significantly associated with one another were assessed separately for model fit based on the Akaike Information Criterion (Fig. 1). Statistical significance was evaluated at $P < .05$ level and data were analyzed using RStudio version 4.1.0.

3. Results

Between October 2020 and February 2021, 114 OALWH from Coachella Valley, California, completed the online study survey. Eighty-six or 75% of respondents agreed/strongly agreed with the COVID-19 vaccine acceptability survey statement in that they saw no problem with receiving a COVID-19 vaccine if 1 became available and 28 (25%) disagreed/strongly disagreed with the same statement. Table 1 lists the demographic, HIV disease, and psychosocial characteristics of participants who responded agree/strongly agree to the COVID-19 vaccine acceptability survey item, as well as those who responded disagree/strongly disagree.

Among those who agreed/strongly agreed with the COVID-19 vaccine acceptability survey item, the mean age was 62.2 years (SD = 7.20); 86% self-identified as White; 95% male; 31% with annual household income <\$20,000; and 91% with more than high school education. Ninety percent were virally suppressed and 62% had a history of AIDS diagnosis. Among those who disagreed/strongly disagreed with the COVID-19 vaccine acceptability survey item, the mean age was 59.9 (SD = 4.85); 50% self-identified as White; 50% Male; 4% with annual household income <\$20,000; and 64% with > high school education. Seventy-five percent were virally suppressed and 61% had a history of AIDS diagnosis. Additionally, those who disagreed/strongly disagreed with the COVID-19 vaccine acceptability survey item compared to those who agreed/strongly agreed had been living with HIV for a shorter period of time (15.5 years vs 25.4, $P < .001$), reported significantly higher levels of HIV-related stigma (30.0 vs 26.8, $P = .03$) and depression (9.9 vs 7.7, $P = .04$) and significantly lower levels of personal mastery (17.8 vs 20.3, $P = .002$). There were also statistically significant differences between the 2 groups in terms of race, ethnicity, gender identification, sexual orientation, marital status, living arrangement, annual household income, education, employment status, and physical disability (Table 1).

In the univariable analyses, explanatory variables race, ethnicity, gender identification, sexual orientation, marital status, living arrangement, annual household income, education, employment, disability, years living with HIV, HIV-related stigma, depression, and personal mastery were statistically significantly associated with the COVID-19 vaccine acceptability outcome variable ($P < .05$), and were considered for the multivariable logistic regression model. Variables for sexual orientation, race, income, living arrangement, and personal mastery were ultimately removed from the model based on their statistically significant associations with other explanatory variables and model fitting using Akaike Information Criterion scores. The final model included explanatory variables ethnicity, gender identification, marital status, employment status, education, disability, years living with HIV, HIV-related stigma, and depression (Fig. 1).

In the final adjusted multivariable logistic regression model, gender identification as female vs male and self-identification as unemployed vs employed were statistically significantly associated with decreased COVID-19 vaccine acceptability (odds ratio = .09, 95% confidence interval: 0.01–0.71 and odds ratio = 0.08, 95% confidence interval: 0.01–0.70 respectively), adjusting for ethnicity, marital status, education, disability, years living with HIV, HIV-related stigma, and depression (Table 2).

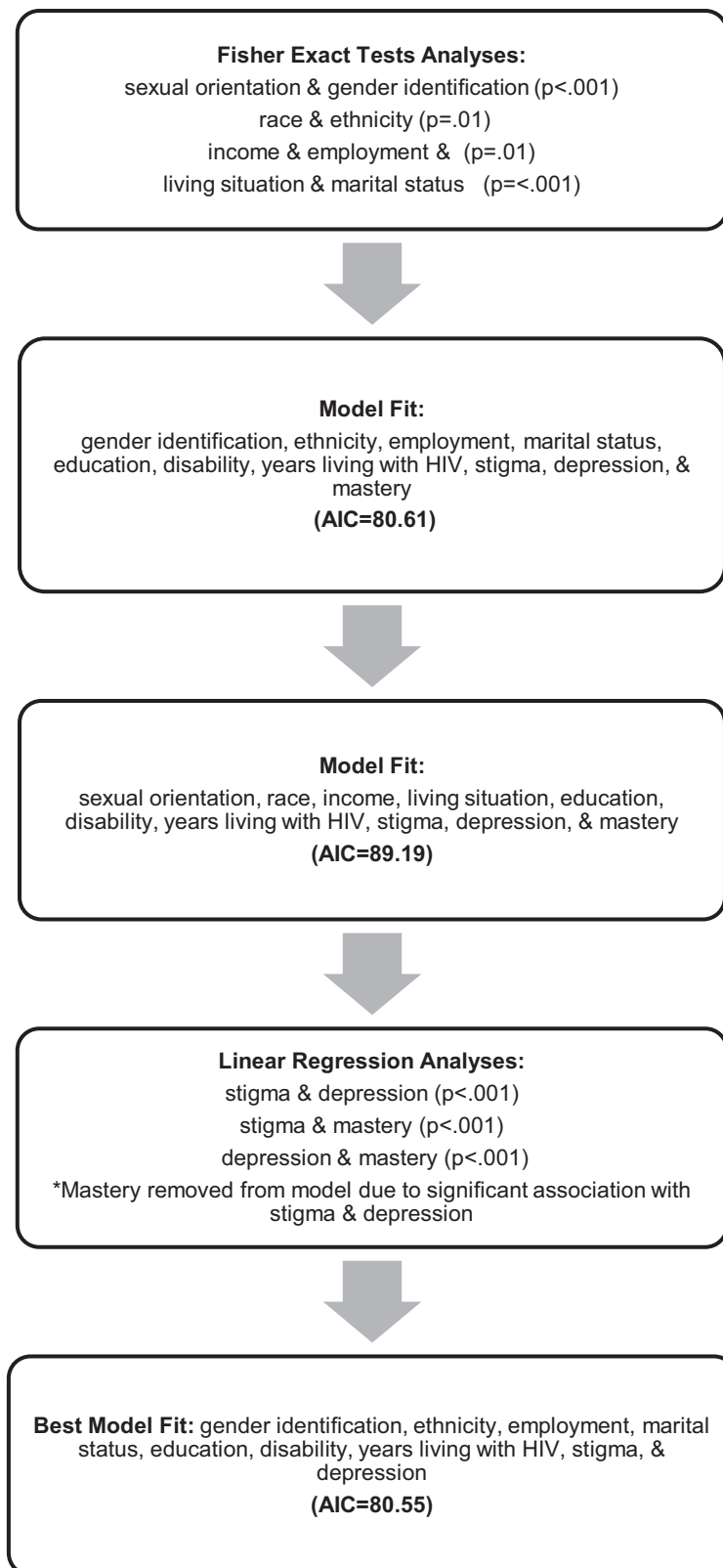


Figure 1. Multivariable logistic regression model selection process. AIC = Akaike Information Criterion.

4. Discussion

In this study, we evaluated demographic, HIV disease, and psychosocial determinants of COVID-19 vaccine acceptability among OALWH in Coachella Valley, California. There were several key findings.

First, most of the study sample (75%) agreed/strongly agreed that they saw no problem receiving the COVID-19 vaccine if 1 became available, indicating high overall vaccine acceptability in this population. This finding was expected as older adults, particularly those with preexisting conditions,

Table 1
COVID-19 vaccine acceptability, demographic, HIV disease, and psychosocial characteristics of the study population.

Variable	COVID-19 vaccine acceptability (agree/strongly agree)	COVID-19 vaccine acceptability (disagree/strongly disagree)	P value
	86 (75%)	28 (25%)	
Age* (mean = 61.62; median = 61.0; SD = 6.70)	Mean = 62.22 (SD = 7.20)	Mean = 59.86 (SD = 4.85)	.05
Race†	N = 86	N = 28	<.001
White	74 (86%)	14 (50%)	
Black/African American	7 (8%)	7 (25%)	
Mixed	4 (5%)	3 (11%)	
Other	1 (1%)	4 (14%)	
Ethnicity†	N = 80	N = 27	
Non-Hispanic/Latino	73 (91%)	20 (74%)	.04
Hispanic/Latino	7 (9%)	7 (26%)	
Gender identification†	N = 85	N = 28	
Male	81 (95%)	14 (50%)	<.001
Female	4 (5%)	13 (46%)	
Other	0 (0%)	1 (4%)	
Sexual orientation†	N = 86	N = 28	.002
Gay or lesbian	77 (90%)	17 (61%)	
Heterosexual/straight	7 (8%)	6 (21%)	
Other	2 (2%)	5 (18%)	
Marital status†	N = 86	N = 28	
Married/domestic partner	42 (49%)	18 (64%)	.03
Single/never married	32 (37%)	3 (11%)	
Divorced/separated	7 (8%)	3 (11%)	
Widowed	5 (6%)	4 (14%)	
Living arrangement†	N = 86	N = 28	.03
Live with partner/spouse	41 (48%)	16 (57%)	
Live alone	33 (38%)	4 (14%)	
Live with others	12 (14%)	8 (29%)	
Income†	N = 84	N = 28	<.001
<\$20,000	26 (31%)	1 (4%)	
\$20,000–\$49,999	22 (26%)	18 (64%)	
\$50,000–\$74,999	12 (14%)	5 (18%)	
>\$75,000	24 (29%)	4 (14%)	
Education†	N = 86	N = 28	<.001
Less than high school	0 (0%)	4 (14%)	
High school	8 (9%)	6 (2%)	
More than high school	78 (91%)	18 (64%)	
Employment status†	N = 86	N = 28	<.001
Employed	30 (35%)	13 (46%)	
Retired	35 (41%)	3 (11%)	
Unable to work	16 (19%)	1 (4%)	
Unemployed	5 (6%)	11 (39%)	
Disability†	N = 85	N = 28	.001
No	46 (54%)	24 (86%)	
Yes	35 (41%)	2 (7%)	
Declined to answer	4 (5%)	2 (7%)	
Undetectable viral load†	N = 86	N = 28	.07
Yes	77 (90%)	21 (75%)	
No	9 (10%)	7 (25%)	
History of AIDS diagnosis†	N = 86	N = 28	>.99
Yes	53 (62%)	17 (61%)	
No	33 (38%)	11 (39%)	
Years living with HIV* (mean = 23.04; median = 26.50; SD = 10.33)	Mean = 25.35 (SD = 9.69)	Mean = 15.48 (SD = 8.90)	<.001
HIV-related stigma* (mean = 27.57; median = 28.0; SD = 6.63)	Mean = 26.76 (SD = 6.71)	Mean = 30.04 (SD = 5.69)	.02
Social support* (mean = 25.66; median = 25.0; SD = 8.41)	Mean = 26.12 (SD = 9.14)	Mean = 24.22 (SD = 5.73)	.20
Depression* (mean = 8.29; median = 9.0; SD = 4.77)	Mean = 7.74 (SD = 4.98)	Mean = 9.86 (SD = 3.76)	.02
Mindfulness* (mean = 3.94; median = 3.93; SD = 0.88)	Mean = 4.02 (SD = 0.89)	Mean = 3.72 (SD = 0.82)	.10
Mastery* (mean = 19.70; median = 19.0; SD = 3.88)	Mean = 20.31 (SD = 3.92)	Mean = 17.75 (SD = 3.19)	.001
Ageism* (mean = 12.77; median = 11.00; SD = 8.13)	Mean = 12.36 (SD = 8.31)	Mean = 13.89 (SD = 7.89)	.39

AIDS = acquired immunodeficiency syndrome, COVID-19 = coronavirus disease 2019, HIV = human immunodeficiency virus, SD = standard deviation.

*Univariable association conducted via *t* tests.

†Univariable association conducted via Fisher exact tests.

have been shown to be at higher risk of contracting SARS-CoV-2, developing complications, and dying of COVID-19 disease.^[3]

Second, participants who disagreed/strongly disagreed with the COVID-19 acceptability survey item were living with HIV

for fewer years compared to participants who agreed/strongly agreed with the same survey item. This finding was supported by 2 US-based studies of PLWH, which found higher rates of COVID-19 vaccine hesitancy among participants reporting fewer years since HIV diagnosis.^[12,21] It is possible that living

Table 2
Multivariable logistic regression analyses for the association of demographic, HIV disease, and psychosocial variables with COVID-19 vaccine acceptability.

Variable	OR	95% CI	P value
Ethnicity			
Hispanic/Latino	1.54	0.07–56.48	.80
Gender			
Other	NA	NA	>.99
Female	0.09	0.01–0.71	.03***
Marital status			
Divorced/separated	1.65	0.09–68.97	.76
Single/never married	4.74	0.43–98.08	.25
Widowed	2.65	0.01–7.73	.41
Education			
Less than high school	N/A	NA	>.99
High school	0.45	0.03–7.03	.56
Employment status			
Retired	10.01	0.79–531.59	.14
Unable to work	0.32	0.01–15.34	.52
Unemployed	0.08	0.01–0.70	.03***
Disability			
Decline to answer	NA	NA	>.99
Yes	4.80	0.27–206.63	.32
Years Living with HIV	1.05	0.95–1.17	.33
HIV-related stigma	1.02	0.87–1.22	.81
Depression	0.86	0.64–1.08	.24

COVID-19 vaccine acceptability coding: agree/strongly agree = "1"; disagree/strongly disagree = "0." CI = confidence interval, COVID-19 = coronavirus disease 2019, HIV = human immunodeficiency virus, NA = not available, OR = odds ratio.

***P < .05.

with HIV for a longer period has made it possible for some OALWH to enhance their health-seeking behaviors and develop strategies to maintain their health long-term, despite chronic HIV infection.

Third, respondents who disagreed/strongly disagreed with the COVID-19 vaccine acceptability survey item reported significantly higher levels of HIV-related stigma compared to those who agreed/strongly agreed with the same survey item. Though studies linking COVID-19 vaccine hesitancy to HIV-related stigma are currently unavailable, it is conceivable that stigma, particularly internalized HIV-related stigma, may be compromising health-conscious decision-making processes among some OALWH. Higher levels of internalized HIV-related stigma, defined as stigma that is endorsed and integrated into the self-definition, have been linked to innumerable adverse outcomes, including poor engagement in HIV treatment and care, and reduced adherence to ARV medications.^[22]

Fourth, respondents who disagreed/strongly disagreed with the COVID-19 vaccine acceptability survey item in this study also reported significantly higher levels of depression. While the association between COVID-19 vaccine hesitancy and depression has not yet been established among PLWH and OALWH, one study of the general population found that those with moderately or severe depression are more likely to be undecided about receiving the vaccine.^[23] Furthermore, the existing evidence suggests that higher levels of depression among PLWH adversely impact outcomes across the HIV treatment cascade.^[24]

Fifth, those reporting that they disagreed/strongly disagreed with the COVID-19 vaccine acceptability survey item also reported significantly lower levels of personal mastery. Personal mastery is a therapeutic internal resource that is associated with psychological health-related quality of life and has been shown to reduce distress associated with HIV-related stigma among OALWH.^[25–27] Therefore, it is possible that OALWH with lower levels of personal mastery, who may also be experiencing HIV-related stigma and depression, are less inclined to receive the COVID-19 vaccine.

Sixth, we found a statistically significant relationship between gender identification as female and decreased COVID-19 vaccine acceptability. This finding was congruent with other studies of the general population in the United States and abroad.^[11,28] Additionally, we observed a statistically significant relationship between unemployment and decreased COVID-19 vaccine acceptability. This finding was supported by a US-based study of the general population conducted by Malik et al,^[11] but not by a study conducted in Jordan by El-Elimat et al,^[28] which found higher vaccine acceptability among those who were unemployed vs employed. Decreased vaccine acceptability among OALWH who self-identified as female and among those who self-reported being unemployed in this study may be due to intersectional COVID-19-related hardships (i.e., reduced social support, loss of employment, and inadequate health insurance) and subsequent decreased access to critical vaccine-related information. It is also important to note here that among respondents of this study who self-identified as female (N = 17), 6 (35%) reported being unemployed at the time of survey completion. Among those who self-identified as male (N = 96), 10 (10%) reported being unemployed at the time of survey completion. Higher percentage of unemployment among females vs males may be attributed to COVID-19-related reductions in employment opportunities, pandemic-related increases in family demands, and gender-based discrimination.

Our study findings have implications for future research. COVID-19 vaccine acceptability and views on vaccines in OALWH are currently understudied. Given that COVID-19 has had a devastating impact on older adults and the possibility of future pandemics negatively impacting this vulnerable population group, it is important to understand how vaccine acceptability decisions are made and if there are avenues for therapeutic interventions. Moreover, robust programmatic efforts may be necessary to disseminate accurate COVID-19 vaccine-related information and resources to historically marginalized groups (i.e., women, Hispanics/Latinos, Blacks/African Americans) and underresourced communities facing a multitude of disparities, including unemployment, low educational attainment, and low income. Additional studies may also be needed to assess COVID-19 vaccine hesitancy among PLWH with more recent HIV diagnoses, those experiencing internalized HIV-related stigma and depression, and with lower levels of personal mastery. Such studies may play an important role in informing targeted clinical care practices, care services delivery, and optimal patient management.

There are several limitations to consider when interpreting the findings of this study. First, the cross-sectional design of the current study precludes causal inferences from being made. Second, the generalizability of the study results is limited by the characteristics of the population, which included a small sample of OALWH from Coachella Valley, California with presumed access to a computer/smart phone to complete the study survey, undetectable viral load, White, non-Hispanic/Latino, male, and with high levels of education. COVID-19 vaccine acceptability may vary vastly in OALWH who identify as ethnic and gender minorities, experience significant ARV adherence barriers, are socioeconomically disadvantaged, with limited access to electronic resources, and who do not live in a well-integrated community/environment. Third, assessment of COVID-19 acceptability in this study was done earlier in the pandemic, during which there was limited information about COVID-19 vaccine efficacy and availability. Participant responses would likely differ if measured at the present time due to increased vaccine promotion campaigns.

5. Conclusions

The current study assessed demographic, HIV disease, and psychosocial factors associated with COVID-19 vaccine

acceptability among OALWH in the Coachella Valley, California. The study found an overall high COVID-19 vaccine acceptability. Additionally, lower COVID-19 vaccine acceptability was observed among respondents living with HIV for fewer years, experiencing higher levels of HIV-related stigma and depression, and lower levels of personal mastery. Furthermore, gender identification as female and self-identification as unemployed were associated with decreased COVID-19 vaccine acceptability. Further work is needed to understand vaccine-related decision-making among OALWH, as they may inform evidence-based interventions and clinical care to improve health outcomes.

Author contributions

Dr. Mariam Davtyan, Jeff Taylor, Christopher Christensen, Dr. Annie L. Nguyen, & Dr. Brandon J. Brown contributed to the study conception and design. Material preparation and data collection were conducted by Dr. Mariam Davtyan. Statistical analyses were performed by Dr. Mariam Davtyan and Dr. Toinette Frederick. The first draft of the manuscript was written by Dr. Mariam Davtyan and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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