IDENTIFYING COVID-19 VACCINE HESITANCY MOTIVATORS FOR PEOPLE WHO INJECT DRUGS IN LANE COUNTY

by

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A THESIS

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People who use injection drugs are at greater risk of mortality from vaccine-preventable diseases, but express higher levels of vaccine hesitancy than the general public. In the context of the COVID-19 pandemic, identifying common vaccine hesitancy motivators among people who inject drugs (PWID) is key to mitigating the mortality rate for the high-risk population. However, very little research has used qualitative methods to examine why PWID are often more vaccine hesitant. This thesis used 41 semi-structured interviews and 260 quantitative surveys with people who use drugs in Lane County to identify the most influential motivators of vaccine hesitancy. The interviews and surveys demonstrated a consistent connection between poor social determinants of health and reduced willingness to receive a COVID-19 vaccine. Using these findings, this thesis proposes a new model for assessing vaccine hesitancy among PWID that is directly informed by the actual experiences shared by collaborators in this project. Moreover, the findings of this thesis provide evidence for the need to address systemic barriers for marginalized communities in healthcare that decrease accessibility, trust, and confidence in health services.

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Terms and Abbreviations

Term	Definition
Breakthrough Infections	Cases of a vaccine-preventable disease among people who are fully vaccinated.
COVID-19	An infectious respiratory illness that is caused by the SARS-CoV-2 virus.
Hard-to-reach Population	A community in which vaccination rates are lower than expected due to geographical, cultural, or social barriers to care.
Harm Reduction	An evidence-based system of practices designed to reduce the negative impacts associated with drug use. It emphasizes judgment-free and holistic approaches to providing support for people who use drugs.
High-risk Population	A population that is more susceptible to severe forms of illness or death. These populations include young children, older adults, people with substance use disorders, and people with autoimmune diseases.
HIV Alliance	An organization founded in Eugene, Oregon that serves people living with HIV/AIDS and provides resources to prevent new HIV infections.
Injection Drugs	Drugs which are taken via a hypodermic needle. Colloquially, this term typically refers to illicit drugs including heroin, cocaine, and methamphetamines.
NSDUH	National Survey on Drug Use and Health
PUA	Pandemic Unemployment Assistance
PWID	People Who Inject Drugs
RADX-UP	Rapid Acceleration of Diagnostics of Underserved Populations
SAGE Working Group	The Strategic Advisory Group of Experts, which serves as the primary advisory group for the World Health Organization for topics related to vaccines and immunization.
SARS-COV-2	The virus that causes COVID-19. It belongs to a family of diseases called coronaviruses and was originally observed infecting people in late 2019.
Social Determinants of Health	Conditions of an individual's environment that affect their health. This includes things like socioeconomic status, education, housing status, and access to healthcare services.

Syringe Exchange	A harm reduction practice that enables safe disposal of used syringes and access to safer injection supplies including sterile syringes, bandages, sterile water, and cotton swabs.
Vaccine	A substance that provides immunity against one or more diseases by stimulating the body’s ability to produce relevant antibodies to prevent infection.
Vaccine Hesitancy	An individual’s level of reluctance to receive a vaccine, even when vaccines are accessible. Vaccine hesitancy exists on a gradient that can change over time and across types of diseases or vaccines.
Vaccine-preventable Disease	Diseases for which an effective vaccine has been created. This includes diseases like Measles, Smallpox, and COVID-19.
WHO	World Health Organization

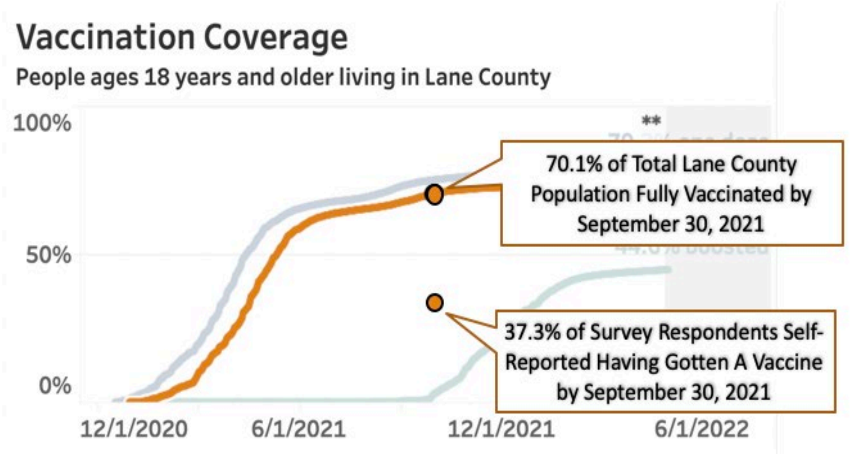
CHAPTER 1: Introduction

The rapid onset of the COVID-19 pandemic following its initial identification in December of 2019 launched the world into an unparalleled global health response. By September of 2021, the COVID-19 pandemic had surpassed the 1918 flu as the deadliest pandemic in United States history (McKeever, 2020). However, the pandemic also demonstrated the massive advances modern medicine has made in the fight against infectious disease, with highly effective COVID-19 vaccines becoming widely distributed in the US just over a year later, in January of 2021. Yet, with the expedited creation and production of these vaccines came high levels of hesitancy to receive vaccinations among some people, many of whom voiced fears that the vaccines were ineffective, unsafe, or untested.

Vaccine hesitancy is not unique to COVID-19. Indeed, the World Health Organization (WHO) highlighted vaccine hesitancy as one of the most pressing concerns for global health a year before the first cases of COVID-19 emerged in 2019 (WHO, 2019). With that said, the global relevance and contemporary nature of COVID-19 vaccine initiatives provide an invaluable opportunity to research how and why people decide to accept, reject, or delay getting a vaccine.

This project's primary focus is to understand what factors contribute to a person's vaccine decision. To answer this question, it examines COVID-19 vaccine hesitancy for people who inject drugs (PWID), a population that is both more at risk of death from COVID-19 and that has exhibited high levels of vaccine hesitancy for past vaccinations. National hospital analyses have established that people with substance use disorders represent an incommensurate number of COVID-19 cases, breakthrough infections, and deaths in the United States (Wang et al., 2021, Wang et al., 2022). Furthermore, preliminary findings from this study showed a large disparity in vaccination rates among PWID in Lane County relative to the entire Lane County population. The figure below demonstrates a 37-percentage-point gap between the estimated vaccination rates in Lane County as a whole and the self-reported vaccination status of 260 PWID survey respondents by September 30, 2021. The gap illustrated on this graph cannot only be attributed to higher vaccine hesitancy, as there are also concerns about differences in accessibility to consider. However, the surveys used in this study were conducted in a period when the COVID-19 vaccine was readily available (often at the locations where these surveys were conducted) and free of charge. This suggests that vaccine hesitancy explains some portion of the large disparity in vaccination rates.

Figure 1: Estimated Vaccination Rates in Lane County and Among PWID Respondents



Vaccination Coverage

People ages 18 years and older living in Lane County

70.1% of Total Lane County Population Fully Vaccinated by September 30, 2021

37.3% of Survey Respondents Self-Reported Having Gotten A Vaccine by September 30, 2021

OHA. (2022). *Oregon's COVID-19 Data Dashboards*. Tableau Public. https://public.tableau.com/app/profile/oregon.health.authority.covid.19/viz/OregonsCOVID-19DataDashboards-TableofContents/TableofContentsStatewide

Thus, the data show that PWID are simultaneously more likely to contract and pass from COVID-19 and less likely to access available vaccination services. As such, PWID must be a key demographic to target with vaccine outreach programs. Additionally, given their frequently low access to traditional healthcare services and their frequent marginalization and dehumanization within their communities, PWID have already been established as a hard-to-reach population for other vaccinations (Ozawa et al., 2019). This is reflected in past research that shows that vaccination rates for Hepatitis A and B and Influenza were lower among people with substance use disorders than for other members of the public (Campbell et al., 2006; McGregor et al., 2003; Price et al., 2021). Understanding vaccine hesitancy for PWID is important for the current pandemic response but also has further implications for current and future vaccine campaigns.

However, while there has been extensive research identifying the presence of vaccine hesitancy among PWID, very little research has incorporated qualitative methods to identify the underlying motivators for vaccine hesitancy. In other words, the issue of vaccine hesitancy among PWID has been identified but attempts to develop a deeper understanding of the issue are underdeveloped. This study fills this gap in the academic literature by incorporating the thoughts and sentiments of PWID to inform a new way of conceptualizing and addressing vaccine hesitancy.

Furthermore, given their status as both a hard-to-reach and a high-risk population, the issue of vaccine hesitancy for PWID must be understood as the culmination of public health and social justice issues. As this thesis will later explain in detail, attempts to mitigate vaccine hesitancy among PWID will only be effective if they are implemented in a way that addresses the underlying social motivators that influence vaccine hesitancy.

> BH: What are some reasons you've decided not to get vaccinated?
>
> HIV Alliance Client: Just, just being preoccupied, you know? Busy with other things that are more important to me at the time.
>
> BH: Like what?
>
> HIV Alliance Client: Just like daily activities… finding meals or a place to sleep. I can't afford to just veer off my path to come get it (Unvaccinated man, age 35).

The conversation above came from one of 41 interviews with PWID in Lane County that were conducted between July and September of 2021. This discussion, in particular, captured one of the key findings of this thesis; extenuating circumstances prompted by negative consequences associated with drug use affect an individual's desire or ability to get vaccinated. As the following chapters will show, these circumstances affect an individual's perception of diseases, their trust in vaccines and vaccine providers, and their ability to easily access vaccine services. The findings within these chapters demonstrate that existing vaccine hesitancy models accurately capture some of the common motivators for vaccine hesitancy but largely fail to consider how an individual's environment shapes their willingness to receive a vaccine. This suggests the need for a more specific and practical model for vaccine hesitancy, particularly for use among marginalized communities like PWID, who generally face greater barriers to healthcare than non-injection drug users.

Thus, one of the primary goals of this thesis is to develop a model of vaccine hesitancy that contextualizes vaccine hesitancy within the specific challenges that PWID face. The model emerged directly from the contributions of members of the PWID community and found 5Cs that affect vaccine decisions. The 5Cs model proposes that an individual's level of vaccine hesitancy is influenced by their *confidence* and *concern* in the vaccine, the *convenience* of vaccination services, potential *communication* barriers restricting education about the vaccine, and *community implications* of the disease and its vaccine. In addition to this model, the discussions with PWID found that efforts to reduce vaccine hesitancy should work in tandem with trusted community health organizations that have already worked with and established a strong relationship with the PWID community.

To explore the topic of vaccine hesitancy among PWID, this thesis employed a mixed-methods design that incorporated quantitative surveys and qualitative interviews that facilitated a more holistic understanding of how an individual's personal and environmental conditions affected their vaccine decisions. To ensure that analysis was conducted with the collaborators' best interests in mind, all research was conducted under the purview of a highly trusted healthcare organization that serves PWID in Lane County, HIV Alliance. This enabled the project to draw on the existing trust between HIV Alliance and its clients to facilitate a more comfortable interview environment for all contributors.

To assess COVID-19 vaccine hesitancy for PWID in Lane County, this thesis begins by providing greater detail on the methods and limitations of the research design. Next, it reviews and critiques relevant literature and theory that explain our current understanding of vaccine hesitancy. It also establishes a foundational understanding of the structural disadvantages that PWID face when they attempt to access healthcare resources.

The second chapter of this thesis presents the results and analysis that emerged directly from collaboration with HIV Alliance clients. This chapter is divided into two sections. The first uses the quantitative data from surveys to assess vaccine uptake among HIV Alliance clients and to establish what, if any, sociodemographic characteristics are correlated with reduced willingness to receive a vaccine. The second section then uses qualitative interviews conducted with HIV Alliance clients to identify the most frequently experienced and devastating effects of the COVID-19 pandemic for PWID in Lane County. This section also explains the direct and mutually destructive connection between worse living situations and worse health outcomes.

The third and final chapter of this thesis draws on the experiences of PWID shared in previous chapters to propose adaptations and additions to the predominant existing model for assessing vaccine hesitancy. Ultimately, it advocates for a greater degree of specificity when modeling vaccine hesitancy to better reflect the issues most relevant to the community the model is intended for. For this project, this means that the model must align with the sentiments that were shared directly by PWID in the Lane County community. It also discusses the implications that the findings reported in this thesis may have for the continued efforts to vaccinate HIV Alliance clients against COVID-19 and for future hypothetical public health campaigns. Finally, it identifies future directions for research that will further benefit vaccine campaigns that specifically target PWID and the implications of this study for other marginalized communities in healthcare.

Methods and Limitations

This study was designed within the transformative framework for research methodology construction. Transformative methodology focuses on generating research that provides actionable results to be used for identifying and addressing social inequities, particularly for marginalized communities in research. Studies within the transformative framework value participant feedback and collaboration highly and seek to empower individuals who participate (Creswell & Poth, 2016). Given that this project's central focus is drawing connections between structural barriers in healthcare and vaccine hesitancy among PWID, transformative methodology closely aligns with the goals of this thesis.

Within the transformative framework, this study employed a convergent mixed-methods design. Convergent designs require that quantitative survey data and qualitative interview data are collected and analyzed simultaneously and independently before being merged. This form of mixed-methods pays specific mind to the interactions between the two data types, especially where findings are in consonance and at odds. A mixed-methods approach was chosen for this project as it allowed for a more complete analysis of the systemic inequity that PWID have dealt with during the pandemic. The quantitative data captured a greater proportion of HIV Alliance clients, making the research more easily generalizable. Conversely, the qualitative data allowed for a richer and deeper analysis of the lived experiences of actual members of the community.

Convergent mixed-methods models are unique among mixed-methods research in that both the qualitative and quantitative data are collected and analyzed independently of the other. A diagram illustrating the simultaneous data collection and analysis is below, titled figure 2. A convergent model was chosen for this project because its design enabled quantitative and qualitative data to be collected at the same time. Given the rapid evolution of the COVID-19 pandemic, collecting data concurrently provided a better mechanism for comparison between the quantitative and qualitative analysis. Additionally, this study shared data with a larger study conducted by the University of Oregon's Prevention Science Institute that investigated implementing COVID-19 testing at HIV Alliance syringe exchanges, making a convergent design the most logical choice.

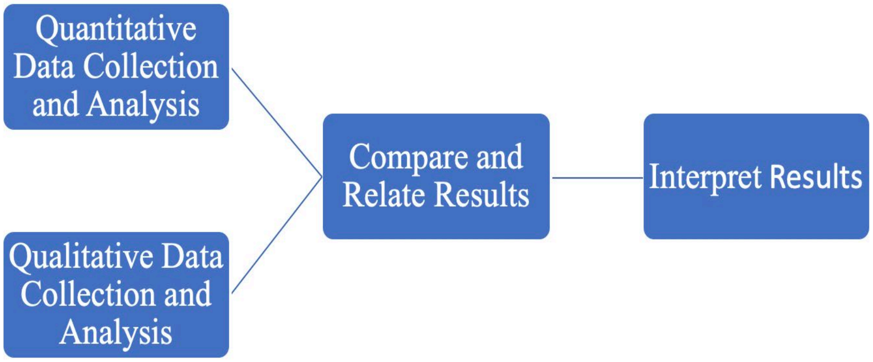
Research reported in this paper was supported by the National Institute on Drug Abuse of the National Institutes of Health under Award Number R01DA037628 (PI Stormshak). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. This study received approval from the University of Oregon Institutional Review Board. Funding was provided through the University of Oregon's Undergraduate Research Opportunity Program (UROP) and the Prevention Science Institute.

Study Recruitment

For both the quantitative and qualitative data collection, all participants were recruited during syringe exchange hours from one of five HIV Alliance syringe exchange locations in Eugene and Springfield, Oregon between, July 1st and September 30th of 2021. For the quantitative data collection, any person over the age of 18 was eligible to receive COVID-19 testing, but only those involved with HIV Alliance's syringe exchange filled out the quantitative surveys used in this thesis. Syringe exchange clients who received testing were recruited verbally to fill out a short quantitative survey about COVID-19, COVID-19 testing, and COVID-19 vaccines. Clients who accepted provided informed consent and were given a $10 gift card as compensation for their time. The survey asked clients to self-report demographic information and vaccination status and to answer questions related to their vaccine sentiments.

For the qualitative interviews, only people over the age of 18 who were observed having exchanged syringes when the researcher was present were considered for participation. Collaborators were selected for interviews using a combination of purposeful and snowball sampling. Clients were asked if they would be willing to participate in an interview that was focused on their experiences during the COVID-19 pandemic and to share their thoughts on COVID-19 testing and vaccines. They were asked to read and sign an informed consent form and understanding of informed consent was verified through knowledge checks. Clients were given a $20 gift card for their time.

Figure 2: Convergent Mixed-Methods Design Framework



Qualitative Data Collection & Analysis

<u>Collection</u>

In total, 42 semi-structured interviews were conducted at the five HIV Alliance syringe exchange locations. One client asked that their interview be erased, leaving 41 interviews that were included for final analysis. After clients provided informed consent, they were asked if they were comfortable having the conversation recorded. The audio of 35 interviews was recorded, four clients asked not to be recorded, and two interviews did not have audio recordings due to technical malfunction. For the six interviews that did not have audio recordings, handwritten notes were used as supplementary resources for analysis.

Given the high value of anonymity for HIV Alliance clients, minimal personal information was collected. For identification purposes, this study adopted the model of client identification that HIV Alliance uses at their syringe exchanges, asking collaborators to provide the first two letters of their last name, the first two letters of the city they were born in, and the last two digits of their date of birth. Additionally, clients were asked to report demographic information to be used for subgroup analysis. At the beginning of each interview, collaborators were asked to provide their age, race, gender identity, and vaccination status. They were also asked if they identified as a member of the LGBTQI+ community. A complete summary of the demographic information reported by interviewed clients is below, marked table 1.

Table 1: Interview Demographic Summary

Variable Name	Total N	Mean (SD) or %
Age	41	45.9 (2.1)
Gender		
Woman	17	41.5%
Man	21	51.2%
Non-binary	1	2.4%
Other	1	2.4%
Prefer Not to Answer / No Answer	1	2.4%
Hispanic	3	7.3%
Race		
White	27	65.9%
Indigenous	6	14.6%
Other	4	9.8%
Prefer Not to Answer / No Answer	1	2.4%
LGBTQ Status		
Yes	6	14.6%
No	32	78.0%
Prefer Not to Say	3	7.3%
Self-Reported COVID-19 Vaccine Status*		
Unvaccinated	23	56.1%
Vaccinated	18	43.9%

* Clients were considered *vaccinated* if they had received one dose of a single-dose vaccine or had received at least one dose of a two-dose vaccine and planned on receiving a second when eligible.

During the interviews, participants were asked to share their thoughts on COVID-19, COVID-19 testing, and COVID-19 vaccines. They were also asked to share their experiences during the COVID-19 pandemic and subsequent lockdown and mask mandates. A sample of the interview key is included at the end of this thesis (Appendix A).

Analysis

Interviews were transcribed and coded using NVivo, a qualitative analysis program. Analysis was done using a partial inductive thematic analysis. True inductive thematic analysis is a systematic method of qualitative analysis where the researcher identifies themes as they emerge from the data, rather than seeing how data fits within a pre-established set of themes. This project employed a partial inductive analysis because some themes in the data were informed by prior research, while others emerged after the first round of coding was completed. After an initial round of coding, the codebook for this project was reviewed by a Graduate Employee of the University of Oregon Prevention Science Institute who was familiar with both the project and HIV Alliance. The codebook was then revised, and a second round of coding was conducted.

The themes identified and confirmed by the second round of coding were then sorted into two distinct sections. The first section focused on relaying the experiences of PWID as they navigated the pandemic and poor social determinants of health that affected their ability or desire to take advantage of available COVID-19 resources. The second section examined whether existing models for vaccine hesitancy represented the common themes that emerged from interviews with PWID. This section then proposed additional considerations that contributed to vaccine hesitancy for HIV Alliance clients.

To fit within the transformative framework of research and to provide a stronger voice for PWID in research, both sections heavily feature quotes taken directly from interviews. When cited, clients are identified by their self-reported vaccination status, gender identification, and age. Individuals who identified as nonbinary or preferred not to provide gender identification information were cited with the gender-neutral term "HIV Alliance client."

Quantitative Data Collection & Analysis

Collection

For the quantitative component of this study, all data were borrowed from a larger project implementing a SARS-CoV-2 testing program at syringe exchange programs in Oregon. This data was collected as part of the National Institutes of Health Rapid Acceleration of Diagnostics for Underserved Populations initiative (RADX-UP, NIH Award Number R01DA037628, PI Stormshak). Although surveys were conducted at HIV Alliance syringe exchanges in four counties in Oregon, only Lane County was included for analysis in this project for the sake of comparison with the qualitative data. All syringe exchange clients who were 18 years or older were eligible for interviews, including but not limited to those who participated in the qualitative interview portion of this research. 260 respondents met the age and syringe exchange status parameters and were included for analysis. Because clients were able to repeatedly access the testing program, some individuals conducted multiple surveys over the span of July to September. In these cases, only the individual's most recent entry was included for analysis.

The survey asked participants to share demographic information and to answer questions related to vaccine status and motivations for refusing a vaccine. The demographic information collected during the surveys was self-reported. The demographic information analyzed in this project included age, racial/ethnic identity, gender identity, education level, housing status, job status, and approximate annual income. For race and gender identity, patients were asked to select all options that they felt applied to them. Age was recorded as a continuous variable. Due to limitations in sample size, for analysis, race was coded as a binary variable with *nonwhite* (1) and *white* (0). Furthermore, given the low count of individuals who identified as *nonbinary*, *transgender,* or *other* (n=5), only individuals who identified as *man* or *woman* were included for analysis. Educational attainment was recorded as a categorical variable with options including *no schooling* (0), *5th grade or less* (1), *6th to 8th grade* (2), *9th to 12th grade* (3), *high school graduate/GED* (4), *some college* (5), *bachelor's degree* (6), and *other advanced degree* (7). Housing status was recorded as a binary variable with *unstable housing* (1) and *stable housing* (0). Unstable housing included individuals who indicated their housing was temporary or those who were currently unhoused. Job status was also considered a binary variable with individuals who were *unemployed* or *temporarily laid off* (1) and individuals who were *employed, attending school, retired*, or identified as *a homemaker* (0). Finally, annual income was recorded as a categorical variable. Options increased in $5,000 increments beginning at $15,000 (1) and ending at $30,000 (4). Any responses for values higher than $30,000 on the survey were coded as $30,000+. A full summary of demographic information for the surveys is marked table 2 below.

The survey also asked questions related to vaccine status and vaccine intentions. Clients were first asked whether they had received a COVID-19 vaccine. Those who responded that they were vaccinated were told to turn in their survey. Those who responded that they had not received a COVID-19 vaccine were asked to continue to the following page of the survey, where they were asked questions related to their willingness to receive a vaccine in the future. To address motivators and barriers to vaccination, self-reported unvaccinated clients were also asked why they would and would not receive a vaccine. For these questions, these clients were provided with a list and were asked to select all options that applied. They were also given a space to indicate *other* and write in their own responses. A sample survey is marked appendix B at the end of this thesis.

Table 2: Survey Demographic Summary

Variable Name	Total N	Mean (SD) or %
Age	260	43 (12.76)
Gender		
Woman	87	33.5%
Man	167	64.2%
Non-binary	2	<1%
Transgender	1	<1%
Other	2	1.5%
Prefer Not to Answer / No Answer	4	1.5%
Hispanic	18	6.9%
Race		
Native Hawaiian or Pacific Islander	6	2.3%
White	222	85.4%
Indigenous	18	6.9%
Black or African American	8	3.1%
Middle Eastern or North African	2	<1%
Asian	4	1.5%
Other	8	3.1%
Prefer Not to Answer / No Answer	5	1.9%
Educational Background		
Have never gone to school	3	1.2%
5th grade or less	3	1.2%
6th to 8th grade	5	1.9%
9th to 12th grade	37	14.2%
High school graduate or GED completed	97	37.3%
Some college / technical / vocational	94	36.2%
Bachelor's Degree	14	5.4%
Other advanced degree	6	2.3%
No Answer Marked	1	<1%
Housing Status		
Unhoused	169	65.0%
Temporary Housing	40	15.4%
Permanent Housing	35	13.5%
Don't know	4	1.5%
Prefer Not to Answer / No Answer	12	5.0%
Employment status		
Currently employed	17	6.5%

Temporarily laid off, sick or on maternity leave	8	3.1%
Unemployed	109	41.9%
Retired	13	5.0%
Disabled, permanently or temporarily	63	24.2%
Student	3	1.2%
Other	17	6.5%
Don't know	14	5.4%
Prefer Not to Answer / No Answer	16	6.2%
Income		
Less than $15,000	179	68.8%
$15,000 - $19,999	10	3.8%
$20,000 - 24,999	7	2.7%
$25,000 - $29,999	6	2.3%
$30,000 or more	13	5.0%
Prefer Not to Answer/ No Answer	45	17.0%
COVID-19 Vaccine Status		
Unvaccinated	151	58.1%
Vaccinated	97	37.3%
Don't know	6	2.3%
Prefer Not to Answer / No Answer	6	2.3%
Intentions to Get Vaccinated Scale*	106	2.8 (1.5)

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* *Intentions to Get Vaccinated* represents the average self-reported likelihood to get vaccinated in the future for currently unvaccinated clients. The scale ranged from 1-5, with 1 representing *definitely not going to get vaccinated* and 5 indicating *definitely going to get vaccinated.*

Analysis

This study used linear regression analysis to examine demographic correlates to self-reported likeliness to receive a vaccine. The regression model coefficients measured effect size and were reported with standardized regression coefficients (marked as βs). Likeliness to receive a vaccine was recorded on a 5-point Likert scale, with (1) indicating *definitely not going to get vaccinated* and (5) indicating *definitely going to get vaccinated.* Furthermore, because only unvaccinated clients were asked to report their likeliness to get a vaccine, any client who answered that they had already received a vaccine was given a score of 6 on the likeliness to receive a vaccine scale.

Regression models were estimated for all demographic variables, including gender, race, age, income, education level, and housing status. This series of demographic variables were selected for analysis to examine how demographic characteristics related to marginalization in healthcare (gender and race) and poor social determinants of health (housing status, job status, and income) affected vaccine willingness. Each model was assessed individually to observe its unadjusted correlation to vaccine hesitancy. Next, all models that were significant at the $\alpha = 0.05$ level were included for adjusted regression models. Finally, summary statistics that calculated the frequency of responses to certain questions were used as supplemental tools of comparison for themes identified in qualitative data. In all sections reporting qualitative results, descriptive statistics of survey responses were used to analyze similarities and differences in the narratives that the quantitative and qualitative data portrayed. All data analysis was conducted using R version 3.6.1.

Limitations

The study procedures for both the collection and analysis of data had several limitations. The samples for both the quantitative and qualitative data were not consistent with national frequencies of several sociodemographic characteristics of PWID. Specifically, both samples were heavily skewed toward people who identified as white and people who identified as male. While these demographic groups are the most common among injection drug users, the homogeneity of the sample is not nationally representative, making subgroup analysis less reliable. For the quantitative analysis, this also prompted the decision to make race and gender binary variables with categories of *white* and *nonwhite* and *male* and *female,* respectively. While this granted more statistical power to the demographic correlate regressions, it does not allow for differentiation among different BIPOC and LGBTQI+ communities. Further study on this subject should aim to study a more representative sample of collaborators.

Another limitation of the study comes from the fact that all collaborators involved in the surveys or interviews were HIV Alliance clients. Researching directly at HIV Alliance syringe exchange locations fostered greater trust among PWID, ensuring that the research was being conducted ethically and with their best interests in mind. However, it likely introduced bias into the sample. All collaborators were inherently comfortable accessing some healthcare resources because of their participation in syringe exchange at HIV Alliance. This demonstrates an elevated level of access to community-based healthcare resources and a higher degree of health consciousness, which may not be reflective of the entire PWID community in Lane County. This may also result in underrepresentation of the difficulties accessing vaccine resources and overrepresentation of the level of concern that PWID had about the effects of COVID-19.

For the qualitative interview component of the study, no questions were asked that related to an individual’s prior vaccine history. Thus, no analysis could be done comparing vaccine sentiments for COVID-19 relative to past vaccines. Additionally, the quantitative surveys only asked if clients had received a COVID-19 vaccine before but did not clarify whether clients are fully or partially vaccinated. Thus, clients who received a first dose but were hesitant to receive a second were not differentiable from clients who were fully vaccinated. Finally, in the quantitative survey, clients who were vaccinated were not asked to fill out questions related to vaccine hesitancy or vaccine motivators. This limited analysis as vaccine hesitancy is not constant over time and periodic booster doses have proved necessary for continued protection. Thus, clients who indicated that they were vaccinated at the time of interviewing could now be exhibiting higher levels of vaccine hesitancy for future booster doses.

Background

To appropriately address vaccine hesitancy among PWID, it is key to establish what is currently understood about how people come to their decision to accept, delay, or reject a vaccine. This chapter begins this process by presenting and examining the current body of literature surrounding vaccine hesitancy and vaccine decision motivators. It then explains how our understanding of vaccine hesitancy has evolved within the added context of the COVID-19 pandemic and the emergency vaccine response that began in early 2021. Next, this chapter provides insight as to what makes PWID a key demographic to target both for vaccine distribution initiatives and for campaigns to reduce vaccine hesitancy. Finally, it ends with a more localized discussion of how mitigating vaccine hesitancy fits within the existing goals of a local organization, HIV Alliance, in providing accessible and judgment-free health and harm reduction resources to PWID.

Vaccine Hesitancy

Vaccinations are a pillar of preventative public health policy and are among the most effective public health measures to curb human death tolls and reduce the economic burden imposed by infectious, vaccine-preventable diseases. Vaccines are estimated to prevent up to 3 million deaths annually (NHS, 2019). Yet nearly 1.5 million lives are lost to vaccine-preventable diseases each year (WHO, 2019). While many of these deaths occur due to limitations in access to immunization services, vaccine hesitancy is also a key contributor.

The WHO's working definition for vaccine hesitancy is "the reluctance or refusal to vaccinate despite the availability of vaccines" (Eskola et al., 2014). This thesis expands on that definition and defines vaccine hesitancy as the level of uncertainty an individual exhibits when they are provided with the opportunity to get vaccinated. Vaccine hesitancy can still be present even among individuals who have previously been vaccinated for a disease. As this definition implies, vaccine hesitancy is neither binary nor stable over time. Rather, it exists on a gradient that is context-specific and highly dependent on a person's past experiences. Research suggests that an individual who was hesitant to receive a vaccine in the past should not be automatically considered vaccine hesitant now (Siegler et al., 2021). So, while a person's level of vaccine hesitancy is fully individual, it can be altered.

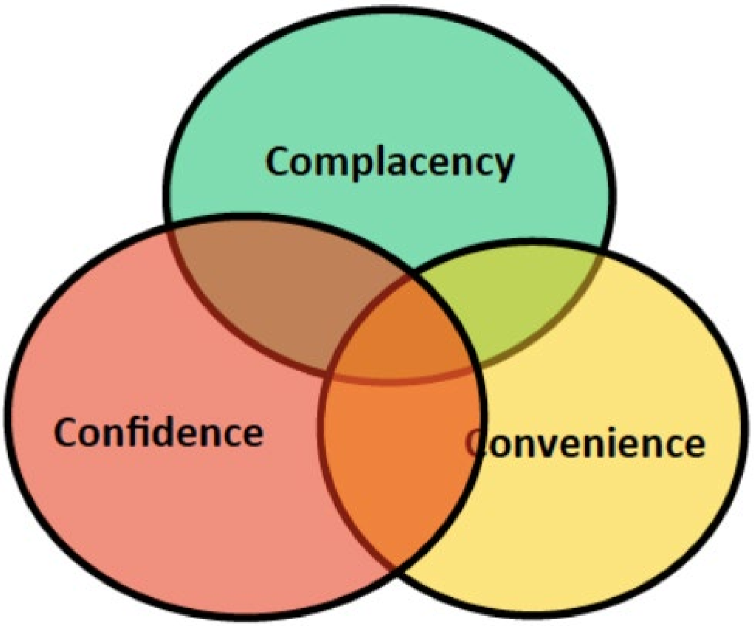
This thesis also operates with the knowledge that vaccine hesitancy varies from person to person and across different vaccine-preventable diseases. An individual who does not receive an annual influenza immunization but is up to date on their Measles, Mumps, and Rubella (MMR) vaccines may be vaccine hesitant for Influenza but not for MMR. Thus, one of the key challenges in studying the topic of vaccine hesitancy is providing information that is specific enough to be useful in addressing individuals' concerns about vaccines while being generalizable enough to be applicable to large groups of people. Its highly variable nature also makes vaccine hesitancy difficult to measure or quantify in a way that remains consistent across time and for different diseases.

The WHO's 3C's of Vaccine Hesitancy

In 2014 the Strategic Advisory Group of Experts on Immunization (SAGE) of the World Health Organization (WHO) established a model of vaccine hesitancy motivators that they named the 3Cs model (Eskola et al., 2014). This model was created after the SAGE working group performed a systematic review of existing vaccine hesitancy literature. The scope of their review spanned multiple diseases, countries, and contexts. Ultimately, the group identified three C's – *convenience*, *complacency*, and *confidence* – that they believe encompass the primary drivers of vaccine hesitancy. The 3Cs model has become one of the most predominant working models for global vaccine hesitancy scholarship (Macdonald et al., 2015; Frugoli et al., 2021; Klassen et al., 2021). While the working group does acknowledge the possible existence of other motives, it argues that those motives are usually subcategories within the broader 3Cs model.

Within the model, *complacency* refers to an individual's interpretation of the threat posed by a vaccine-preventable disease. For instance, an individual who decides that Influenza does not pose a substantial enough risk to their health to warrant an annual immunization would be considered complacent. This complacency can be rooted in low perceived risk from the vaccine-preventable disease, more pressing concerns, or low self-efficacy (an individual's lack of belief in their ability to get vaccinated). Lack of vaccine *confidence* refers to an individual's lack of trust in a vaccine, a vaccine's providers and producers, policymakers who enable the creation and provision of a vaccine, or any combination of the three. An individual that chooses to reject or delay a vaccine due to a lack of vaccine confidence may cite fear that a vaccine may carry dangerous side effects, fear that providers offering vaccine services are incompetent or unreliable, or fear that policy makers do not have their best interests in mind. Finally, vaccine *convenience* refers to how easily an individual is able to access vaccine services. If an individual perceives that the effort required to get vaccinated is greater than the benefit derived from being vaccinated, vaccine convenience would be considered a primary motivator of their degree of vaccine hesitancy. Convenience can refer to geographical space between an individual and relevant vaccination services, cultural or social barriers to care, time constraints, and affordability.

Figure 2: WHO 3C's Model of Vaccine



An illustration of the WHO 3C's Model of Vaccine Hesitancy as presented in the 2014 SAGE working group report (Eskola et al., 2014).

After its conception, a few studies in related fields of psychology and public health have argued that while the 3C's model may capture a large proportion of vaccine hesitancy motivators, there are other important factors that are not explained within the model. Razai et al. (2021) argue that the model fails to consider the social context within which an individual is making their vaccine decision. Characteristics like religion, occupation, ethnicity, and socioeconomic status may all contribute to an individual's sentiments regarding a vaccine. They also argue that the definition used by the WHO and the 3C's model places blame on individuals without considering that their hesitancy may stem from systemic issues like racism, discrimination, or barriers to accessing healthcare services that negatively impact healthcare and vaccine uptake. Finally, they contend that communication plays a substantive role in an individual's level of vaccine hesitancy. An individual's sources of information, as well as the pervasiveness of misinformation and anti-vaccination conspiracy theories, may have a significant impact on how an individual views vaccination services in general or, more likely, how they perceive a specific vaccine. It should be noted that Razai et al. do not provide any form of empirical data when presenting their proposed additions to the 3Cs model.

Wismans et al. (2021), however, do provide empirical data through the form of cross-sectional surveys that suggests that a sense of collective responsibility also played a key role in motivating college students in the US to get vaccinated against COVID-19. Collective responsibility refers to an individual's willingness to protect others by getting a vaccine themselves. In their surveys, the categories *collective responsibility* and *confidence* held the greatest weight when an individual considered receiving the COVID-19 vaccine. The proposed additions of both Wismans and Razai illustrate a broader critique of the WHO's 3C's model and its conception of vaccine hesitancy. While the 3C's model accomplishes its primary goal by identifying common categories for vaccine hesitancy across all demographic groups, it lacks the clarity needed to make it a legitimate and practical tool for mitigating vaccine hesitancy, particularly when applied to marginalized communities. Furthermore, given the highly variable nature of vaccine hesitancy across diseases, social contexts, and time, there is a need for greater specificity in discourse related to vaccine hesitancy than what is provided by the current working model. Thus, this research advocates for understanding not only what creates feelings of vaccine hesitancy in the individual but also how vaccine hesitancy is altered by an individual's social and environmental conditions.

Vaccine Hesitancy during COVID-19

The discovery and distribution of multiple COVID-19 vaccines was a critical turning point in the global effort to curb the death toll from the COVID-19 pandemic. The vaccine is an essential tool not only for ensuring individual safety but also for protecting high-risk populations who are unable to receive vaccines themselves. However, the success of COVID-19 vaccines in mitigating the devastation caused by the virus is largely dependent on the equitable and widespread distribution of the vaccines. When hesitancy is high and uptake is low, it comes with a direct cost to human lives. Consequently, part of the continued pandemic response must address the complications that are posed by vaccine hesitancy. This is easier said than done, however, as there is a persistent belief in the United States that if the COVID-19 vaccine is not completely effective in preventing transmission, it is not worth getting at all. Some attribute the lack of urgency to a lack of data on the long-term protection of vaccines against SARS-CoV-2 (the virus that causes COVID-19). However, this sentiment fails on two fronts. While it is true that the risk of breakthrough infection (an infection that occurs among vaccinated individuals) increases with time, current research shows that protection from more severe forms of COVID-19 remained low at least nine months after vaccination (Lin et al., 2022).

Furthermore, the continual evolution of SARS-Cov-2 strains and the arising questions about the long-term protection offered from the first round of COVID-19 vaccines point to a greater need for vaccination, not a lesser one. Experts predict that total elimination of COVID-19 is highly unlikely (D’Souza et al., 2021). Greater vaccination rates would both reduce mortality rates and reduce the total number of COVID-19 cases. Fewer cases also mean fewer chances for the virus to mutate in ways that make it more resistant to treatment and less likely to be stopped by the vaccine. Minimizing case numbers is the most manageable long-term solution for mitigating the mortalities caused by the persistence of COVID-19. While globally eradicating or even regionally eliminating COVID-19 may be out of the question, increasing vaccination uptake is vital to an effective long-term public health response.

Vaccine Hesitancy Among People Who Inject Drugs

Past research has shown that people with substance use disorders, on average, are less likely to receive hepatitis A and B or annual influenza vaccines than other members of the public (Campbell et al., 2006; McGregor et al., 2003; Price et al., 2021). As these two diseases are among the most relevant for PWID, this suggests that they may experience higher rates of vaccine hesitancy for other diseases as well. However, there is a dearth of research that discusses the motivations for why PWID exhibit high rates of vaccine hesitancy. There is an even greater shortage in PWID vaccine hesitancy research that uses qualitative methods to incorporate the voices and experiences of real members of PWID into their analysis. PWID face frequent ostracization and dehumanization by other members of society, increasing the need for literature that specifically echoes their shared sentiments and experiences. Most of the relevant studies conducted to date only measures the presence of vaccine hesitancy and offers conjecture as to its potential causes but do not root their speculation within the narratives of actual PWID community members. Among research conducted for currently administered vaccines, only Campbell et al. included any qualitative research methods within their study design whatsoever. However, even Campbell et al.'s research only partially fills the present gap in PWID vaccine hesitancy work. While the study does incorporate qualitative data in the form of interviews with PWID, their study focuses on how convenient access to hepatitis A and B vaccines affected uptake of vaccines, not on generating a general framework for vaccine hesitancy among PWID.

There have been some other efforts to incorporate qualitative methods for research on hypothetical vaccines for drugs associated with drug use like HIV/AIDS. Both Young et al. (2014) and Fleming et al. (2020) used qualitative methods to find that cost, side effects, and distrust in government were frequently cited motivators for vaccine hesitancy among PWID. However, while Young et al. found that HIV vaccine acceptability among PWID in Appalachia was high, Fleming et al. found very low levels of acceptability among PWID in Vancouver, Canada. It is unclear whether the contrasting views of this research are due to temporal, geographical, or other differences between the two studies, but regardless the disparity exemplifies the need for further research that includes considerations of how environmental, social, and political factors influence vaccine decisions. Furthermore, there is reason to expect that interview responses for hypothetical vaccines may differ from responses for vaccines that are currently being administered. Unlike with HIV/AIDS vaccines that are not available to the public, there is already a substantial body of literature demonstrating the proven effectiveness of COVID-19 vaccines, which likely has a significant effect on vaccine hesitancy.

The COVID-19 vaccines offer a unique opportunity to further analyze vaccine hesitancy motivator for PWID by meshing the two bodies of literature discussed above. COVID-19 vaccines have already been shown to be highly effective in preventing COVID-19 (Pilishvili et al., 2021; Tartof et al., 2021; Lin, 2022). However, as research about COVID-19 and COVID-19 vaccines continues to emerge, public health specialists are still actively adapting recommendations for COVID-19 vaccination schedules. Thus, using the continually evolving nature of COVID-19 vaccine hesitancy research in this area could bridge the gap between the literature on vaccine hesitancy as it relates to time-tested vaccines like those for Hepatitis A and B and literature on hypothetical vaccines like those for HIV/AIDS. Yet, research discussing COVID-19 vaccine hesitancy among PWID remains almost non-existent. Dietze et al. (2021) find higher levels of COVID-19 vaccine hesitancy for PWID than for the general public in Melbourne, Australia, but rely on hypothetical data collected before vaccines were widely distributed. To my knowledge, only Cioffi et al. (2022b) and Strathdee et al. (2021) discuss COVID-19 vaccine hesitancy motivators for PWID using data conducted after the vaccines initially became available to most adult members of the public in early 2021. No qualitative research has been conducted on the subject. Thus, the qualitative discussions of this project, which are grounded directly in the experiences of active members in the PWID community, will provide the much-needed context to explain the high rates of vaccine hesitancy observed in past quantitative research. In turn, this will enable more well-informed campaigns to increase vaccine uptake among PWID.

People Who Inject Drugs and Healthcare

Because of the illicit nature of injection drug use, estimating the total number of injection drug users in the US is nearly impossible. The most recent estimates of current injection drug users range from about 0.24% to 0.59% of the US population (Bradley et al., 2020; Lansky et al., 2014). However, given the value that PWID place on privacy, these reports are likely underrepresenting the true percentage of the US population that has used injection drugs in the past year. Demographic data is also difficult to measure accurately. While there is no concrete demographic data for all PWID, there is an annual survey administered by the Substance Use and Mental Health Services Administration that captures demographic information for a variety of substances, including cocaine (the second most common injection drug, behind heroin which is not included in some parts of the survey). This survey, the National Survey on Drug Use and Health (NSDUH), reports self-reported drug use among 70,000 individuals that are randomly selected from across the United States. Using cocaine as an indicator for injection drug use, the results from the most recent NSDUH administered show that cocaine users were most likely to be male, white, and between the ages of 26 and 49. Unemployment and low household income were also associated with cocaine use (CBHSQ, 2021).

Based on demographic data collected during a study at several HIV Alliance syringe exchange locations in Oregon between March and April of 2021, syringe exchange clients in Oregon were also predominantly white and male (Cioffi et al., 2022a). Out of the 1,151 unique syringe exchange clients during this period, 83% of clients identified as white and 62% of clients identified as male. Furthermore, 58% of clients who participated in syringe exchange during the length of the study were unhoused. While the demographic information of the average syringe exchange client in Oregon matches the average profile provided by the NSDUH, due to very low representation of BIPOC PWID at Oregon syringe exchanges, HIV Alliance's demographics are not nationally representative.

Furthermore, across the United States, the PWID community also faces significantly higher rates of being unhoused, which has shown to increase exposure to HIV/AIDS, Hepatitis C, and tuberculosis (Topp et al., 2013; Arum et al., 2021; Aldridge et al., 2018b). Oregon has the fifth-largest per-capita rate of unhoused individuals among all states in the US, suggesting that HIV Alliance clients may experience housing instability more frequently than a national sample of PWID. Given connections between unstable housing and higher mortality rates, PWID in Lane County may be at higher risk from COVID-19.

Due to higher susceptibility to severe symptoms from infectious diseases, it is particularly important for PWID to have easy access to vaccination services. However, structural barriers within the healthcare system increase their likelihood of rejecting or delaying vaccines. This makes them a particularly important demographic group for addressing and soothing vaccine hesitancy. Myriad social, economic, and legal impacts of substance use put PWID in a position where they are simultaneously in greater need of accessible healthcare resources and are less likely to access available necessary services (Muncan et al., 2020). Fear stemming from the stigma of drug use and of discrimination by healthcare providers disincentivizes PWID from using healthcare, even when those services are readily available (Biancarelli et al., 2019). Diminished uptake of healthcare services subsequently amplifies the issues posed by pre-existing poor social conditions that often accompany injection drug use. In turn, this creates an even greater need for healthcare. Consequently, this generates and perpetuates a cycle that results in worse health outcomes and worse relationships between PWID and providers.

Physiological Risk Factors

The physiological consequences of the harsh living conditions that are commonplace for PWID are well documented in academic literature. PWID have higher rates of mortality than the average US citizen across a wide range of categories, including injury, infectious diseases, poisoning, cardiovascular diseases, and other external causes (Aldridge et al., 2018a; Zivanovic et al., 2015). This high burden of mortality and morbidity is almost certainly a result of the massive gaps in healthcare availability and quality for PWID. PWID also face higher likelihoods of contracting and experiencing severe symptoms from infectious diseases. PWID are at significantly greater risk of developing respiratory complications like asthma and COPD (Abadie et al., 2021; Koslik et al., 2020). They also have a high burden of autoimmune diseases like HIV/AIDS, with 1 out of every 15 HIV diagnoses in the US coming from a person who injects drugs (CDC, 2020). Both underlying conditions also make fighting off infections from other diseases far more difficult.

The higher rates of transmission and mortality for infectious diseases are evident during the COVID-19 pandemic as well. A study from September 2020 analyzed electronic health records from 73 million patients in the US and found that people with substance use disorders made up 15.6% of patients diagnosed with COVID-19, despite representing only 10.3% of the sample (Wang et al., 2021). The same study also found that people with substance use disorders at any point in their past also had higher rates of COVID-19-related hospitalizations (41% compared to 30% for non-drug users) and mortality (9.6% compared to 6.6%). Further hospital analyses from 2021 showed that even when fully vaccinated against COVID-19, patients with prior history of substance use were twice as like to experience a breakthrough infection (Wang et al., 2022).

Social Determinants of Health

The disproportionate burden imposed on marginalized populations during the COVID-19 pandemic has also further illustrated the impacts of broader social inequities on healthcare quality, access, and provision. However, while COVID-19 may have further illustrated the relationship between social inequality and disparities in health outcomes, PWID have been experiencing the detrimental effects of poor social determinants of health for far longer than just the last couple of years. Social determinants of health (things like housing status, education, income, experiences with discrimination, food security, and health literacy) are conditions and characteristics that inherently impact an individual's ability to stay healthy. These factors influence how a person views and interacts with their healthcare system. This can resonate through how individuals perceive their own health, their trust or mistrust of healthcare services, how accessible healthcare services are for them, or how at-risk they are for various health issues.

For PWID, the most common social determinants of health that negatively impact health outcomes are food insecurity, limited access to transportation, low socioeconomic status, difficulties accessing healthcare facilities, frequent incarceration, and being unhoused (Corro et al., 2020). Each of these factors individually increases the likelihood that a person will face poorer health outcomes. Among PWID, these factors often work in conjunction with each other. An individual with unstable access to shelter likely also faces greater food insecurity and more difficulty accessing healthcare. Thus, mounting effective public health campaigns, especially during periods of extreme crisis like the COVID-19 pandemic, requires careful implementation of strategies that consider and address the convergence of multiple social inequities and health disparities among underserved communities like PWID. This is especially true when these disparities in healthcare services are understood not only as compounding factors on health quality but also as direct consequences of poor social and environmental determinants of health.

HIV Alliance

HIV Alliance is a well-regarded healthcare organization serving PWID in Lane County. The organization was founded in 1994 with two primary goals in mind: to support individuals currently living with HIV/AIDS and prevent new HIV infections. As a group that faces high rates of HIV/AIDS, PWID are a key demographic that HIV Alliance serves within the community. Through all the community support services that they offer, HIV Alliance seeks to "provide interventions that are highly evidence-based, low barrier, trauma-informed, equity-oriented, and client-centered, and which work to directly address social determinants of health" (HIV Alliance, n.d.). As part of their continued effort to reduce the transmission of bloodborne diseases like HIV/AIDS, HIV Alliance offers syringe exchange services across several counties in Oregon. Their consistent and continued presence has developed strong ties to the PWID community within Lane County, placing them in a unique position relative to traditional healthcare providers. HIV Alliance's focus on reducing the harm associated with drug use and providing judgment-free services has allowed them to build and maintain a strong foundation of mutual trust between themselves and their clients. This also puts them at a distinct advantage when it comes to providing COVID-19 testing and vaccination services. By using and reaffirming their commitment to ensuring the safety of their clients, even during the ongoing pandemic HIV Alliance has continued to provide invaluable resources to minimize the dangers of injection drug use. Given their trusted position within the PWID of Lane County, they are also among the most well-equipped public health groups for encouraging PWID to get COVID-19 testing and vaccines.

HIV Alliance, along with most other organizations that work directly with PWID, believes strongly in the practice of harm reduction. Harm reduction is an evidence-based ideology for providing support to individuals with substance use disorders. It considers the social and environmental context of substance use and addiction and does not advocate for abstinence-based solutions. Instead, its primary aim is to reduce the negative health, legal, and social consequences of drug use by minimizing unsafe using practices (like sharing or reusing syringes, using alone, or using impure products). Harm reduction practices seek to provide resources that include individuals at all stages of the recovery process, including those still in active addiction. In practice, harm reduction is both cost-effective and successful in reducing the social impacts of addiction (Wilson, 2014). Harm reduction services have also been shown to benefit community health by decreasing HIV and Hepatitis C transmission, reducing risky substance use behaviors, and limiting opioid overdoses (Ksobiech, 2003; Kilmer et al., 2012; Des Jarlais, 2017).

The same ideology for providing lifesaving harm reductive services can be extended to providing COVID-19 health resources as well. Providing a judgment-free and readily accessible space for PWID to find information, testing, and vaccines is key to protecting the high-risk community from severe symptoms and death from COVID-19. However, organizations that work with PWID can only be effective agents in improving the COVID-19 response if their clients are willing to accept the resources they are providing. The relationships developed by these organizations can be leveraged to increase vaccine uptake, but this becomes complicated when clients experience high levels of vaccine hesitancy. Past discrimination by healthcare services may discourage PWID from taking advantage of vaccination services, even if they are accessible and coming from a trusted provider. Furthermore, demonstrated vaccine hesitancy for other vaccines suggests that vaccine hesitancy may be high for a newly released vaccine, like those for COVID-19. Before trusted organizations like HIV Alliance can begin alleviating vaccine hesitancy among their clients, they must understand what factors contribute to vaccine hesitancy for PWID. Thus, a key contribution of this project is to provide a model that informs and enables the HIV Alliance to directly address the most influential motivators of vaccine hesitancy among their clients.

CHAPTER 2: Results

Survey Results and Analysis

This section uses the quantitative data collected in the 260 surveys with HIV Alliance clients to assess the magnitude of vaccine hesitancy among PWID in Lane County. It relies on Lane County public health data as a tool for comparing vaccination rates among this sample to the estimated averages for all county residents in the same period. It also examines whether a variety of sociodemographic characteristics are correlated to willingness to get vaccinated using unadjusted and adjusted linear regressions. Ultimately, the data discussed in this chapter provides empirical evidence that suggests that vaccine hesitancy is elevated among HIV Alliance clients and is correlated with several social factors of wellbeing, including stable housing and education.

Vaccine Uptake

37.3% (n=97) of the 260 HIV Alliance clients surveyed between July 1st and September 30th of 2021 indicated that they had received a COVID-19 vaccine, 58% (n=151) of clients marked that they had not been vaccinated, and 5% (n=12) did not provide an answer. Because the relevant question on the survey is phrased as “have you ever received a COVID-19 vaccine”, there is no way to clarify whether clients who responded *yes* were fully vaccinated (1 dose of Johnson & Johnson or 2 doses of Moderna or Pfizer) or partially vaccinated (1 dose of Moderna or Pfizer). For analysis in this thesis, any client who responded *yes* to having received a COVID-19 vaccine was considered fully vaccinated. This decision was made to provide the upper bound for vaccine uptake for the sample, thus erring on the side of overrepresenting vaccine status when comparing PWID to the Lane County average. By the end of September 2021, according to the Oregon Health Authority website, the rate of complete vaccinations for Lane County residents was 70.1% and the proportion of the population who had received at least one dose was 74.8% (OHA, 2021). Thus, the proportion of the quantitative survey sample of PWID at HIV Alliance who had received a vaccine was at least 32.8 percentage points lower than the estimate for all of Lane County.

Some of the disparity between the vaccine uptake rates for the sample of HIV Alliance clients within Lane County and the OHA's county-wide estimates are certainly due to greater difficulties accessing COVID-19 services. However, all data for this study was collected at HIV Alliance syringe exchanges between July and September of 2021, a period when vaccines were widely available for free in Eugene and Springfield, including on-site at some of HIV Alliance's syringe exchanges. This suggests that some of the 30-percentage point difference between HIV Alliance clients and Lane County residents as a whole is from a lower willingness to accept available vaccine services. This is further evidenced by data in the sample showing that, of the 151 unvaccinated individuals, 32% (n=49) were hesitant to receive a vaccine (marking *not at all likely* or *definitely not getting a vaccine*) compared to 25% who desired to get a vaccine (marking *very likely* or *fairly likely to get vaccinated*). Thus, with nearly 1 out of 3 unvaccinated clients in the sample expressing some degree of vaccine hesitancy, identifying the motivators behind this hesitancy is key to the continued pandemic response for PWID.

Demographic Correlates

After running unadjusted regressions on each of the sociodemographic characteristics provided by the 260 quantitative surveys, three characteristics showed statistically significant correlations with willingness to get vaccinated. These three characteristics were age (β = 0.02, p = 0.0219), educational attainment (β = 0.42, p = 0.00008), and being unhoused (β = -0.96, p = 0.0017). In other words, participants who were younger, had received fewer years of education, and who were unhoused expressed lower willingness to receive a COVID-19 vaccine. After running adjusted regressions including these three characteristics, educational attainment (β = 0.39, p = 0.0002) and being unhoused (β = -0.97, p = 0.0043) remained statistically significant at the α = 0.05 level. Gender, race, and income level did not have a statistically significant effect on vaccine hesitancy. A full table of the unadjusted and adjusted regression results is provided below, marked Table 3.

Table 3: Regressions of Self-Reported Demographic Characteristics on Willingness to Receive a COVID-19 Vaccine

Variable Name	**Unadjusted Results**			**Adjusted Results**	
	n	β value	p-value	β value	p-value
Age	244	0.02^{**}	0.022	< 0.01	0.334
Female	238	0.09	0.725		
Non-White	240	0.07	0.844		
Educational Attainment	243	0.42^{***}	< 0.001	0.39^{***}	< 0.001
Unstable Housing Status	241	-0.96^{***}	0.002	-0.97^{***}	0.004
Unemployed	191	-0.03	0.911		
Income Level	204	0.18	0.125		

In the table above, ** denotes significance at the α = 0.05 level, *** denotes significance at the α = 0.01 level.

The results of the quantitative analysis suggest two things about vaccine hesitancy among PWID. First, the data suggest that vaccine uptake among HIV Alliance clients remained well below averages for all Lane County residents for the period of

July to September of 2021. The 37-percentage-point disparity between the entire Lane County population and the sample of 260 PWID in this study demonstrates the importance of identifying COVID-19 vaccine hesitancy motivators among PWID specifically. This is particularly noteworthy because data for this project was collected at a time when vaccines were significantly more accessible for PWID than they were after their initial distribution in early 2021. Consequently, the relatively low uptake of vaccines among PWID in this sample points to higher vaccine hesitancy among this group.

Second, the results of the adjusted demographic correlate regressions indicate that socio-economic characteristics (namely housing status and access to education) are correlated with willingness to get vaccinated. In this sample, education level was positively correlated with willingness to receive a COVID-19 vaccine, indicating that clients with higher levels of education expressed lower levels of vaccine hesitancy. Moreover, unstable housing status (being unhoused or living in temporary housing) was negatively correlated with willingness to receive a COVID-19 vaccine, suggesting that people with unstable housing status expressed greater levels of vaccine hesitancy. These results imply that there is a connection between an individual's environment and their willingness to get vaccinated. It shows that systemic barriers to healthcare (particularly those associated with being unhoused) may manifest as heightened vaccine hesitancy. The following section will rely heavily on the 41 qualitative interviews with HIV Alliance clients to assess how the social determinants of health of PWID were affected by the pandemic and how they influenced HIV clients' willingness to receive COVID-19 vaccines.

HIV Alliance Clients and the COVID-19 Pandemic

This section provides key context for understanding the experiences of PWID during the COVID-19 pandemic and lockdown by focusing on the qualitative interviews conducted for this study. Using the 41 interviews and 260 surveys conducted at HIV Alliance syringe exchanges, it first discusses clients' anxiety stemming from high rates of pre-existing medical conditions and feelings of isolation and estrangement from society. It also shows how the pandemic worsened already-present structural disadvantages for many HIV Alliance clients as they struggled to gain or keep access to stable housing, sources of income, and harm reduction supplies. Finally, it analyzes how HIV Alliance's ability to continue providing harm reduction supplies and necessities to their clients strengthened the relationship between the organization and PWID in Lane County, illustrating a model for more public health responses targeting PWID in the future.

Anxiety and Isolation

When asked how the COVID-19 pandemic affected them in the qualitative interview portion of this study, 41% (n=17) of the 41 clients referenced an impact on their mental wellbeing. These impacts were divided into two categories, heightened anxiety about contracting COVID-19 due to pre-existing conditions and strong feelings of isolation that resulted from the closure of locations that PWID commonly relied on for social gatherings.

Anxiety from Pre-Existing Conditions

20% (n=10) of the clients in the qualitative interview sample explicitly mentioned that they had pre-existing conditions that would make them more susceptible to COVID-19. Most of these conditions were respiratory illnesses, including COPD and asthma, but some clients also mentioned that they had various autoimmune diseases like Hepatitis C, Lyme disease, and HIV/AIDS. In general, the high frequency of clients that mentioned pre-existing conditions among this set of interviewees is consistent with the observed higher burden of respiratory and autoimmune illnesses among PWID within the US and internationally (WHO, n.d.).

The interactions between pre-existing conditions and COVID-19 fears among HIV Alliance were also explored in the quantitative survey component of this study through the lens of vaccine acceptance motivations. 7% (n=17) of the 260 survey respondents marked *I would get a COVID-19 vaccine because I have a chronic health condition like asthma or diabetes*. While this figure is well below the 20% of discussions in interviews that focused on pre-existing conditions and COVID-19, there are a few factors that explain the discrepancy. First, due to the design of the survey, only unvaccinated individuals were asked to respond to questions about COVID-19 vaccine acceptance and reluctance. This meant that only 151 unvaccinated HIV clients responded to the question, rather than the total 260 survey respondents. Furthermore, as this section will explain in detail, the presence of pre-existing conditions acted as a motivator for some individuals to get vaccinated early, thereby eliminating them from the sample for this question. Finally, by only looking at pre-existing conditions as a motivator for vaccine acceptance, this may have dissuaded individuals with pre-existing conditions and high levels of vaccine hesitancy from selecting this answer. All three of these elements suggest that the number of HIV Alliance clients who have pre-existing conditions is likely underrepresented by this measure.

While the qualitative interviews cannot provide a representative sample of the frequency of pre-existing conditions among HIV Alliance clients either, they do bring clarity as to how pre-existing conditions contributed to high levels of anxiety for some individuals. Six of the 12 clients who mentioned they had pre-existing conditions in the qualitative interviews also expressed very high levels of stress and anxiety related to the possibility of contracting COVID-19. The other six mentioned that they had pre-existing conditions but did not comment on how their conditions affected their perception of the pandemic. Of the six that had the highest level of concern, all voiced fears that, for them, COVID-19 would effectively be a death sentence. When asked about this concern, two women from the group spoke candidly about how their conditions made them more susceptible to the virus.

> I am pre-dispositioned. I have lung disease. I have got COPD, health issues majorly. [COVID-19] would kill me. Yeah. It would kill me. (Vaccinated woman, age 53).

> I'm terrified of getting it. I just don't think my lungs can handle it and I can barely breathe these days. My brother told me that when he had it, he had to go on a nebulizer machine. That's the only thing that saved him and he has asthma. So, I take it seriously (Vaccinated woman, age 52).

As the quotes from the women above illustrate, for some clients, physiological predispositions affected both their perceived risk of contracting COVID-19 and their mental health. The clients who mentioned pre-existing conditions also used words like “terrified,” “afraid,” or “worried” to describe their experiences during the pandemic more frequently than clients that did not mention any pre-existing conditions. Even after receiving the vaccine, some of these clients still experienced severe anxiety about what would happen if they contracted the disease. The woman in the first quote above explained later in her interview that even with her recent vaccination, she still got tested weekly to ensure that she didn’t have a breakthrough infection.

> I come to see if I have it every week. I'm coming here to see, to make sure I don't have it because even though you have shots, you can still get it. (Vaccinated woman, age 53).

Another woman, who was born with severe asthma, expressed a similar sentiment regarding the need for further peace of mind beyond the vaccine.

> [I get tested for] my peace of mind. I figured that I'd probably know that I have it before they even get a hold of me, but it gives me and other people peace of mind. (Vaccinated woman, age 49).

The compulsion to get weekly tests that both women expressed illustrated that even with the demonstrated added protection of the vaccine, they still experienced high levels of anxiety related to contracting the virus.

Isolation

People who use drugs tend to experience social and emotional loneliness more frequently than other demographic groups (Hosseinbor et al., 2014). This was likely only exacerbated by the pandemic as stay-at-home orders restricted people’s ability to socialize outside of their households. Indeed, 34% (n=14) of the 41 clients experienced heightened feelings of isolation as a direct result of the pandemic and stay-at-home orders. While the difficulties of isolation during the COVID-19 pandemic are not unique to PWID, they do pose a heightened risk for PWID. Strong external support systems are particularly vital tools for preventing higher rates of mortality and morbidity associated with substance use. Research during the COVID-19 pandemic shows that using alone has led to higher rates of overdose, fentanyl poisoning, and other drug-related morbidities (Perri et al., 2021; Roxburgh et al., 2021). This is because many PWID are familiar with the signs of overdose and thus can react when an individual exhibits symptoms. When an individual uses alone, they run the risk of overdosing without anyone around to reverse it. Consequently, isolation for PWID has both mental and physical health implications.

In a conversation with one man, he explained that not having anyone to contact for support or comfort took a major toll on his wellbeing.

> I was broken. Kinda really depressed. I went [to the fairgrounds], didn't know if the world was gonna end or what was gonna happen or what to expect. Nobody to contact or that cared about me. It was really hard on me. Really hard. I don't have a lot of people to reach out to to feel comfortable. (Unvaccinated man, age 35).

Having just lost his job and his housing, this client felt both neglected and ignored by other members of society. As he explains, this was made even more difficult by the fact that there was a huge amount of uncertainty, especially at the onset of the pandemic. Unfortunately, the sentiments shared by this client were common for others as well. When asked how COVID-19 affected their daily life, a couple of clients shared that the most prominent effect of the pandemic for them was the toll that social isolation took on them during the lockdown.

> HIVA Client: Mentally, oh my gosh.
> BH: Ok, how do you mean?
> HIVA Client: Just feeling very isolated and lonely. Then when the lockdown lifted last year, I just felt so guilty for, like, even going out. (Vaccinated woman, age 24).

> Social isolation definitely. Difficulties finding people to spend time with. (Vaccinated woman, age 36).

For two clients who had been incarcerated for part of the pandemic, COVID-19 social distancing rules during and immediately after being released from prison made socialization even harder in an environment that already restricts people's ability to interact with others.

> When I was in prison, we already had a bunch of cell time. [With COVID] we weren't allowed to be in a group of more than four people or eat at a table with more than four people. And we couldn't be within six feet of each other, so that really sucked because you already get no time with people. (Vaccinated man, age 24)

> They had us on lockdown. There was no communication with anybody, you know, I mean, especially being in prison. You're already away from your people. So, then them not even getting notified that we were moved, you know. (Unvaccinated man, age 43).

The second quote above came from a man who was in a prison that suffered a large COVID-19 outbreak. As part of the response, some people were moved to other nearby prisons and put in quarantine for two weeks. Those who were moved were given no opportunities to contact loved ones outside of the prison and were put in a lockdown – meaning they were given almost no opportunity to leave their cells at any point.

Another man explained how he was left feeling isolated from society after establishments that he relied on both for resources and for socialization were closed with the pandemic.

> I was homeless before the pandemic started. And my life might be considered bleak, to begin with. So, the pandemic popped up and everything was shut down, all the places that I could otherwise go to get warm or cool down or go to at night to go out and have a drink or whatever. Everything was just shut down; it was a ghost town from there. So that, um, left me feeling even more estranged from society (Unvaccinated man, age 66).

As this client explains, the organizations that provide resources to disadvantaged communities also give them a space to build strong ties with other people around them. For example, in Lane County, the St. Vincent de Paul Lindholm Center provides myriad services from several different organizations serving PWID. These services include hot meals, laundry, showers, syringe exchange from HIV Alliance, Hepatitis C testing, and, more recently, COVID-19 testing and vaccines. There is also a covered seating area that fits somewhere around 50 people, allowing people without shelter to seek refuge from heat or inclement weather for the day. With all these services centrally located in an area that is accessible and comfortable for patrons, it encourages individuals to access multiple services at once and has consequently created a lively and strong sense of community among its frequent visitors. However, when these services were restricted or altogether closed during the pandemic, many people lost their ability to interact with other members of their community. The closure of resource and community providers was particularly relevant for those who had to reconcile intersections with other marginalized communities in healthcare related to race, gender, and sexual identity. One such client, an intersex man, spoke transparently about how the closure of a resource center in Portland affected his ability to access LGBTQIA-specific resources and to get support.

> Resources. For example, like the Q center up in Portland. That's not been available, and same with anywhere else that's there to help the LGBTQIA, all the other ones. Being in the LGBTQIA community, the Q center is a major resource when I am able to go. So that's a huge loss in possible resources and assistance that I'm no longer getting. [It has also affected] my social life moderately. A lot of the available clubs and things like that are either reduced or not running. (Unvaccinated man, age 45).

As this client's comments explain, the pandemic left many people without access to support systems that they normally relied on. Even temporary loss of areas like the Lindholm center or the Q center for the client above not only affected their ability to get important supplies but also their ability to seek community with their peers. This, in turn, can have severe impacts on the physical and mental wellbeing of members of a community that already face higher rates of loneliness and high all-cause mortality rates.

Loss of Housing and Income

Given that both stable housing and higher income are correlated to lower mortality rates for COVID-19, assessing the degree to which clients experienced changes to their job or income status is integral to understanding how the pandemic affected PWID in Lane County (Ahmad et al., 2020; Arceo-Gomez et al., 2022). To examine the effects of the pandemic on HIV Alliance clients' ability to maintain a steady source of income and stable housing, collaborators were explicitly asked whether their housing status or job status changed during the pandemic. Out of the 41 interviews included in this study, 39% (n=16) included some references to instability in either housing status or job status.

Job Loss and Unemployment

13 of the 41 clients interviewed mentioned that they either lost a job or had greater difficulty finding work during the pandemic. In the quantitative survey component of this study, of the 260 people surveyed, 45% (n=117) self-reported as *unemployed*. This is compared to 6.5% (n=17) of clients who described their current employment status as *employed*. The remaining 48.5% (n=126) of people either

declined to answer or marked another answer such as *student*, *retired*, or *keep house*. While it is unclear from these statistics whether unemployment rates for HIV Alliance clients were elevated during the pandemic, the interviews showed that PWID felt significant employment shocks. When asked about how the pandemic affected their ability to work, a couple of collaborators shared stories about their difficulties finding or keeping jobs.

> Well, before all of this I was a union laborer, and I used to travel for work. In three and a half years in the union, I was never in one spot for more than six months. Now, I've been here for a year and a half, and I've worked about four days in the last year. I was on unemployment until I got cut off in March, and so, you know, gotta do something to make money (Unvaccinated HIV Client, age 45).

> Yeah. You can't go out and get yourself a job, like say you wanna help someone clean their house or you want to help do something. They don't [want you to] because they're not sure. They don't want you pitching in because you might be sick. It definitely hinders a lot (Vaccinated woman, age 55).

Both clients explained that work that had normally been a reliable source of income before the pandemic was no longer possible during the pandemic. The first client was a union laborer, but after COVID-19 caused mass layoffs, he found himself unable to find any source of consistent income. He was able to take advantage of Pandemic Unemployment Assistance (PUA) initially but later lost his unemployment benefits and was unable to secure any other source of consistent income. Similarly, the second client worked as a freelance house cleaner but was unable to find work as people tried to limit their contact with individuals outside their household.

Unemployment was not a problem unique to Lane County or PWID. Between April and August of 2020, the US experienced its single largest drop in employment in history (Smith et al., 2021). For those already facing severe economic hardship, the pandemic made paying for basic necessities even less attainable. There is also a significant overlap between populations with substance use disorders and populations with low household incomes. Of the 260 HIV Alliance clients who filled out the quantitative survey component of this study between July and September of 2021, 69% (n=179) reported that their household income in 2019 was less than $15,000 (for reference, the federal poverty threshold for 2019 for a one-person household was $13,300). For those living at or near the poverty threshold, the pandemic carries an even heavier burden. Past research from the pandemic era showed that individuals in the bottom 10% of income in a sample of adults in Mexico were five times more likely to die from COVID-19 than individuals in the top 10% (Arceo-Gomez et al., 2022). Given that almost 70% of survey respondents were living near the poverty threshold at the time of interviewing, the risks to health observed in prior research likely extend to many of the collaborators in this study.

Housing Instability

Housing is an integral social determinant of health. Unstable housing has been shown to have substantial negative effects on mortality and morbidity regardless of gender identification, age, and race (Schanzer et al., 2007; Baggett et al., 2013). Furthermore, the decreased employment opportunities for PWID likely compounded issues of housing instability. Of the 260 survey respondents, 65% (n=169) reported their housing status as *unhoused*. An additional 15% (n=40) reported *living in temporary housing*, while 13.5% (n=35) reported that they were currently *living in permanent housing*. The remaining 6.5% (n=17) marked that they were either *unsure how to* *describe their housing status* or *preferred not to answer*. These statistics confirm the extensive overlap between housing instability and PWID in Lane County, with at least 80% of all surveyed people living in unstable housing environments.

With that said, only three interviews with HIV Alliance clients referenced difficulties with finding or keeping stable housing as an effect of the COVID-19 pandemic. However, this may be due to the high proportion of HIV Alliance's syringe exchange clients who were unhoused before the pandemic started. For collaborators of this project that did experience housing turmoil because of the pandemic, the mental and physical toll was significant. One such example comes from a man who was saving money to move from a shelter to a permanent living situation:

> Lord have mercy. I was living at the mission. I had a job, I had enough money saved to go get an apartment, but then I got laid off, and I had nowhere to go. I had to go to the fairgrounds when that opened up. That was just debilitating. (Unvaccinated man, age 35).

Even for a woman who was able to keep her housing throughout the pandemic, lost income from COVID-19 significantly increased her stress levels as she tried to ensure that rent was paid each month. In my discussion with her, this collaborator detailed the mental, financial, and emotional toll of the possibility of losing her housing:

> My roommates not being able to pay rent and me with the only guaranteed income in the whole house. I'm paying everybody's rent right now with nothing to spare. Nothing for utilities. This is creating a humongous (sigh). I'm on Social Security. I was barely able to survive as it is. I make thirty dollars over my rent right now. I can't get PUA [Pandemic Unemployment Assistance], so I don't get anything other than Social Security. It's just barely making the rent and that's it. So, it's, it's hard, it's hard to feed the animals and hard to feed ourselves at that point. (Vaccinated woman, age 48).

Her story shows the razor-thin margins that are created and worsened by a prolonged pandemic. Even when she was fully able to pay rent, she was doing so by sacrificing her ability to pay for groceries. For months at a time, she was forced to choose between stable housing and food security. Furthermore, her experiences managing both reduced income and fears of unstable housing provide a tangible example of how issues with employment and housing status were prompted and exacerbated by COVID-19 and the ensuing lockdowns.

Implications for HIV Alliance

One of the concerns that some experts voiced at the onset of the COVID-19 pandemic for PWID was that it might increase substance reliance (Alexander et al., 2020). While it is possible that substance use changed during the pandemic, harm reduction practices are intended to provide support regardless of a person's using habits. Intrinsic to this philosophy is understanding that a person's substance use frequency should not be a core focus when providing them with care. Framing greater substance reliance as a negative consequence of the pandemic only serves to further stigmatize people who use drugs and vilify a community of people who are already frequently neglected by other members of their communities. No questions were asked during interviews or surveys to examine people's using habits or if they changed during the pandemic. Thus, this thesis does not speak to or comment on whether using patterns changed as a result of the pandemic.

However, while controlling substance use habits is counter to harm reduction ideology, preventing overdose-related mortality is a core component of it. Consequently, intersections between rising opioid-related mortalities and the COVID-

19 pandemic are a grave concern for the safety of PWID. To examine the gravity of this intersection in Lane County without impeding on the privacy of my clients, the questions asked regarded their access to HIV Alliance and similar resources in town. The questions also asked how they felt about HIV Alliance's response to the pandemic to see if they had suggestions for improving crisis response strategies for the future. While these questions did not provide a perfect proxy for assessing the safety of these clients, they do inform how easily clients were able to access harm reduction resources. Given the extensive literature that enumerates the benefits to personal safety that come with consistent access to harm reduction supplies, loss of resources would likely mean worse individual safety for clients. Thus, this section explains how COVID-19 affected clients' access to harm reduction resources – and by proxy, their ability to use drugs safely, rather than changes to their substance use habits.

HIV Alliance Syringe Exchange Availability

Due to staffing issues created by the social distancing guidelines during the pandemic, some of the usual syringe exchange locations and times had to be changed. Fortunately, HIV Alliance was able to keep nearly all its locations operating at reduced capacity. However, three locations (one in Florence, one in Salem, and one in Brookings) were suspended at the onset of the pandemic. Furthermore, during the pandemic, one location in Eugene had to stop providing services on one of their two normal days of operation during the week. Because these changes had to be made quickly, some clients were not informed that syringe exchange locations were changed during the pandemic. The information was published on HIV Alliance's various social media profiles, but many HIV Alliance clients do not have consistent access to the internet. This likely created an initial lag before information started to spread via word-of-mouth between clients.

The consistency with which HIV Alliance was able to provide most of its services even during the pandemic was reflected in the sentiments shared by clients. Access to HIV Alliance's syringe exchange was reported as remaining consistent across nearly all 41 individuals interviewed. This is intriguing because it is contrary to what experts predicted at the onset of the pandemic and does not match what data from other areas show. A national study across the United States found that 43% of 173 surveyed syringe exchange programs had to significantly reduce their services due to COVID-19 (Glick et al., 2020). A comparable survey in England and Northern Ireland produced similar results (Croxford et al., 2021). Interestingly, a qualitative study conducted in rural Oregon was the only other study that found that reported that syringe exchange access was largely uninterrupted for their study population (Seaman et al., 2020). As HIV Alliance syringe exchanges are a key location for both harm reduction and COVID-19 services, understanding how HIV Alliance was able to maintain consistent service could benefit future public health campaigns as well.

For HIV Alliance, the discrepancy between national findings and local access to syringe exchange services is likely due to some of the unique infrastructural advantages that served HIV Alliance well during the pandemic. By operating out of an RV, HIV Alliance already had the necessary equipment to conduct syringe exchanges outdoors – something that other syringe exchange locations were unable to do (Seaman et al., 2020). This enabled them to keep their operations functional while adhering to vital public health measures like physical distancing. Furthermore, an initiative by the Lane

Transit Direct bus service enabled passengers to ride for free throughout Lane County. This meant that individuals who may have otherwise struggled to receive transportation to syringe exchange locations were able to get there far more easily during the pandemic. By extension, this also meant that HIV Alliance clients were consistently able to access COVID-19 testing and vaccination services if they so desired, thus eliminating some accessibility-related barriers to vaccination.

Trust Between HIV Alliance and Clients

One of the most evident effects of the pandemic was a growing sense of trust between HIV Alliance and its clients. Nearly all 41 clients interviewed spoke positively about HIV Alliance, particularly when speaking about HIV Alliance's efforts during the pandemic. Several clients explained that HIV Alliance became a key resource during the pandemic. For these individuals, including those in the passages below, HIV Alliance's commitment to providing service throughout the pandemic instilled greater confidence in their minds that the organization truly cared about its clients.

> The people that worked for HIV just seem to be on the ball for doing what they set out to do. I'm sure there's a lot of people that do not agree with this service. Probably the majority of the public. But I know that in the heroin crowd, we're happy they're here. (Unvaccinated man, age 66)

> I just think it's just top-notch. HIV Alliance is just top-notch. And I've been across America and dealt with a lot of, like, homeless shelters and people. And [HIV Alliance is] just on it. (Unvaccinated HIV Alliance Client, age 42).

Both clients above explained that one of the main factors that set HIV Alliance apart from other organizations was their attentiveness to their clients. The ability of the HIV Alliance to react quickly to the changing circumstances imposed by the pandemic was already evident from their ability to continue providing services when other syringe exchange providers could not. The consistency and reliability of the HIV Alliance made it an invaluable resource for PWID during the pandemic. Furthermore, as COVID-19 testing and vaccines became available, HIV Alliance's incorporation of these services into normal syringe exchange operations enabled them to leverage the trust they had already established with their clients to convince them to take advantage of COVID-19 resources.

During the pandemic, HIV Alliance quickly became a key distributor of COVID-19 resources and information. Even the clients who were most skeptical about the pandemic or the new vaccines viewed HIV Alliance as a valid and trustworthy resource for COVID-19 information and services. When asked where they look for COVID-19 information, ten clients mentioned HIV Alliance as their primary source of information (this was second only to more general responses like "Google" or "the news"). This shows that HIV Alliance quickly assumed the role of a distributor of trustworthy COVID-19 information. The discussions with the two women below show the clear link between trust in HIV Alliance and trust in the COVID-19 information they provide. These were their responses when asked how they felt about HIV Alliance's response to the pandemic.

> I trust them with all my heart because these people wouldn't give anything that's going to hurt you. Because these people here are very, very helpful and concerned about people's lives. I'd like to see more of that too, people's lives being helped (Vaccinated woman, age 60).

> You can get the test and the vaccine if you want to. And if you wanted more, if people wanted information, they have tons of information about it too. Which I think is good for us homeless people and stuff like that, because we don't a lot of people don't have the internet to go to get

> information about it. So, these guys help a lot. (Vaccinated woman, age 60).

Both women also mentioned that they chose to get vaccinated after being exposed to the information that HIV Alliance provided to them. The power that trusted organizations have in persuading individuals to get vaccinated is key to reaching hard-to-reach populations. As HIV Alliance and the two women above explain, trust that was predicated on mutual respect between clients and providers was naturally extended to other health efforts that they offered, like the incentivized COVID-19 testing program, the vaccination outreach program, and the qualitative interviews conducted for this project. This created a centralized gathering of support resources where clients could exchange syringes, get tested for COVID-19, get vaccinated, and contribute to ongoing research efforts to better understand how the COVID-19 pandemic affected PWID in Lane County. Even as our ability to respond to COVID-19 improves and pandemic public health measures are reduced, the suite of services offered at syringe exchange locations provide an efficient working model for community-centered public health outreach for PWID.

Providing COVID-19 resources in an environment that is familiar and comfortable for PWID is key to narrowing the health gap for PWID. As a marginalized community in healthcare, PWID consistently put off accessing healthcare services until their illnesses are more severe (Muncan et al., 2020). This leads to worse health outcomes and higher mortalities from preventable diseases. Thus, outreach services are particularly important to reach members of the community of PWID. However, these outreach services are not effective unless they are accepted by community members.

Therefore, HIV Alliance is a key player in the continued efforts to provide COVID-19 services to PWID in the long term. Even beyond the pandemic, providing a consistent avenue for vaccinations and testing services will be essential to ensuring that COVID-19 does not continue to spread among high-risk PWID.

The same success that allowed HIV Alliance to mount a joint response to reduce overdoses and COVID-19-related deaths during the pandemic should be applied for future events as well. Centralizing resources in a familiar and easily accessible location (or locations) is a tactic that would be effective in other areas, for other crises, and for other marginalized communities in healthcare. The adaptations that HIV Alliance has made to its services are replicable and can provide community-based integrated healthcare for populations that face structural barriers to traditional healthcare systems.

CHAPTER 3: A New Framework and Its Implications

This chapter uses the evidence discussed in prior chapters to advocate for more targeted mechanisms for mitigating future vaccine hesitancy among PWID. First, it draws on the experiences of HIV Alliance clients as shared in their surveys and interviews to identify the strengths and shortcomings of existing vaccine hesitancy models for practical use for PWID. Next, it proposes alterations and additions to the dominant 3C's model of vaccine hesitancy that was created by the WHO to better reflect the concerns of the collaborators involved in this research. These alterations consider and expand on the connections between an individual's social determinants of health and their hesitancy in accessing available vaccine services. Finally, it discusses the potential implications that this model could have for efforts to reduce vaccine hesitancy made by community organizations like HIV Alliance.

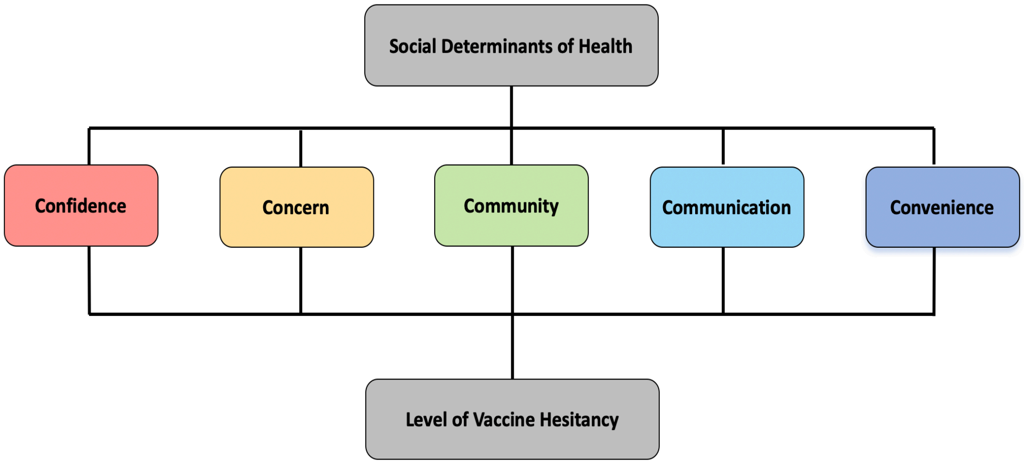
Developing a Vaccine Hesitancy Framework for PWID

The experiences shared by HIV Alliance clients show the need for a model that is specific to PWID and that is rooted in the sentiments shared by actual members of the PWID community. As this chapter later demonstrates, the standard 3C's model of *confidence*, *complacency*, and *convenience* lacks the specificity and applicability required for use within marginalized communities in healthcare like PWID. The WHO's model is intended to be widely generalizable across all demographic groups. However, by intentionally maintaining a broad perspective, the 3C's model fails to capture the heart of the vaccine hesitancy issue on an individualized level, particularly for people who face discrimination and dehumanization within their communities.

Vaccine hesitancy is variable and hugely dependent on an individual's social and environmental circumstances. As the prior chapter illustrated, determinants of health like housing stability, access to education, and experiences with discrimination shape how an individual perceives and accesses healthcare resources, including vaccines. Thus, this project proposes an updated and adapted model that considers the arguments of the 3C's model but contextualizes them within the unique ways that poor social determinants of health influence these motivators for PWID. It also proposes the addition of two new themes – *communication* and *community implications*.

The updated model thusly proposes 5C's for vaccine hesitancy among PWID – *confidence*, *concern*, *convenience*, *communication*, and *community implications*. It also presents these 5Cs as factors that are directly influenced by an individual's social determinants of health. There is some conceptual overlap between the model presented here and the WHO's more general model. However, while the WHO's model is restricted by its broad scope, this thesis analyzes the vaccine hesitancy motivators that were frequently mentioned by PWID. By supplementing the existing 3C's with two additional factors (*communication* and *community implications*), this thesis takes a closer look at the impact that an individual's social network and environment have on their vaccine intentions. It does this by looking at how information availability, information authenticity, and community considerations influence an individual's vaccine hesitancy level. A figure illustrating the 5Cs model is shown in figure 4 below.

Figure 4: Proposed 5C Model of Vaccine Hesitancy



The contents of this chapter are divided into two subsections. The first discusses this project's proposed adaptations and contributions to the existing 3C's of vaccine hesitancy while offering critiques where the existing model is inadequate for practical use among PWID. The second subsection then explains the need to expand the WHO's model beyond its 3C's to provide a functional paradigm for describing vaccine hesitancy motivations. This subsection also focuses heavily on the influence of community factors, something that the WHO's 3Cs model doesn't directly take into consideration. Both subsections are firmly grounded in the data from the surveys and interviews conducted with the help of HIV Alliance's clients.

Adapting the WHO's 3C's

Confidence

Confidence-related vaccine hesitancy refers to how an individual's level of trust in those in charge of vaccine development and distribution affects their hesitancy to receive a vaccine. This confidence is motivated by trust or distrust in government officials, in healthcare workers (both those developing and administering the shot), or in the vaccine itself. This study's quantitative survey found a relatively high rate of responses that indicated low confidence levels as a vaccine motivator. On the survey, when unvaccinated clients were asked why they had not gotten a vaccine, two responses pointed to a lack of confidence in vaccination services, *I'm concerned about side effects from the vaccine,* and *I don't think vaccines work very well.* Of the 151 unvaccinated clients who filled out this portion of the survey, 38% (n=58) marked at least one of the two responses.

The qualitative interview component of the project found that a much higher frequency of responses referred to lack of confidence as a vaccine hesitancy motivator than is shown by the quantitative surveys. Of the 41 HIV clients interviewed for this project, 78% (n=32) mentioned a lack of confidence in government, healthcare services, the vaccine, or any combination of the three as a primary motivator for heightened vaccine hesitancy. The disparity between the qualitative and quantitative data is likely because the quantitative surveys only targeted lack of confidence in the vaccines themselves, while the open-ended questions of the qualitative interviews allowed collaborators to voice distrust in government and healthcare providers as well.

Distrust in government was mentioned in 23 of the 41 interviews conducted for this project. This distrust was generally rooted in the underlying sentiment that the government had an unknown agenda when encouraging people to get vaccinated. As a community that is provided very little support through much-needed social welfare programs like socialized healthcare or government-subsidized housing, the distrust of government actors is not surprising. However, the depth and gravity of government distrust among the individuals interviewed for this project was significant. Without prompting, 20% (n=8) of clients specifically cited fears that the government was using the virus or vaccines as a genocidal method of population control, stating that it was intended to target unhoused, infirmed, and elderly people. When asked why they don't trust the COVID-19 vaccines, the three clients below explained their fears related to the supposed ulterior motives of the government.

> It's just a way for the government to… I don't know. It's a way to round people up, the homeless and stuff and do something with them. So, it would be the smart thing to do to instead control the population because we have too many fucking people in this world. And they're gonna take out the weak and the old and the homeless. (Unvaccinated man, age 52).

> Well, just because of what I've heard, I feel like, with people who are sick, I think [the vaccine] is pretty much [the government] trying to kill them off. That kind of thing. And like older people too, you know, I don't know. Pretty much, that's what I feel like. (Unvaccinated woman, age 30).

> Well, I heard about the vaccine being started and how it started. The sergeants that were in the Army are the ones that started all this. They're the ones that got that started from China because they went away and then brought it over to here and got it all started. You know they thought they were going to kill most of us, but they didn't. (Vaccinated woman, 52).

The above quotes, as well as the sentiments of several other HIV Alliance clients, weave a similar narrative. These comments show a deep and ingrained sense of distrust prompted and perpetuated by the lack of support resources provided to them by the government. Additionally, the fact that government-sponsored genocide through vaccines was a commonly shared sentiment within the sample population of this project demonstrates how influential government distrust is for an individual's vaccine decision. For those who cited other reasons for government distrust, their fear mostly stemmed from fear that the government was withholding information. Some clients feared that the COVID-19 pandemic was being used by the government to gain more information about its constituents. Of the 15 people who mentioned government distrust but did not mention rumors about population control, eight feared that the government was not being truthful with them. When asked why they did not trust the government, many clients stated things like:

> I don't know what the bigger part of this is. I said I'm not a big conspiracy guy, and I'm not. But I can see it's crooked. Somebody is walking a crooked line. My government, the government here is crooked. I don't think for one second this is only about a virus. (Unvaccinated man, age 66)

> There's more to it. There's stuff that they're not telling us. The information is not all the way out there. There's no, there's not enough information. They're lying to us. (Unvaccinated man, age 34).

Governments play a prominent role in vaccine development and distribution, particularly in crisis scenarios like the COVID-19 pandemic. Thus, distrust in government has directly translated into heightened COVID-19 vaccine hesitancy. If a high proportion of PWID are disincentivized from getting the COVID-19 vaccine due to government involvement, ongoing and future COVID-19 vaccine outreach programs need to find a way to alleviate those fears.

The government was not the only factor that shaped confidence regarding the COVID-19 vaccines. When asked about their views on the COVID-19 vaccine, 40% (n=16) of interviewees reported that trust or distrust in healthcare influenced their decision to receive a vaccine. Contrary to the overwhelmingly negative perception of government actors, the perception of healthcare providers was generally more positive. 12 of the 16 collaborators in this group discussed healthcare providers as a positive resource, encouraging them to feel more comfortable receiving a vaccine. It's important to note that very few of these conversations discussed healthcare providers in a formal setting (like private clinics or hospitals). Instead, many clients cited trusted health organizations like HIV Alliance and White Bird Clinic that cater specifically to unhoused communities. These organizations prioritize judgment-free care for PWID and thus have developed strong ties to many members of the community. This further emphasizes the vital role that community health organizations have for vaccine outreach programs. Clients drew heavily on past experiences and existing relationships with these healthcare organizations when they considered whether they wanted to receive the vaccine or not. In the instance shared below, past experiences with HIV Alliance enabled greater trust for when clients sought COVID-19 and syringe exchange resources.

> Just like asking them two ladies up there, they were very helpful. Explaining what was, what is, what's going on. I can't remember the questions I had, but you know, when I started off, I was kind of in the dark and other than the stuff I partially heard on the news, I didn't know what to believe. And they just pretty much laid out what's going on, you know how it's doing. (Unvaccinated man, age 60).

The trust that underscores the conversation above is key to increasing vaccine uptake among hesitant PWID. The discussions with all twelve individuals who spoke positively of healthcare providers shared a common thread – the providers that mitigated vaccine hesitancy among their clients were also those that cultivated an environment that was reliable, trustworthy, and provided agency to clients to improve their own health. Of the twelve individuals who spoke positively about their experiences with healthcare workers, those who had received vaccines usually did so through one of the vaccination outreach programs offered by HIV Alliance or White Bird, stating things like:

> The doctor that comes to the exchange talked me into [a vaccine] (Vaccinated woman, age 29).

HIV Alliance and White Bird also readily provided information about COVID-19 and COVID-19 vaccines while openly challenging misconceptions that clients had. They combatted misinformation in ways that considered the role of consistent dehumanization in vaccine hesitancy motivations. The COVID-19 testing and vaccination booths at HIV Alliance syringe exchanges became places where clients could ask healthcare experts questions about COVID-19 and its vaccines without fear of judgment. In fact, 13 of the 41 individuals interviewed explained that one of HIV Alliance's key roles during the pandemic was acting as a consistent source of trustworthy COVID-19 information. This shows that even for those who did not express trust in healthcare as a primary motivator for reduced vaccine hesitancy, HIV Alliance still acted as a significant source of accurate information.

Of the four clients that expressed distrust in healthcare as a motivator of greater vaccine hesitancy, three referenced fears of "Big Pharma" companies like Pfizer and Moderna as motivation to forego or delay the vaccine. These fears were largely tied to the government distrust referenced previously in this chapter. When asked where the distrust in vaccine services may stem from, one client spoke transparently about the link they saw between distrust in government and distrust in healthcare providers.

> I think it’s the government and them trying to tell the medical people what to do... I don't know, maybe it's both. I don't know (Vaccinated woman, age 29).

Another client feared that vaccine researchers were understating the dangers of side effects from COVID-19 vaccines.

> It takes a long period of time, you know, to come up with [a vaccine] like this. To figure out [the virus] and what can combat it. And so now, there are always trials with medicine and stuff. They run trial tests. We didn't have time for trial tests. We would be the trial tests. You know, they're saying the FDA is saying, "take this." Well modern medicine tells me this, that even with the best doctors in the world today, they're able to help this problem. But in doing so, you might die. You might get liver problems. (Unvaccinated man, age 35).

For clients that already have greater difficulty accessing healthcare, calming fears that arise about the safety and trustworthiness of providers is paramount. Some of these fears emerge from deep-seated distrust in a system that has perpetually marginalized and degraded them. To that end, assuaging those fears completely is beyond the scope of this thesis. However, the demonstrated positive influence that HIV Alliance and other local organizations have played in reducing vaccine hesitancy among their clients shows that completely mitigating general distrust of healthcare or government actors doesn’t need to be the end goal. Rather the data from the interviews conducted for this project suggest that fostering high-quality working relationships between members of the community and local organizations is an effective way of combatting distrust in the people providing vaccination services, even if distrust in government forces remains.

Trust and distrust specific to the COVID-19 vaccines was the most frequently mentioned influential factor in motivating an individual’s decision to accept, reject, or delay a COVID-19 vaccine. 73% (n=30) of the 41 clients interviewed mentioned having some reservations about getting vaccinated that were directly tied to information they had received about the COVID-19 vaccines. However, the significance of these reservations was highly variable across interviews. There were two primary themes that emerged from the data related to trust and distrust in COVID-19 vaccines. First, some clients feared that the vaccine was more harmful than it was helpful. Second, some clients feared that the expedited development of the vaccine made it unsafe.

63% (n=26) of clients in the sample voiced fears related to rumors of complications after receiving a COVID-19 vaccine. Secondhand stories of severe reactions to the vaccine were frequent, with many clients voicing that they felt that reactions to the vaccine were more severe than COVID-19 itself. Though these rumors are not supported by scientific research, the perceived risk of COVID-19 vaccination was high among the sample population interviewed for this project. A couple of clients stated that the primary reason they were not vaccinated was because of the risk of immediate complications.

> Not too sure about it. I've heard about people getting sick. Lots of complications with [the vaccine] that had me scared. The rumors say that lots of people are getting sick and having complications from it. (Unvaccinated man, age 46).

> It might protect some people, but maybe it might not protect others. Everybody's different. We haven't done enough research; we haven't had enough time for the research. Seems like they are just trying to find a fix-it to the problem or like a problem fixer. I don't know, it's sketchy as fuck to me. When it comes to your body, you've really got to care about what you put in it. (Unvaccinated woman, age 37).

Others were less worried about short-term complications but questioned whether the vaccine would be safe in the long run. 11 clients worried that the long-term implications of the vaccine outweighed the value of protecting themselves against COVID-19 now. Seven worried that the entire vaccine development process was rushed. In general, there seemed to be a shared sentiment that not enough research had gone into developing the vaccine. Several clients described the vaccines using terms like "experimental" or equated those who had gotten vaccinated to "guinea pigs." When asked whether she felt like the COVID-19 vaccine was safe, one client expressed,

> It's a social experiment, a science experiment for somebody somewhere. Give me a break. It's experimental drugs (Unvaccinated woman, 58).

Another client believed that the testing that the vaccines had to undergo was not intensive enough, stating,

> It hasn't gone through long clinical studies or whatever, stuff like that. It just makes me wary of it (Unvaccinated man, age 30).

Both conversations highlight the skepticism that strongly influenced vaccine decisions for many HIV Alliance clients. However, unlike the underlying and deeply rooted distrust in healthcare systems and governing bodies, distrust that is acutely related to specific vaccines can be directly combatted. Accessible educational resources that directly address frequent concerns – like the fast-tracked vaccine development process, the evidence showing the effectiveness of vaccines, and the low rates of complications from vaccines – are invaluable for increasing trust in vaccine providers. Furthermore, as this thesis will explain in greater detail later in this chapter, the source of that information must be both trusted and highly regarded.

Concern (Not Complacency)

Within the WHO's 3Cs model, *complacency* contributes to vaccine hesitancy when individuals perceive the risk of vaccine-preventable diseases as too low to warrant getting vaccinated against. The interview data support that perceived risk plays a prominent role in an individual's vaccine decision but framing low perceived risk as complacency is inaccurate. Using the term complacency inherently implies that individuals who prioritize other responsibilities over getting vaccinated are willingly facilitating the spread of vaccine-preventable diseases. For some HIV Alliance clients, the other responsibilities reducing motivation to get vaccinated included things like securing meals, water, and shelter. This project proposes that the category be renamed to *concern*. *Concern* addresses the same points that the WHO considers in their model with *complacency* but does so without the negative implications that vaccine hesitant people are intentionally complacent to disease transmission. *Concern,* as it is mentioned in this study, refers to how an individual's perceived risk of a vaccine-preventable disease relative to other potential risks to their health (including food security, chronic health issues, etc.). This definition understands that while vaccination is vital for mitigating the impacts of deadly diseases for PWID, many people may have other pressing matters that constrain their ability to get vaccinated or make getting vaccinated a lower priority. So, how people interpret their own risk is meaningful for determining their vaccine decisions.

72% (n=30) of the 41 interviewed HIV Alliance clients described their perceived risk of contracting COVID-19 (either high or low) as influential in their decision to accept, delay, or refuse a vaccine. For the survey component of the study, 32% (n=48) of the 151 unvaccinated individuals marked that concern about COVID-19 played a role in their vaccine decision making process. 21% of the total survey sample (n=32) marked that they would get a COVID-19 vaccine because they *don't want to get really sick from COVID-19*, while 16% (n=24) marked that one of the reasons they would not get a vaccine was because they were *not concerned about getting really sick from COVID-19*. The patterns in these responses show that individuals' assessments of the risks posed by COVID-19 were both variable and influential when choosing to receive or delay a COVID-19 vaccine.

One of the key questions asked during the interview portion of the study was whether HIV Alliance clients were personally worried about getting COVID-19. This question was asked to see how each client assessed their own risk profile regarding COVID-19. Of the 41 clients interviewed, 80% (n=33) responded that they were not worried about getting COVID-19, and 15% (n=6) responded that they were worried. 2 clients chose not to answer the question. All clients that were worried about COVID-19 cited fears about their personal health as the main reason for concern. All six also mentioned one or more pre-existing respiratory conditions including, COPD, asthma, lung cancer, and lung disease.

Those with low levels of concern for COVID-19 fell into two categories. Ten of the 33 clients who expressed low levels of concern explained that they had other pressing matters that demanded more of their attention than receiving a COVID-19 vaccine. Most of these concerns had to do with activities that many members of the public do not have to deal with on a consistent basis – things like finding meals, accessing a shower, or ensuring that they have a safe place to stay for the night. Perhaps the clearest connection between vaccine hesitancy and concerns over other pressing matters came from a client when asked why they had not yet been vaccinated,

> I just don't have the time for it. Just trying to stay alive is a full-time job, especially when they make you move locations every 3-7 days (Unvaccinated HIV Alliance client, age 46).

Coupled with rumors that the vaccines caused severe allergic reactions that left people unable to operate normally, many clients chose to delay or reject getting vaccinated because they felt it was not worth the risk of being unable to fulfill their daily responsibilities. This sentiment was shared across the other nine clients as well, with some clients citing other responsibilities that were linked to basic survival needs as a huge barrier to being able to access vaccine services. When asked why they had not yet chosen to get vaccinated, a few clients were transparent about the fact that it was not the highest priority for them. One such client shared his thoughts below.

> I've got so much going on on a daily basis that it never crosses my mind (Unvaccinated man, age 46).

Extenuating circumstances took time and energy away from clients, which, in turn, manifested as lower willingness to receive a COVID-19 vaccine. Daily responsibilities such as securing meals or housing for the evening restricted clients from accessing vaccine resources because they were forced to prioritize the concern they saw as the most significant risk to their health.

19 of the 33 people interviewed who were not concerned about COVID-19 expressed that they felt they would be able to fight off the virus if they were to contract it. Six of those 19 individuals expressed that their lack of concern stemmed from a perceived level of immunity – through past exposure or because of COVID-19

vaccines. The other 13 clients felt that COVID-19 was not worth getting concerned about at all. For those who were vaccinated, there was a general assumption that once they had completed their initial round of vaccinations (one dose for Johnson & Johnson and two for Pfizer and Moderna), they would have permanent immunity against the virus. In many conversations, clients used their vaccination as justification for no longer being worried about getting COVID-19.

> Um, no, not really. I'm not that worried about it because I got the vaccination. The Johnson and Johnson one (Vaccinated woman, age 43).

> I'm not worried now because I have the vaccine (Vaccinated man, age 65).

> Well, um, no I'm not really worried. I got my first shot today, so I'm just not worried. (Vaccinated woman, age 36).

The misconceptions about the permanence of protection offered by COVID-19 vaccines that are illustrated above are likely a product of our continuously evolving understanding of how to combat the virus. These interviews were conducted just before booster vaccinations were recommended for all adults in the US, so news that protection offered by the vaccines wavered over time may not yet have been common knowledge among HIV Alliance clients. The assumed permanence of COVID-19 vaccine protection also poses a unique dilemma in combatting COVID-19 vaccine hesitancy long-term. If educational outreach programs do not address the fact that COVID-19 vaccines lose effectiveness over time, the perceived risk of COVID-19 for previously vaccinated HIV Alliance clients may not match the actual risk posed to them by the disease. This could then result in lower vaccine uptake and higher vaccine hesitancy in the long term as people are less motivated to remain consistent with their COVID-19 vaccinations.

Of the 13 collaborators that felt that the virus was not a valid source of concern, only three had previously tested positive for COVID-19. For those three individuals, their lack of concern (and thus heightened vaccine hesitancy) came from having only experienced minor symptoms. For the remaining ten clients, their lack of concern about the severity of the virus came from a few different sources. Five clients were ambivalent about contracting the virus, even though they perceived the risk to their health to be considerable.

> No, I don't care if it does or not. I mean, it would be sad to die alone, but that's God's plan. (Unvaccinated man, age 35).

> It could be argued that my defenses are down. But I don't worry about getting it. There are two choices, the choice to worry about it and a choice to not worry about it. It's a false dichotomy, I suppose, there's a million choices in between, but I just choose to not worry about it. (Unvaccinated man, age 66).

> Um, I’m not really worried because if I get it, I get it. If I don't, I don't. The only thing, and I mean, really, the only thing I worry about is my kitty and whether she's taken care of or not and being able to be there for her, but otherwise, I’m not worried. (Unvaccinated woman, age 44).

> If [the virus] is going to get me, it’s going to take me out, but I'm ready. (Unvaccinated woman, age 58).

> No, I mean, I've had a crazy life. I was really abused when I was a kid, and you know, I moved so much. I mean, now with any kind of worries from the virus, I'm over it. I didn't think I'd live to see 20. (Unvaccinated HIV Alliance client, age 42).

These discussions provide insight as to how an individual's level of concern is shaped by how dangerous they view the virus and how their perceived risk of the virus fits within other risks and responsibilities they have to manage. Even for those who view the virus as a significant risk to their health, lack of concern can still play a role in their desire to protect against the virus through vaccination.

The remaining motivations that reduced concern about the virus and consequently reduced incentive to get vaccinated were largely due to perceived natural immunity. Three clients had low levels of concern because they felt that their immune systems were strong enough to fend off any infection from the COVID-19 virus.

> I just don't think it's worth [worrying about]. I think if I get it my body will pull through. (Unvaccinated woman, age 37).

> I don't know why [I'm not worried]. I guess it's because I just don't catch anything. I don't know how that's possible, but I don't get sick. (Unvaccinated man, age 55).

> Because I just don't, I'm not worried about it. I have a phenomenal immune system. (Unvaccinated man, age 34).

These instances best capture when low perceived risk from a disease can translate into high vaccine hesitancy. For the above individuals, the cost of receiving a vaccine outweighed the potential benefits because they did not see COVID-19 as a legitimate threat to their health in the first place. This sentiment is the one that most closely follows what the WHO describes as *complacency*. However, *complacency* fails to capture the huge array of vaccine hesitancy motivators that are related to an individual's level of concern regarding a certain virus. While low perceived personal risk of severe symptoms contributes to higher vaccine hesitancy, the relationship between perceived risk and vaccine hesitancy is more complex than the WHO's definition of *complacency* describes.

Convenience

Convenience in both the WHO's 3C model and the PWID-specific framework proposed in this thesis relates to how easily individuals can access vaccine resources. Potential barriers that can hinder the convenience of obtaining a vaccine include transportation difficulties, trouble affording vaccines, and comfort in accessing vaccine resources. If individuals perceive vaccine services to be inconvenient, they may choose to forego getting a vaccine and thus would exhibit higher levels of vaccine hesitancy. There is an important distinction to be made here between convenience and lack of access. Lack of access occurs when receiving a vaccine is physically challenging or impossible due to lack of transportation, lack of availability, or geographical barriers. Conversely, convenience-related vaccine hesitancy occurs when vaccines are technically accessible, but the cost of receiving that vaccine – in terms of time, energy, and money – outweighs the perceived benefits of the vaccine. Complete lack of access is not considered a motivator of vaccine hesitancy because vaccine hesitancy is predicated on the fact that vaccines are physically accessible. Of the WHO's 3Cs, *convenience* was the category that was least frequently mentioned in conversations with Lane County's PWID community. 29% (n=12) of the 41 interviewed clients expressed that convenience was a determining factor in their vaccine decision.

The comparatively low frequency of responses related to convenience is likely due to several different unique elements of the ongoing COVID-19 vaccination efforts at HIV Alliance. First, because the vaccination effort is currently taking place midpandemic, COVID-19 vaccines are free to the public. This means that – as far as paying for the actual vaccine itself – affordability should not be a hindrance to conveniently accessing COVID-19 vaccines. Furthermore, COVID-19 vaccines are among the first vaccines that have been offered on-site at HIV Alliance syringe exchanges. This makes receiving a vaccine far more convenient and comfortable for PWID who were already consistently attending syringe exchanges. Additionally, HIV Alliance syringe exchange locations are strategically chosen to serve as much of Lane County's PWID community as possible. Since COVID-19 testing and vaccine booths are located at these syringe exchanges, these services are equally well-placed. The vaccine and testing services are also integrated into the ecosystem of harm-reductive services that HIV Alliance was providing pre-pandemic, making them more approachable for HIV Alliance clients. Four clients referenced the convenience of having testing and vaccine services easily accessible at syringe exchange locations. Three of these discussions are included below.

> They've got the vaccine right there. So that's helpful; they come to you. Makes it a lot easier. (Unvaccinated woman, age 57).

> [COVID-19 resources] are always available at every needle exchange. You can always get the test and the vaccine if you want to. (Vaccinated woman, age 43).

> BH: Do you think that HIV alliance has done an adequate job at providing covid-19 resources when you've wanted them?
>
> HIVA Client: Oh, absolutely.
>
> BH: What makes you say that?
>
> HIVA Client: Because they have the testing at every site that you go to, and they have it set up where you can get the vaccine if you want it. (Vaccinated woman, age 44).

However, not all the elements of the COVID-19 pandemic response have resulted in fewer convenience-related barriers for clients. One of the complexities of the COVID-19 vaccination campaign that is more difficult to address is the two-dose regimen for Pfizer-BioNTech and Moderna COVID-19 vaccines. The respective three-and-four-week long gaps between the two doses of each vaccine present a substantial challenge for vaccinating a community that faces a disproportionate rate of inconsistent housing. Six clients mentioned that the fact that Pfizer and Moderna required two separate doses made them hesitant to commit to even the initial dose for either. For this reason, many clients also explicitly voiced their preference for the Johnson & Johnson vaccine because it only required one dose.

> Well, yeah, I think it is, you know, it's just the one-shot deal, and I think that's a lot better than the two-shot thing. It's more convenient if you just have to get one. (Vaccinated woman, age 43).

> Yeah, you know, and now there's like two of them. If I was going to get one, you know, it'd probably need to be just the one shot. (Unvaccinated man, age 44).

However, while Johnson & Johnson made receiving initial doses far more convenient for clients, the difficulties in returning for a second dose provide insight for future booster doses. With the current evolution of the virus and of the vaccines, booster doses are an unavoidable complication. The effectiveness of all available COVID-19 vaccines wanes over time, making boosters a necessary addition to vaccine regimens. Consequently, the long-term efforts to protect PWID from COVID-19 must optimize the convenience of getting repeated doses of the vaccine. For HIV Alliance, this means continuing to provide mobile vaccine services at syringe exchanges to decrease the barriers to vaccination that are created when individuals are either uncomfortable or unmotivated to receive a COVID-19 vaccine. It also means that addressing convenience-related vaccine hesitancy now will pay dividends in the future if boosters continue to be necessary.

Another complication that likely contributed to convenience-related vaccine hesitancy, but one that was far more difficult to research, were challenges that arose when trying to get transportation to vaccine providers. Only five interviewed clients reported difficulties accessing syringe exchange due to complications with personal or public transportation. However, as a previous chapter discussed, HIV Alliance's infrastructure enabled a quick pivot to mobile syringe exchange (and thus later vaccination) programs, meaning this sample is likely not representative of the experiences of PWID nationally. Indeed, during the pandemic, there has been a substantial national decrease in syringe exchange participation due to transportation issues (Glick, 2020). Additionally, since all interviews for this project were conducted on-site at syringe exchange locations, individuals who were altogether unable to access syringe exchange were not included in the sample population. In Lane County, HIV Alliance remains one of the main sources for COVID-19 vaccination outreach programs targeting PWID, so difficulties accessing syringe exchange translates directly to difficulties accessing vaccine resources. Thus, increasing access to affordable and accessible transportation would likely also decrease convenience-related vaccine hesitancy.

Adding to the Framework

While the themes expressed in the WHO's 3C's framework capture a fair amount of the vaccine hesitancy motivations for PWID, there are other significant contributors to vaccine hesitancy that are not included. The 3C's model only considers vaccine hesitancy at the individual level; the discussion of *confidence*, *complacency* (or *concern*), and *convenience* is centered on how a person's unique individual perception of vaccines affects their vaccine decisions. However, the original 3C's model fails to consider how the environment around individuals alters their perception of vaccines. In particular, the ways that people receive and interpret vaccine information from external sources – local, national, and international media, trusted community members, community organizations, etc. – have a substantial influence on how people perceive the safety, effectiveness, and importance of a vaccine.

Consequently, the adapted framework proposed in this project specifically addresses how an individual's community influences their willingness to get vaccinated. The discussions with HIV Alliance syringe exchange revealed that the connection between community influence and vaccine hesitancy should be added to the existing model through two additional categories: *communication* and *community implications*. *Communication* relates to how an individual's access to information about vaccines and vaccine-preventable diseases affects their sentiments on the vaccine in question. It also explains how exposure to misinformation and the spread of rumors related to vaccines can substantially hinder an individual's willingness to get vaccinated. *Community implications* explores the degree to which an individual sees themselves as an actor within their community. This includes the degree to which a sense of collective responsibility and the desire to protect their high-risk peers influences an individual’s desire to receive a vaccine.

Communication

The sources and methods of communication that people use to learn new information about vaccines and vaccine-preventable diseases have a substantial effect on their perception of getting vaccinated. The notion of communication-related barriers contributing to vaccine hesitancy was first hypothesized by Razai et al. in 2021. However, prior to this study, no empirical research had been conducted to confirm communication’s role in influencing vaccine hesitancy. This thesis finds that both misinformation and lack of information contribute to vaccine hesitancy. If claims that vaccines are harmful or were produced too hastily come from sources that an individual trusts, they are more likely to accept those reports as true. Additionally, since PWID often have limited access to internet-equipped devices, their ability to access up-to-date information is hindered. Thus, both an individual’s preferred sources of news and their ability to stay up to date on the latest can influence their decision to accept, delay, or reject a vaccine.

Limited exposure to trustworthy information was a vaccine hesitancy motivator voiced by many HIV Alliance clients in both the quantitative survey and qualitative interview components of this project. 44% (n=67) of the 151 survey respondents explained that they would not get a COVID-19 vaccine because they *don’t know enough about how well a COVID-19 vaccine works*. Likewise, 29% (n=12) of the 41 clients interviewed expressed that they didn’t feel like they had enough information about the COVID-19 vaccine to make an educated decision to receive or reject it. Of the

12 interviewed clients that mentioned communication-related barriers to vaccination, four clients expressed that they did not have the desire to access any information about COVID-19 at all. When asked what sources of information they used to find information on COVID-19 and COVID-19 vaccines, these clients explained that they intentionally avoided looking for such information.

> BH: If you're looking for information about COVID-19, where would you usually go for that?
>
> HIVA Client: Oh, I don't look for it at all. (Unvaccinated HIVA Client, age 42).

> BH: What sources have you used to learn more about the vaccine?
>
> HIVA Client: None. (Unvaccinated man, age 24).

For the remaining eight clients who mentioned communication-related barriers, their desire to learn more about COVID-19 and COVID-19 vaccines was high, but their ability to do so was restricted by a lack of access to quality information channels. One client articulated the difficulties that unhoused people faced when trying to stay caught up with the latest news.

> If people want information, [HIV Alliance] has tons of information about [COVID-19] too. Which I think is really good for us homeless people because we don't -- a lot of us don't have the internet to get information. So, these guys help a lot. (Vaccinated woman, age 43).

This client also brings up another key point. In situations where the internet isn’t easily or consistently available, organizations like HIV Alliance must be able to provide trustworthy, accurate, and reliable information. While most clients that mentioned HIV Alliance as a primary source of information referred to verbal conversations with the health professionals at the testing and vaccination booths, this information should also be presented in several formats including in written form and in a space that allows people to get questions answered. While this client was clearly supportive of the information that HIV Alliance was able to provide to its clients, other interviewees felt that information from HIV Alliance or other sources was hard to access, hard to understand, or was not truthful. For these individuals, a lack of information from sources they trusted created a high level of skepticism toward receiving a vaccine. When questions went unanswered, clients exhibited greater doubt about the safety of the vaccines. For instance, one woman who had received a Johnson & Johnson vaccine was having trouble understanding the lower vaccine effectiveness rates for her shot relative to the Pfizer and Moderna vaccines.

> The Pfizer and Moderna I've heard have a higher success rate, but the one I got, unfortunately, does not have a huge protection rate. So, I don't know [if the vaccine is effective] because I don't understand how it's different. If it all has the same coding to tell your body how to fight off the infection, why is it different? That has me concerned. (Vaccinated woman, age 24).

This difficulty reconciling the differences between the vaccines may not have dissuaded this client from receiving a vaccine, but given the need for a long-term response to COVID-19 transmission, her difficulty finding information that she could trust could result in greater vaccine hesitancy in the future. Another client felt that the information she was receiving from HIV Alliance wasn’t complete and thus felt that the source of information wasn’t highly credible.

> How do we know that what [HIV Alliance] is telling us is completely true? It could just be true to their knowledge. Are they only providing information that they believe to be true? I wish they were providing more information than the very specific things they provide. They should be

> able to relay your questions and answers. (Unvaccinated woman, age 58).

The other five clients expressed similar sentiments, with all five delaying their COVID-19 vaccinations because they didn't feel like they had enough information to make an informed vaccine decision.

Furthermore, the politicization of the COVID-19 pandemic and public health response has shown that misinformation can be a highly influential motivator for vaccine hesitancy. Research conducted during the pandemic found that misinformation campaigns consistently lowered the intent to get vaccinated (Garett & Young, 2021; Loomba et al., 2021). Trusted sources spreading conspiracy theories about unsubstantiated dangers of COVID-19 vaccines can create long-term distrust in healthcare that manifests as vaccine hesitancy. During massive vaccination campaigns like the ongoing effort to mitigate the transmission of COVID-19, false information and conspiracy theories must be addressed and disproven.

Of the 41 HIV Alliance clients interviewed for this project, 56% (n=23) referenced some form of misinformation related to COVID-19 vaccines. The most common form of misinformation was through conspiracy theories and local rumors spread by trusted individuals or larger media outlets. While most of the clients did not accept these conspiracy theories as absolute truth, the unsubstantiated claims about the dangers of the vaccine still made many people more hesitant to receive a vaccine. Nine clients cited local rumors or conspiracy theories that they had heard as motivation for delaying getting their vaccine. The client below shared a story she had heard secondhand about a young woman living in Eugene.

> You hear about all these different things, like this one lady, her teenage daughter was a straight-A student, like a genius and all that. Went down and got her first one. She was like, okay. She got her second one and now she's like paralyzed. Like she can't move, and she can't even talk anymore. And it’s scary. (Unvaccinated woman, age 37).

The rumors shared by other clients followed a similar format; an otherwise healthy individual received a COVID-19 vaccine and experienced severe symptoms that led to permanent harm or death. The rumors that were shared cannot be completely disproven; however, only one death has ever been reported in Oregon that was potentially related to complications from the COVID-19 vaccine (OPB staff, 2021). Thus, the frequency at which these rumors were mentioned makes their validity questionable. The latest research on allergic reactions to COVID-19 vaccines found that the rate of reactions is about 0.2% (Beatty et al., 2021). Furthermore, none of the stories came from firsthand experience with the person who had adverse reactions to the vaccines, but all came from a source that the client trusted. These experiences illustrate the significant effect that a person’s social circle has on the perceived danger of the vaccines.

Additionally, 14 clients mentioned that they knew someone who fell victim to COVID-19 misinformation. One such client shared her thoughts on why conspiracy theories were particularly dangerous for unhoused people.

> They ought to make it illegal to [spread conspiracy theories]. It makes me mad to freak people out like this. And it's the homeless people that are affected mainly. Then they pass the paranoia. Like my friend’s old man, he’s got HIV. He won’t get vaccinated because he says it’s got nanobots in it. I said come on man, you got HIV, you need to get it, you need the vaccine. I tell people all the time they need to get the vaccine. (Vaccinated HIV Alliance Client, age 65).

Even for those who haven’t fallen victim to the myriad misinformation campaigns about COVID-19 vaccines, when false information permeates social circles, it can create doubts about the safety of vaccines. Another client explained how having friends that believed in conspiracy theories about the vaccine made her more nervous about getting vaccinated.

> They're convinced that the government is making sure that everybody who has taken the vaccine now has some sort of I don't know, X on their back or something like that so that they can get rid of all the people that have had the vaccine to lower the population of the Earth. I don't agree with most of it, but it's just scary. And you never know nowadays. You don't know. That could be the absolute truth. (Vaccinated woman, age 49).

This shows the influence that misinformation that comes from trusted individuals can have on individuals that are otherwise skeptical of conspiracy theories. Thus, this same logic must be applied when attempting to distribute accurate vaccine information. This is especially true given the large proportion of interviewed and surveyed clients that voiced their distrust in government. Because of their government affiliation, common actors for disseminating accurate disease and vaccine information like public health departments may not be an effective method for quelling fears from misinformation within this demographic. This is another space where local organizations that work closely with PWID can be an invaluable resource in the continued response to COVID-19. HIV Alliance already provides information about COVID-19 through written pamphlets and offers a space for clients to ask questions at the COVID-19 testing booth. However, fears about conspiracy theories and purported dangerous side effects of the vaccines remain common motivators for PWID to reject or delay vaccination. Thus, the efforts to provide information should be reinforced to meet the demand for accurate, updated, and reputable educational resources.

Community Implications

The final branch of the PWID vaccine hesitancy framework developed through this research refers to individuals' motivation to receive a vaccine that emerges from a sense of responsibility to protect others within their community. Due to the dehumanization that PWID frequently face from other members of society, many of HIV Alliance's clients rely on each other for systems of mutual support. This also means that there is a strong sense of community among HIV Alliance's clientele. This sense of community is an irreplaceable asset when trying to reach marginalized communities like PWID during vaccination efforts. Thus, it is imperative to understand how community responsibility manifests as a motivator for vaccine decisions. As Wismans et al. (2021) found in their sample of college students, a sense of collective responsibility has already been shown to influence vaccine uptake among some demographic groups. Yet, the WHO's 3C's model largely fails to address any form of community influence on vaccine influence. While it could be argued that a sense of community may be captured as a modifier to the previously discussed *concern* term, the analysis of discussions with HIV Alliance clients revealed a key distinction between the two terms. *Concern* refers to the personal risk assessment that every individual makes when they consider the severity of a vaccine-preventable disease relative to other life or health responsibilities. Conversely, *community implications* refers to the level of importance a person places on the perceived risk of a vaccine-preventable disease for other members of their community. Thus, while both consider perceived risks from vaccine-preventable diseases, the two capture wholly different motivators for vaccine intentions.

49% (n=74) of the 151 self-reported unvaccinated survey respondents indicated that community responsibility was a primary reason why they would consider getting vaccinated. Of those 74 respondents, 58 people marked *I want to keep my family safe*, 38 people marked *I want to keep my community safe* and 22 people marked both. This was consistent with the qualitative interviews as well, which found that 37% (n=15) of the 41 interviewed clients made some mention of collective responsibility as a reason to consider receiving a vaccine.

This sense of collective responsibility was primarily motivated by a shared sentiment that it was the moral imperative of healthy individuals to receive vaccines for those with impaired immune systems. 11 of the 15 clients mentioned that they got vaccinated because they felt it was their moral responsibility to protect those around them.

> Because I live in a community and I'd rather have it to protect, you know, take precautions. (Vaccinated woman, age 57).

> Definitely the only reason that I want to get it is because of my peers. I love the community. I don't want to be a burden to them by any means. (Unvaccinated man, age 35)

> I just think it's unconscionable not to take the precaution [and get vaccinated] if you can. (Vaccinated HIV Alliance Client, age 48).

One client explained that it wasn’t until a close friend of his passed from complications related to COVID-19 that he realized he had a responsibility to get vaccinated.

> Well, a girl I knew who was 27 years old died from it after having it for a week. She was healthy. She didn't even smoke cigarettes or anything. I just couldn't believe it. When women and children start dying... I'm 64

> and I just don't want to pass it to nobody, you know. (Vaccinated HIV Alliance client, age 65).

The client then went on to explain that he had since convinced about 20 of his fellow community members to get vaccinated. Another client felt a similar responsibility to not only get vaccinated herself but to also make a concerted effort to encourage others to get vaccinated as well.

> HIVA Client: Most of them didn't want [vaccines]. But they saw me do it and they said, “okay, let's go do it and get this vaccine now” and they took care it. And now they've been all vaccinated… They did it because they trust me. They trusted in me, and they saw that I was fine (Vaccinated woman, age 60).

Both scenarios highlight the potential benefits that working directly with members of the community has for vaccine campaigns. They also show the potential benefits that peer-to-peer outreach programs have that traditional healthcare settings cannot replicate. Both clients launched impromptu vaccine outreach programs among their social circles and alleviated vaccine hesitancy in the process. Giving PWID the tools to advocate for themselves is a key tenet of harm reduction. As the two clients above show, that same thinking should be applied to PWID-specific vaccine outreach programs. By working with trusted and active community members, vaccine providers can eliminate some of the hesitancy that arises due to fear or distrust in healthcare.

Implications and Conclusions

The quantitative surveys and qualitative interviews crafted similar narratives about the connection between social inequities and vaccine hesitancy for PWID in Lane County. The statistically significant negative correlation between poor social determinants of health (as indicated by unstable housing status and lower educational attainment) and willingness to receive a COVID-19 vaccine in the adjusted regression models suggests that an individual's environment plays a significant role in their willingness to accept available healthcare resources. This was then further informed by the qualitative interviews, which used the shared experiences of HIV clients to examine both how the pandemic affected PWID in Lane County and how structural barriers to healthcare manifested as and further exacerbated vaccine hesitancy. These findings demonstrated that the working model for vaccine hesitancy proposed by the WHO failed to accurately capture how social determinants of health and a person's external environment influence their vaccine hesitancy.

The lower rates of vaccine uptake for HIV Alliance clients relative to the statewide average for the same period suggest that vaccine hesitancy is a matter that must be addressed expediently. While alleviating vaccine hesitancy is important for all individuals, it is particularly vital for communities that face higher frequencies of social and physiological disadvantages that contribute to poorer health outcomes from infectious diseases, including COVID-19. As the results of this research exemplify, each element of the PWID-specific framework is reflective of the low access to support resources that PWID can rely on. The same barriers to healthcare and poor social determinants of health that create poorer health outcomes also engender strong feelings of distrust, fear, and hesitancy for PWID when they consider accessing healthcare resources like vaccines. Likewise, difficulties accessing trustworthy information, transportation, or community resources discouraged HIV Alliance clients from seeking vaccines. Thus, there is a fundamental connection between social conditions and vaccine uptake for this demographic.

The conversations with collaborators also provided insight as to how these feelings of vaccine hesitancy can be addressed most effectively. Nearly every client involved in the qualitative interviews spoke incredibly highly of HIV Alliance's ability to maintain and expand services during the pandemic. Even for individuals who were highly skeptical about COVID-19 vaccines, HIV Alliance was highly regarded as a trustworthy and accessible resource for getting COVID-19 information and testing. This was largely due to HIV Alliance's ability to leverage their pre-existing relationships with clients and their known role in the community as a harm reduction resource. Thus, HIV Alliance has already established a working model for easing vaccine hesitancy among clients in a way that traditional healthcare providers cannot.

One of the largest implications of the research presented in this thesis is the potential benefits of a PWID-specific vaccine hesitancy model. Since the likelihood of COVID-19 being completely eradicated is almost nonexistent and there will likely be a need for consistent vaccine boosters; thus, HIV Alliance must remain diligent in its efforts to soothe COVID-19 vaccine hesitancy in their clients. To do this effectively, they must focus their energy on addressing the motivators of vaccine hesitancy that are most prevalent among their clients. The adapted framework developed in the process of this research will help HIV Alliance ensure that their future vaccine initiatives, for COVID-19 and beyond, are rooted in the sentiments expressed by actual clients. By more effectively addressing the motivators for vaccine hesitancy that are enumerated in this thesis, HIV Alliance can leverage and build on their trust with their clients to increase vaccine uptake and promote greater wellbeing.

With that said, a significant amount of the vaccine hesitancy among clients can be traced back to disadvantages and distrust fostered by frequent marginalization, discrimination, and dehumanization by institutions and other members of society. Therefore, a substantial component of addressing vaccine hesitancy among high-risk and marginalized groups like PWID must be first addressing social inequities in healthcare that result in worse health outcomes, reduced access to resources, and greater feelings of distrust.

There is a dire need for further research that examines the connection between an individual's environment and their level of vaccine hesitancy, both for the continued efforts against COVID-19 and future disease prevention campaigns. This is even more true for PWID and other marginalized communities in healthcare who consistently face higher mortality rates and lower access to healthcare services. However, for future research to be truly impactful, it must feature the voices of actual members of the community to ensure that the research prioritizes collaboration with and empowerment of the collaborators involved. As the efforts of HIV Alliance have made abundantly clear in this project, a foundation of trust is an invaluable asset in providing vital health resources to those who need them most.

As the conversations with HIV Alliance clients repeatedly conveyed, the first step in combatting vaccine hesitancy for PWID must be taking the time to understand and contextualize it through the experiences of actual people in our community. In doing this, it not only enables more effective public health efforts but also confronts the criminalization, ostracization, and dehumanization of PWID from their peers. Reducing vaccine hesitancy among PWID must be part of a necessary and much larger effort to improve the health and wellbeing of marginalized communities in healthcare. As the woman below eloquently puts it, addressing vaccine hesitancy must begin with ensuring people receive the help and support they need when they need it.

> I'd like to see more of that too, people's lives being helped. Especially people who have HIV and cancer and all that, we need to help more of them (Vaccinated woman, age 60).

APPENDIX A: Qualitative Interview Tool

HIV Alliance ID Information

1. Can you please tell me the first two letters of your last name?
2. What are the first two letters of the city you were born in?
3. What is your date of birth?
4. How long have you been coming to needle exchange and/or HIV Alliance?
5. Do you identify as a member of the LGBTQ+ community?
6. How would you describe your racial or ethnic identity?

General COVID-19 Information

7. Have you heard of anyone in your community getting COVID-19? About how many?
   - If yes, what have you heard from them?
8. Where do you usually get your information about COVID-19?
9. How has the COVID-19 pandemic affected your day-to-day life?
   - Job/Housing/Food/Transportation/Syringe Exchange?
10. Are you worried about getting COVID-19? Why/Why not?

COVID-19 Testing Hesitancy

11. Have you ever received a COVID-19 test from HIV Alliance or from any other source?
    - If yes, about how many would you say you've gotten?
    - If yes, what are the reasons you decided to get tested for COVID-19?
12. What are some reasons why you've decided not to get a test, even when it was available to you?

COVID-19 Vaccine Hesitancy Determinants

13. Are you vaccinated? Why/Why not?
14. If you decided you wanted to get a COVID-19 vaccine, where would you go to get one?
15. Do you think the COVID-19 vaccine is safe? Why/Why not?
16. Do you think the COVID-19 vaccine would protect you from getting COVID-19? Why/Why not?
17. Can you think of any other reasons why you would choose not to get a vaccine?

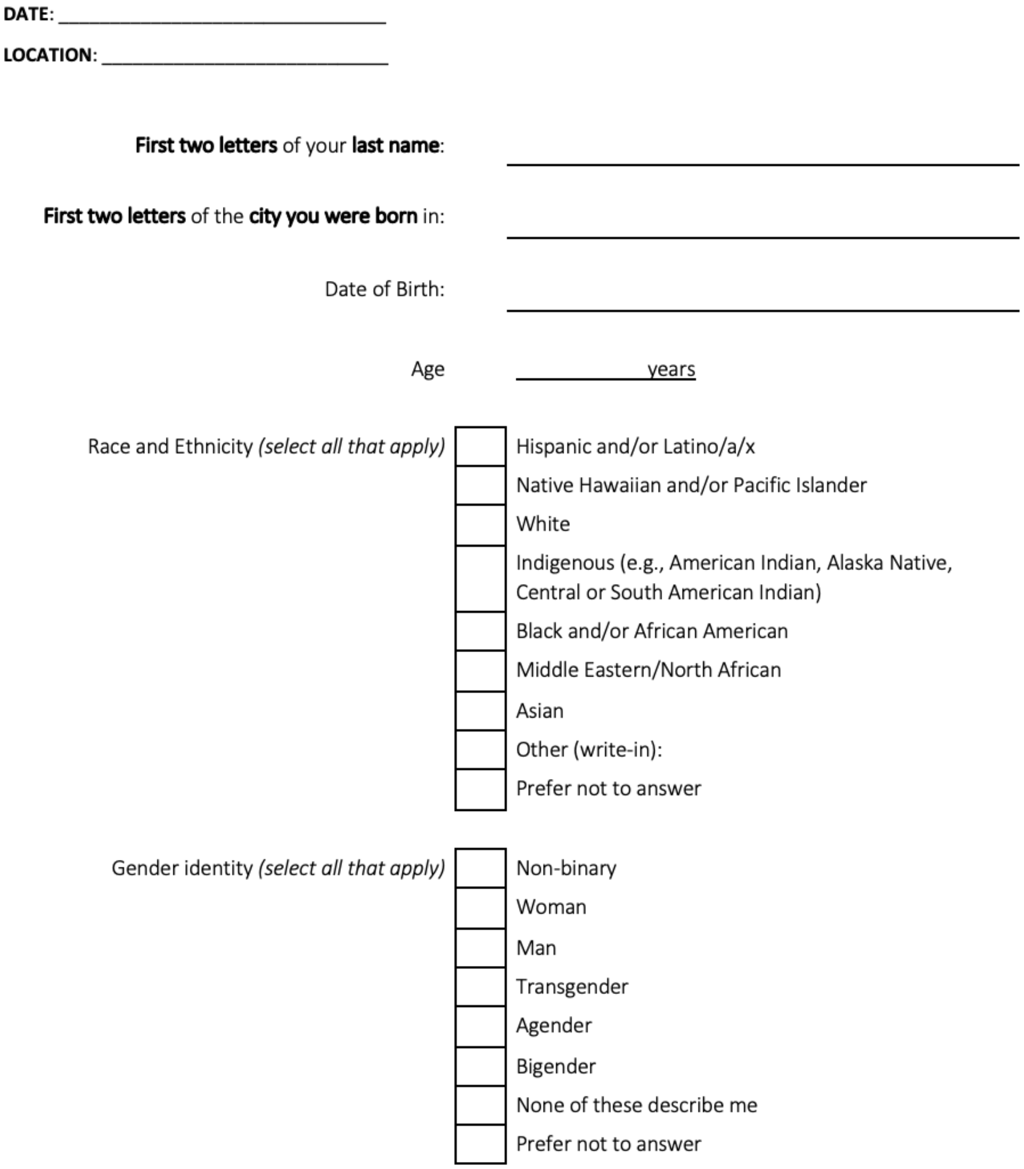
Personal Experience with COVID-19 Vaccines

18. Do you know anyone who has received a COVID-19 vaccine?
    - If yes, what did that person tell you about getting the vaccine?
    - What proportion of your close contacts would you say are vaccinated versus aren't vaccinated?
19. What sources do you get information about the COVID-19 vaccine from?
20. Have you heard any specific stories about people getting COVID-19 vaccines that make you not want to get a vaccine?
21. Are there any other COVID-19 or COVID-19 vaccine related questions you would like to tell me?

Recommendations for HIV Alliance

22. Do you think HIV Alliance has done a good job at providing COVID-19 information to you?
23. Is there anything else about COVID-19 or COVID-19 vaccines that you would like to tell me?
24. Do you have any questions you'd like to ask me?

APPENDIX B: Quantitative Survey Tool



DATE: ______________________________

LOCATION: __________________________

First two letters of your **last name**: ______________________________

First two letters of the **city you were born** in: ______________________________

Date of Birth: ______________________________

Age __________ years

Race and Ethnicity *(select all that apply)*

- ☐ Hispanic and/or Latino/a/x
- ☐ Native Hawaiian and/or Pacific Islander
- ☐ White
- ☐ Indigenous (e.g., American Indian, Alaska Native, Central or South American Indian)
- ☐ Black and/or African American
- ☐ Middle Eastern/North African
- ☐ Asian
- ☐ Other (write-in):
- ☐ Prefer not to answer

Gender identity *(select all that apply)*

- ☐ Non-binary
- ☐ Woman
- ☐ Man
- ☐ Transgender
- ☐ Agender
- ☐ Bigender
- ☐ None of these describe me
- ☐ Prefer not to answer

Education ☐ Have never gone to school
☐ 5th grade or less
☐ 6th to 8th grade
☐ 9th to 12th grade
☐ High school graduate or GED completed
☐ Some college level/ technical/ vocational
☐ Bachelor's degree
☐ Other advanced degree (Master's, Doctoral degree)

Housing status ☐ Unhoused
☐ Temporary housing *(staying with a friend/family, transitional housing)*
☐ Permanent housing *(trailer, house, apartment I rent or own)*
☐ Prefer not to answer
☐ Don't know

Employment status ☐ Working now
☐ Only temporarily laid off, sick or maternity leave
☐ Looking for work, unemployed
☐ Retired
☐ Disabled, permanently or temporarily
☐ Keeping house
☐ Student
☐ Other (*please specify*):
☐ Prefer not to answer
☐ Don't know

Insurance coverage	☐	I do NOT have health insurance
	☐	Oregon Health Plan (OHP)
	☐	Medicare (for seniors or those with disabilities)
	☐	Tricare
	☐	VA insurance
	☐	Private (purchased directly or through employer
	☐	Don’t know
	☐	Prefer not to answer
Do you speak a language other than English at home?	☐	Yes
	☐	No
	☐	Prefer not to answer
	☐	Don’t know
In 2019, what was your total household income before taxes?	☐	Less than $15,000
	☐	$15,000 - $19,999
	☐	$20,000 - $24,999
	☐	$25,000 - $29,999
	☐	$30,000 - $34,999
	☐	$35,000 - $39,999
	☐	$50,000 – $74,999
	☐	$75,000 - $99,999
	☐	$100,000 and above
	☐	Prefer not to answer

Have you ever been tested for COVID-19?

☐ Yes
☐ No
☐ Don’t know
☐ Prefer not to answer

Have you ever tested **positive** for COVID-19?

☐ Yes
☐ No
☐ Don’t know
☐ Prefer not to answer

Have you ever received COVID-19 vaccine?

☐ Yes
☐ No
☐ Prefer not to answer
☐ Don’t know

If **YES** to ever received vaccine <u>STOP</u>

If **NO** to ever received vaccine <u>CONTINUE</u>

How likely are you to get an approved COVID-19 vaccine when it becomes available?

☐ Very likely
☐ Fairly likely
☐ Not too likely
☐ Not at all likely
☐ Definitely not
☐ Prefer not to answer
☐ Don’t know

Why would you get a COVID-19 vaccine? *(check all that apply)*	☐	I want to keep my family safe
	☐	I want to keep my community safe
	☐	I have a chronic health problem, like asthma or diabetes
	☐	My doctor told me to get a COVID-19 vaccine
	☐	I don't want to get really sick from COVID-19
	☐	I want to feel safe around other people
	☐	I believe life won't go back to normal unitil people get a COVID-19 vaccine
	☐	Other *(write in)*:
	☐	Prefer not to answer

Why would you NOT get a COVID-19 vaccine? *(check all that apply)*	☐	I'm allergic to vaccines
	☐	I don't like needles
	☐	I'm not concerned about getting really sick from COVID-19
	☐	I'm concerned about side effects from the vaccine
	☐	I don't think vaccines work very well
	☐	I don't believe the COVID-19 pandemic is as bad as some people say it is
	☐	I don't want to pay for it

☐	I don’t know enough about how well a COVID-19 vaccine works
☐	Other *(write in)*:
☐	Prefer not to answer

To be filled out by collection staff

Location of collection:

Date of collection:

Is the participant skipping testing because they were positive in the last 90 days?	Yes No

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