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Assessing Medical Discrimination, Mistrust, and Healthcare Engagement as Predictors of COVID-19 Vaccination among Transgender and Gender Diverse Individuals

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ASSESSING MEDICAL DISCRIMINATION, MISTRUST, AND HEALTHCARE ENGAGEMENT AS PREDICTORS OF COVID-19 VACCINATION AMONG TRANSGENDER AND GENDER DIVERSE INDIVIDUALS

A dissertation submitted in fulfillment of the requirement
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Abstract

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As of March 11th 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. Early studies conducted among LGBT+ communities indicated that individuals of color and transgender individuals were more likely to express hesitation towards a possible COVID-19 vaccine. Such hesitation can be explained by historical medical mistreatment of people of color and LGBT+ communities which contributes to higher medical mistrust within these populations. The present study assessed vaccination behaviors among a sample of transgender and gender diverse individuals (N=385) and results indicated an association amongst experiences of discrimination in healthcare, medical mistrust, COVID-19 mistrust, barriers to vaccination, and having not receive a booster at the time of the study. Although race did not significantly contribute to any findings, binary gender predicted a delay in initial vaccination and having not received a booster at the time of the study. Participants who engaged in telehealth had lower vaccine hesitancy, lower COVID-19 mistrust, and lower perceived barrier to vaccination compared to participants who did not utilize telehealth during the pandemic. These results provide support for previous findings regarding TGD health, discrimination, and mistrust and contribute novel findings to the role of these factors when assessing COVID-19 vaccination behaviors amidst the ongoing pandemic.

Vita

Shelby Ann Smout was born on October 16, 1995, in Arlington Virginia and is an American citizen. They graduated from HB Woodlawn Secondary Program in 2013. They received their Bachelor of Science in Psychology and Bachelor of Arts in Gender, Sexuality, and Women's Studies from Virginia Commonwealth University in 2016. They received a Master of Science from Virginia Commonwealth University in 2020.

INTRODUCTION

Background

Transgender and gender diverse (TGD) individuals encounter a number of barriers to comprehensive healthcare. Extensive research has indicated that these barriers are created and sustained by structural factors which prevent gender-affirming care from being integrated into healthcare systems at large (Braveman & Gottlieb, 2014; James, 2015; Blosnich et al., 2016) In turn, TGD individuals who are able to access healthcare for both their general and gender affirming needs may experience interpersonal and institutional discrimination wherein their TGD identity is not accurately represented in medical forms and/or their healthcare provider is not knowledgeable about TGD identities and health (Lambrou et al., 2020). Such barriers are further compounded for TGD individuals of color who may encounter additional interpersonal and structural discrimination due to the intersection of their gender and racial identities. Consequently, medical mistrust has been observed more frequently among TGD individuals and communities of color relative to cisgender, white individuals (LaVeist et al., 2009; Owen-Smith et al., 2016; Jaiswal & Halkitis, 2019). Although the topic of medical mistrust had been researched prior to the turn of the 21st century, it began receiving international attention beginning in March 2020 as COVID-19 prompted the U.S. and many other countries to shut down in an attempt to quell the spread of the virus. As soon as cases of COVID-19 began surging across the globe, research on a vaccine for the virus was underway. However, the development of a vaccine was met with mixed reactions in the U.S. as vaccination mandates and even the existence of the virus itself became politicized (Bogart et al., 2021; Boulton & Wagner, 2021). Although much of the vaccine hesitancy observed early in the pandemic resulted from the spread of misinformation, medical mistrust among marginalized communities who had

experienced a history of systematic discrimination and mistreatment by the U.S. medical system also played a critical role. Research conducted early on in the pandemic indicated that vaccine hesitancy was higher among Black and Hispanic/Latino populations citing mistrust of both the medical system as well as the U.S. government (Guidry et al., 2021; Bogart et al., 2021; Teixeira da Silva et al., 2021). Research on COVID-19 vaccine uptake in the months following vaccine dissemination indicated that full COVID-19 vaccination was highest among Asian Americans (94.0%) followed by Hispanic/Latino (77.8%), White non-Hispanic (77.8%), Black (76.2%), and Native Americans (64.8%) (CDC_a, 2022). However, little research exists on COVID-19 vaccination among TGD individuals and even less research on how medical mistrust and experiences of discrimination in healthcare settings may inform vaccination decisions within this population. Furthermore, as additional booster shots are required in order to be protected against COVID-19 variants, continued research on factors that contribute to or hinder COVID-19 vaccine uptake among historically marginalized populations is necessary.

TGD Health

Health disparities and inequities among TGD individuals in the United States have been well documented particularly since the release of the 2015 U.S. Transgender Survey (USTS)(James, 2016). The USTS collected responses from 27,715 TGD individuals from across the country and consisted of survey items that addressed experiences of violence, discrimination, economic hardship, housing instability, and health. At the time of the survey, 39% of respondents reported experiencing serious psychological distress during the month prior to completing the survey and 40% indicated they had attempted suicide in their lifetime which is nine times the attempted suicide rates of the general U.S. population (4.6%) (James, 2016). Such disparities persisted into healthcare settings wherein one-third (33%) of respondents indicated

that they had experienced at least one negative experience related to their gender identity when seeking out health care in the year prior to taking the survey. Additionally, 23% indicated they had avoided seeking health care when they needed it due to the fear of being mistreated because of their gender. When examining these disparities by race and ethnicity, the USTS indicated that TGD individuals of color, including Latino/a, multiracial, and Black survey respondents, were more likely to be living in poverty and experience greater health disparities relative to their White counterparts. The USTS was crucial in identifying and documenting the health disparities experienced by TGD individuals in the U.S. and that the inequities experienced by all people of color in the United States was compounded among TGD individuals of color. These data set the groundwork for the research, policies, and programs that were implemented in the years following the USTS which has offered much needed insights into the healthcare needs and motivations among TGD individuals.

TGD Health During the COVID-19 Pandemic

In the five years following the dissemination of the USTS, considerable research was conducted concerning the healthcare needs and experiences of TGD individuals. These studies informed a number of programs and protections meant to address health disparities and inequities experienced by TGD individuals in the U.S. (Reisner et al., 2015). However, the onset of the COVID-19 pandemic in March 2020 brought unprecedented challenges to the progress that had been made regarding gender-affirming care and the overall wellbeing of TGD individuals. One such study indicated that 55% of participants reported limited access to one or more gender-affirming resources due to closure and restrictions brought on by the COVID-19 pandemic (Jarrett et al., 2020). Approximately 38% of respondents indicated that the COVID-19 pandemic had reduced or entirely eliminated their ability to live according to their gender and

that transfeminine individuals were more likely to report this experience relative to transmasculine and non-binary individuals. Reductions in access to gender-affirming care were associated with poorer mental health and screening positive for depression, anxiety, and suicidal ideation (Jarrett et al., 2020). Such outcomes were more common among those whose access to gender-affirming resources had been limited due to the pandemic. Prior work has documented similar associations between limited access to gender-affirming care and psychological distress (Lambrou et al., 2020; Pampati et al., 2020; Perl et al., 2021). With regards to psychological wellbeing, findings from a recent longitudinal study on TGD individuals indicated that, between the months of March and June of 2020, participants experienced significantly higher psychological distress compared to pre-pandemic (Kidd et al., 2021). Additionally, a higher percentage of participants met the criteria for clinically significant depression and anxiety symptoms relative to their scores prior to the pandemic. Similar findings were evident in other studies which indicated that transgender college students were more likely to report psychological distress compared to their cisgender counterparts (Hunt et al., 2021; Gonzales et al., 2020; Hawke et al., 2020). One such study indicated that TGD youth were more likely to experience a disruption of psychological health services which may have contributed to greater psychological health deterioration compared to cisgender youth (Hawke et al., 2020).

The COVID-19 pandemic created numerous barriers to healthcare for TGD individuals who already encountered barriers to comprehensive and gender- inclusive healthcare. As demonstrated by research during the pandemic, these additional barriers limit TGD individuals' access to gender-affirming care which has serious physical and psychological ramifications. Furthermore, TGD individuals have a higher prevalence of underlying health conditions that have been associated with severe COVID-19 illness (McNaughten et al., 2022). This

compounded with serious challenges to political protections for TGD healthcare, employment, and housing suggests that the wellbeing of TGD individuals and their experiences accessing healthcare during the COVID-19 pandemic should continue to be researched.

Medical Mistrust

In addition to restrictions to healthcare and other resources, the COVID-19 pandemic has prompted a national discourse regarding medical mistrust which has been fueled by equal parts misinformation and valid, historically supported concerns (Jaiswal & Halkitis, 2019). Medical mistrust has been identified as a key contributor to health disparities overall and has become more prevalent during the COVID-19 pandemic (Boulton & Wagner, 2021). The majority of medical mistrust research has been conducted among Black and African Americans and to a lesser extent among TGD individuals, particularly those of color (Jaiswal & Halkitis, 2019; Bogart et al., 2021; Brenick et al., 2017; Kolar et al., 2015). Historic events such as the Tuskegee Syphilis Study justifiably explain the medical mistrust that has been observed in communities of color relative to their White counterparts (Thompson et al., 2021; Smith et al., 2021). These events combined with the pervasive structural inequalities and inequities that impact experiences in and access to healthcare among communities of color are what distinguish medical mistrust from misinformation (Thompson et al., 2021; Smith et al., 2021). This is important to note so as not to conflate medical mistrust among marginalized communities with ignorance or an inability to discern misinformation from accurate medical information. Medical mistrust among marginalized communities poses serious consequences to their health as medical mistrust has been associated with lower utilization of healthcare and poorer management of health conditions (Moore et al., 2004; Ballantyne et al., 2007; Jaiswal & Halkitis, 2019; Bazargan et al., 2021). Within studies assessing the role of medical mistrust on healthcare engagement, race often

presents as a significant factor with Black and African Americans exhibiting higher rates of medical mistrust compared to White Americans (Kolar et al., 2015; Cuevas et al., 2019; Benkert et al., 2009). Anticipation of discrimination based on race has also been identified as an important predictor of health care utilization among Black and African Americans and even more so for those whose racial identity is particularly salient (Cuevas et al., 2019). In turn, higher mistrust contributes to lower healthcare engagement which greatly contributes to health disparities and gaps in engagement in preventative care among communities of color.

Medical Mistrust and TGD Individuals

While the reasoning and justification for medical mistrust among communities of color has been well established, less is known about medical mistrust as it pertains to TGD individuals who are often susceptible to similar health disparities due to lack of access to comprehensive healthcare (Hornsey et al., 2018). The existing research indicates that fear of experiencing gender-based discrimination often predicts whether TGD individuals seek out healthcare services (Underhill et al., 2015; Owen-Smith et al., 2016; Ozawa et al., 2019). Recent studies have also indicated hesitancy regarding the utilization of pre-exposure prophylaxis (PrEP) among LGBT+ individuals and particularly among transgender women (Strathdee et al., 2021). Such research also suggests that the U.S. government's handling of the HIV/AIDS epidemic during the Reagan administration may also contribute to medical mistrust among TGD individuals (Daniels et al., 2019, Jaiswal & Halkitis, 2019). Research on predictors of HIV-related medical mistrust and PrEP hesitancy can provide important insight about how to conduct medical mistrust research among racially diverse TGD individuals in the time of COVID-19. Stigma associated with HIV is grounded in both racism and homophobia which influenced initial motivations to address the virus and continued to influence how the virus was studied (Strathdee et al., 2021). This

culmination of structural and interpersonal discrimination in medical settings may have alienated TGD individuals from healthcare systems thus impacting their decision to receive a COVID-19 vaccine. While no research has been conducted on the role that medical mistrust has played on TGD individuals' decisions to get a COVID-19 vaccine, recent studies on the associations between race, medical mistrust, and COVID-19 vaccine uptake have indicated that medical mistrust and past experiences of discrimination in healthcare settings significantly contribute to Black Americans' decisions to get vaccinated (Bazargan et al., 2021; Thompson et al., 2021; Smith et al., 2021). Previous work on medical mistrust suggests that poor experiences in healthcare settings and higher perceived discrimination contribute to the development of general medical mistrust (Byrne, 2008). Therefore, research on the health of racially diverse TGD individuals during the COVID-19 pandemic should continue to assess vaccine uptake as well as how factors such as medical mistrust and experiences of discrimination inform these decisions.

Vaccine Hesitancy

Prior to the COVID-19 pandemic, vaccine hesitancy was already a growing topic of concern within the United States. Much of the vaccine hesitant discourse we are familiar with today was initiated among middle to upper class, White, American parents who are commonly referred to as "anti-vax" (Dube et al., 2015). Although vaccines have a history of meeting both social and political pushback, as was observed during the dissemination of the polio vaccine, the current anti-vaccination movement was initially fueled by falsified links between vaccination and autism in children (Boodoosingh et al., 2020). As anti-vax discourse caught international attention, these hesitancies and outright rejection of vaccines became more widespread as social media platforms, such as Facebook, were used to help facilitate anti-vax discourse and group organization (Goldstein et al., 2015). In 2019, the World Health Organization (WHO) listed

vaccine hesitancy as one of the ten leading threats to global health and that vaccine hesitancy is often the strongest predictor of vaccine uptake (Boulton & Wagner, 2021). When assessing potential contributors to vaccine hesitancy, various studies have found that medical mistrust is one of the primary predictors of vaccine hesitancy (Bogart et al., 2021; Rueben et al., 2020; Hornsey et al., 2020). In turn, as misinformation about COVID-19 began circulating and public trust in health and government agencies faltered, vaccine hesitancy became a primary topic of concern in the U.S. at the onset of the COVID-19 pandemic.

Vaccine Uptake during the COVID-19 Pandemic

Much of the research conducted within the context of the COVID-19 pandemic suggests that medical mistrust has contributed to this uptick in vaccine hesitancy particularly among communities of color. Initial findings from studies conducted during the early stages of the pandemic indicated that, within the U.S., Black and Hispanic individuals were less likely to indicate willingness to receive a COVID-19 vaccine once it was developed and were more likely to be vaccine hesitant relative to White individuals (Guidry et al., 2021; Nguyen et al., 2021; Saluja et al., 2021). The most common reasons given for higher vaccine hesitancy included worry about side effects or safety, wanting to wait and see if the vaccine worked, and lack of trust in the government to handle vaccine development (Saluja et al., 2021). However, current data from the CDC indicates that vaccine uptake across racial and ethnic groups in the U.S. is generally high with more than 75% of Black, Hispanic/Latino, and White Americans reporting full vaccination as of December 2021 (CDC_a, 2022). That said, as COVID-19 variants such as Delta and Omicron have developed in the year following initial COVID-19 vaccine development and dissemination, it is important to continue monitoring booster uptake and the persistence of

vaccine hesitancy as mistrust in vaccine benefits and lowered perceived seriousness of COVID-19 have also been shown to inform vaccine hesitancy (Gerretsen et al., 2021).

Vaccine Uptake among LGBT+ Individuals

Although the data on COVID-19 vaccination across racial and ethnic groups is reassuring, little data exists for LGBT+ populations and even less pertaining to TGD individuals specifically. What research that has been conducted assessing vaccine hesitancy among LGBT+ individuals has produced mixed findings. Findings from one study indicated that LGBT+ individuals were not less likely than their cisgender, heterosexual counterparts to express an interest in vaccination (Phillips et al., 2021). Furthermore, a separate study reported that LGBT+ respondents were not more likely to avoid testing or delay treatment for COVID-19 compared to their cisgender, heterosexual counterparts (Harner et al., 2021). A recent CDC report indicated that the percentage of vaccinated transgender and non-binary survey respondents was similar to that of cisgender respondents (McNaughten et al., 2022). However, this same report indicated that vaccination coverage was lowest among non-Hispanic Black LGBT+ respondents across all categories of sexuality and gender. Additionally, transgender and non-binary respondents expressed confidence in COVID-19 vaccine protection but not safety. Other studies have indicated similar findings that suggest disparities may exist at the intersections of racial and gender identity regarding COVID-19 vaccine hesitancy and resulting uptake. Findings from a study on vaccine hesitancy among sexual minority men and transgender women indicated that medical mistrust was significantly associated with a decrease in vaccine acceptance and that Black participants were significantly less likely to accept a COVID-19 vaccine (Teixeira da Silva et al., 2021). In a study conducted among LGBT+ Pennsylvanians, 57.5% of Black respondents indicated they had not been vaccinated at the time of the study compared to 45.8% of all LGBT+

Pennsylvanians (Garg et al., 2021). This same study indicated that one in four transgender respondents and one in three genderqueer respondents were more likely to delay vaccination due to previous negative experiences with health providers. Given that research conducted prior to the pandemic indicated that TGD individuals are more likely to experience discrimination in medical settings and encounter barriers to vaccination, it is important to continue studying COVID-19 vaccine uptake among TGD individuals of all racial and ethnic backgrounds.

Telehealth

The use of technology to facilitate healthcare, otherwise known as telehealth, became a crucial tool during the COVID-19 pandemic as hospitals were often overcrowded, healthcare providers were overworked, and social distancing was one of the few methods we had to quell the spread of the virus (Kato-Lin et al., 2021; Miner et al., 2021). Although methods for facilitating telehealth such as video conferencing and online portals were developed and implemented in the years prior to the pandemic, this increased need for remote healthcare prompted providers and patients alike to learn how to utilize these methods to meet their needs (Miner et al., 2021). As more and more people became reliant on telehealth, it was important to assess whether the services provided via telehealth were comparable to services provided in-person. While previous research suggested many of the tasks necessary to conduct both physical and mental health evaluations could be conducted via telehealth, the COVID-19 pandemic presented novel challenges to both telehealth and in-person care (Waad et al., 2019; Russell et al., 2021). In turn, a number of studies were conducted aimed at assessing the effectiveness of telehealth services during the COVID-19 pandemic.

Telehealth During the COVID-19 Pandemic

Among studies conducted on telehealth utilization during the pandemic, the most common finding was an increase in first time telehealth users for both patients and providers. One study indicated that only 12% of physicians used telehealth in their practice prior to the pandemic compared to 96% reporting use following the onset of the pandemic (Miner et al., 2021). Similarly, many patients were also first time telehealth users following the onset of the pandemic with one study reporting that 81.5% of respondents used telehealth or virtual visits for the first time during the COVID-19 pandemic (Kato-Lin et al., 2021). Additionally, satisfaction with telehealth was generally high for both patients and providers and was associated with intention to utilize telehealth in the future (Miner et al., 2021; Kato-Lin et al., 2021). Most notably, one study found that level of trust in physicians' ability to diagnose COVID-19 was higher among respondents who had engaged in telehealth visits relative to those who had not (Rovner et al., 2021). This finding suggests that engagement with telehealth during the pandemic may bolster trust in physicians at least as it pertains to COVID-19 diagnoses. However, it should also be noted that racial disparities similar to what was observed prior to the pandemic were also evident in studies conducted on telehealth use during the pandemic. Telehealth was used less often by individuals of color and among Black participants specifically wherein access to telehealth was often limited to audio capabilities rather than both video and audio (Pierce et al., 2020). Black and Hispanic patients were also more likely to use either emergency room or office visits over telehealth visits which in the context of the pandemic may have increased their likelihood of exposure and vulnerability to contracting COVID-19 (Weber et al., 2020). Taken together, this research suggests that although telehealth has proven to be a valuable tool during the pandemic with promising utilization moving forward, research should continue to be

conducted regarding disparities in telehealth use and accessibility particularly for patients of color.

Telehealth use among TGD Individuals During the Pandemic

The onset of the COVID-19 pandemic created a unique set of barriers for TGD individuals to either continue or initiate gender affirming care. Specifically, there was concern regarding access to hormonal treatments and gender affirming surgeries (Gava et al., 2021). Prior work on utilizing telehealth technologies to provide LGBT+ competent care indicated that telehealth was often a more viable option for LGBT+ individuals as access to telehealth reduced barriers for LGBT+ individuals living in areas where availability of culturally competent care is scarce (Waad et al., 2019). Health interventions disseminated using telehealth technologies also demonstrated the capacity to improve transgender women's access to culturally competent care and improve health care utilization (Magnus et al., 2018). However, the question still remained as to whether gender affirming care could be successfully provided to TGD patients within the context of the pandemic. One such study indicated that, of the 800 transgender care visits included in the study, 374 (46.75%) were administered via telehealth and helped to bolster the total number of transgender care visits during the pandemic (Lock et al., 2021). Other studies indicated that TGD patients who participated in telehealth visits during the pandemic felt that clinic and telehealth visits were equally satisfactory and interest in receiving gender affirming care via telehealth was high (Russell et al, 2021; Sequira et al., 2020). Accessing healthcare via telehealth may be particularly beneficial for TGD individuals since it allows patients to interact with their provider exclusively from the privacy of their home compared to in-person methods which require patients to navigate multiple interactions with various people in a public and potentially unfamiliar space. Therefore, this novel but growing body of research on using

telehealth to provide gender affirming care suggests that engagement with telehealth during the pandemic is an important factor to consider when assessing healthcare accessibility, interaction, and satisfaction among TGD individuals.

Theoretical Frameworks

Health Belief Model

First developed in the early 1950's, the Health Belief Model (HBM) is one of the most frequently used conceptual frameworks within health behavior research. It is frequently used to explain change and maintenance of behaviors related to health as well as to guide the development of health behavior interventions (Becker, 1974; Champion & Skinner, 2008). The HBM applies five key constructs in order to explain how demographic variables such as race, class, gender, and sexuality relate to predictions of whether or not people will take action to prevent, screen for, or treat illnesses. These constructs include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy (see figure 1). The HBM has been utilized across a wide array of health prevention and treatment efforts including breast cancer screening, AIDS-prevention, and smoking cessation, all of which have demonstrated disparities across intersections of gender and race (Champion & Skinner, 2008). A recent study assessing predictors of COVID-19 vaccine hesitancy and willingness to be vaccinated under Emergency Use Authorization (EUA) utilized the Health Belief Model as a conceptual framework (Guidry et al., 2021). Results indicated participants that were more willing to get vaccinated were more likely to feel susceptible to contracting COVID-19, perceived benefits that outweighed the barriers, and had high self-efficacy to overcome barriers to vaccination. This same study also noted that while the model informed by the HBM was successful in explaining 66% of the variance in intention to get an FDA approved COVID-19 vaccine, the same model

was only successful at explaining 33% of the variance in willingness to get a COVID-19 vaccine under EUA. The authors note that there are likely other factors that should be considered when assessing willingness to get vaccinated under EUA such as trust in government agencies and vaccine development. It was also noted that Black respondents were less likely than White respondents to indicate intent to get the vaccine. This disparity may be attributable to greater mistrust of the government and healthcare organizations among Black Americans due to historical and present-day medical and structural racism. Therefore, while the HBM provides a good foundation for assessing vaccine hesitancy and predictors of vaccine intention there are additional considerations, such as affect and cultural norms, that ought to be incorporated in future frameworks exploring vaccine hesitancy and the racial disparities regarding COVID-19 vaccination uptake.

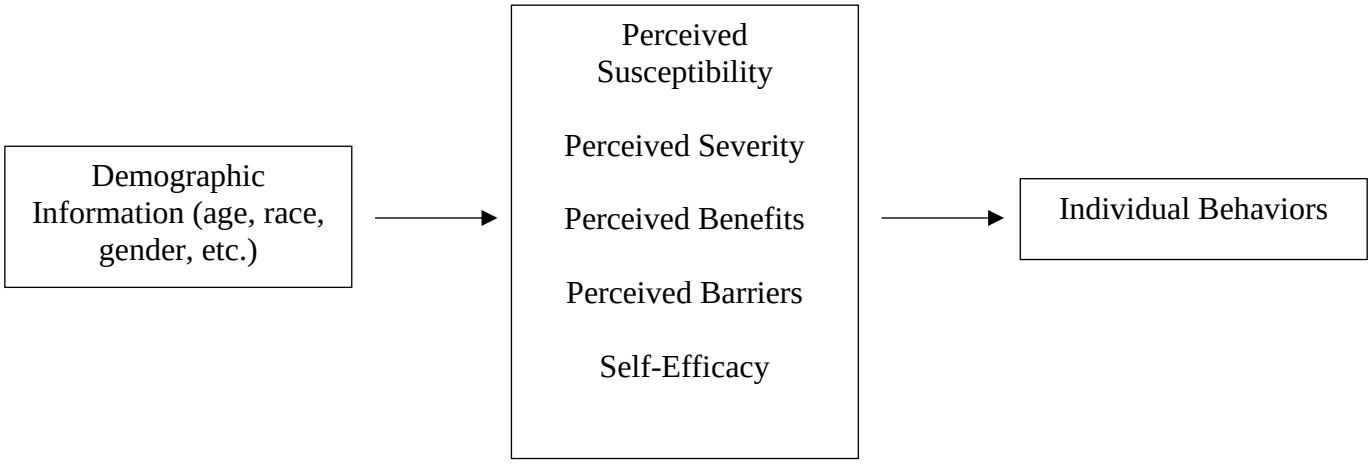


Figure 1. The Health Belief Model

Theory of Care Seeking Behavior

Based on Triandis' theory of behavior, the Theory of Seeking Care (TSC) was designed to systematically predict the probability of engaging in health behavior as a function of

psychosocial variables and facilitating conditions (see figure 2) (Lauver, 1994). Although similar to the HBM, the TSC proposes that the role of psychosocial variables in influencing behavior is conditional upon, rather than aligned with, facilitating conditions. In other words, while psychosocial variables are necessary to initiate care seeking behavior, they are not sufficient and require the presence of facilitating conditions in order to fully result in care seeking behavior (Lauver, 1994). The psychosocial variables included in the TSC include affect, utility, norms, and habits. Affect refers to the feelings associated with care seeking behavior such as anxiety or embarrassment. In the context of the COVID-19 pandemic, affect towards receiving a COVID-19 vaccine may be reflected in feelings of doubt or mistrust regarding the vaccine's safety or effectiveness. Utility is conceptualized as the combination of expectations and values regarding the outcome of care seeking behavior. For example, expectations regarding COVID-19 vaccination may include assumptions about side effects, both immediate and long-term, while values are reflective of how important those expectations are regarding the decision to get vaccinated. Norms include social norms, which reflect others' beliefs about care seeking behaviors, as well as personal norms about a given care seeking behavior. Personal and social norms about COVID-19 vaccination may be reflected in beliefs about how people of similar backgrounds or experiences choose to get vaccinated as well as personal experiences in medical settings that inform COVID-19 vaccination decisions. Finally, habits refer to how one typically behaves when one is in need of medical care. Measures used to assess general vaccine hesitancy as well as COVID-19 specific vaccine hesitancy used past vaccination behavior to inform the development and validation of their measure (Martin & Petrie, 2017; Bogart et al., 2021). Therefore, utilizing these measures in conjunction with similar items that assess past vaccinations behaviors, such as receiving a flu shot in the past year or ever declining to receive a

doctor recommended vaccine, adequately conceptualize the role of "habit" in the TSC (Martin & Petrie, 2017).

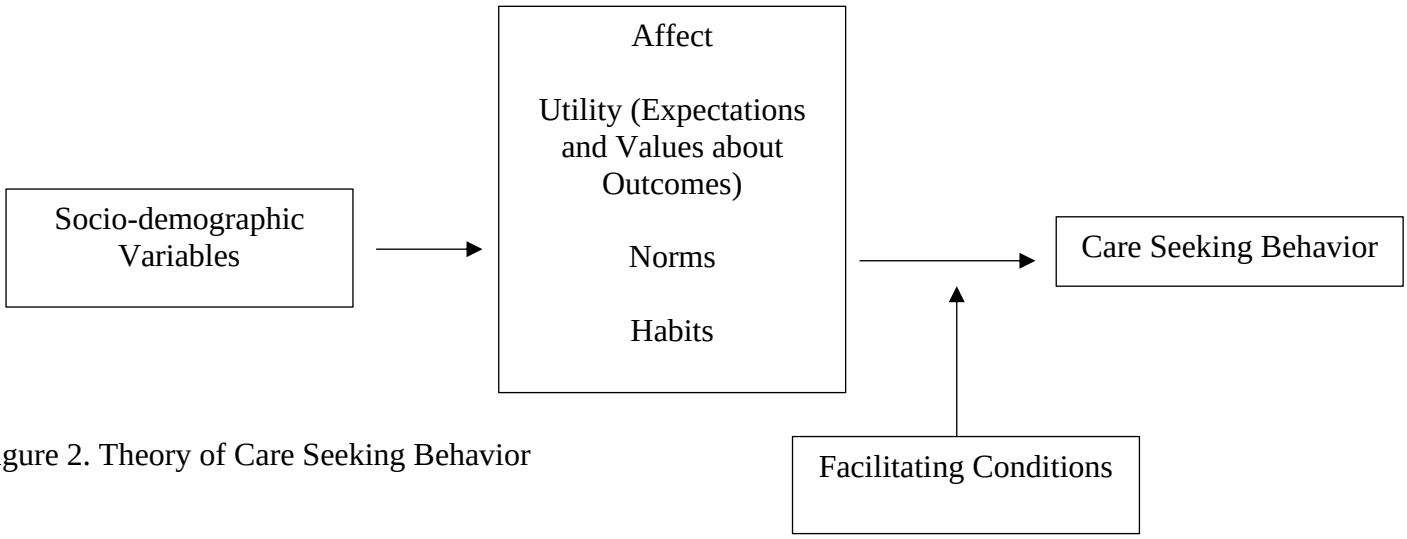


Figure 2. Theory of Care Seeking Behavior

Although the TSC is less well known and has not been directly applied to the COVID-19 pandemic, it has been used to assess factors associated with healthcare avoidance (Byrne, 2008; Heit, 2001). It may also be particularly useful when assessing healthcare engagement within the context of the COVID-19 pandemic as access to healthcare services became severely limited due to a surge of patients suffering from COVID-19. Additionally, once a vaccine for COVID-19 was developed, many people who were not considered immunocompromised or front line workers could not receive the vaccine right away and had to wait a number of months. It is possible that this delayed access to care combined with limited interactions with healthcare workers during a time when vaccine mandates were being actively opposed created additional fears about receiving a COVID-19 vaccine. In other words, facilitating conditions played a key role in whether people were able to receive a COVID-19 vaccine and may continue to play a role

in whether vaccinated individuals choose to receive a booster. Interactions with healthcare during the pandemic may have influenced individuals' decisions to get vaccinated and receive a booster even when medical mistrust and experiences of discrimination are present. Therefore, the moderating role of interactions with healthcare providers (i.e., facilitating conditions) should be considered when assessing the factors that contribute to COVID-19 vaccine uptake among populations where medical mistrust and experiences of discrimination in healthcare settings have been observed.

Present Study

TGD individuals, particularly those with intersecting minoritzed racial identities, experienced significant health disparities and barriers to healthcare prior to the COVID-19 pandemic. These disparities have since become exacerbated due to economic and sociopolitical factors. Furthermore, research assessing vaccine hesitancy during the COVID-19 pandemic identified medical mistrust as a predictor of vaccine hesitancy among people of color but little has been established as to how medical mistrust may contribute to vaccine hesitancy among TGD individuals. Therefore, the present study aimed to assess predictors of COVID-19 vaccination as it pertained to intersecting identities of gender and race. Furthermore, the present study aimed to assess the role of engagement in healthcare in COVID-19 vaccination decisions. Engagement with healthcare, and telehealth specifically, may serve as a protective factor against the development/progression of medical mistrust and vaccine hesitancy and thus type of healthcare engagement (no engagement, in-person only, telehealth only, combination of in-person and telehealth) were also be assessed.

Hypotheses

In order to assess the relationship among experiences of discrimination in medical settings, medical mistrust, vaccine hesitancy, COVID-19 mistrust, healthcare engagement, and COVID-19 vaccination behaviors among TGD individuals, the following hypotheses were tested

Hypothesis 1a-1b

The first hypothesis assumed a predictive relationship between measures of attitudes and experiences and resulting levels of mistrust within the overall sample. Specifically, it was hypothesized that: (a) higher general vaccine hesitancy would predict higher COVID-19 specific mistrust and (b) greater reported experiences of discrimination in medical settings would predict greater medical mistrust.

Hypothesis 2a-2b

The second hypothesis predicted that discrimination experiences in healthcare settings, medical mistrust, greater COVID-19 specific vaccine mistrust, and having a racial identity of color would predict lower COVID-19 vaccination behaviors. Specifically, it was hypothesized that demographic information and predictor variables would predict (a) a delay in receipt of a first dose of a COVID-19 vaccine and (b) lower COVID-19 vaccination uptake at the time of the study.

Hypothesis 3a-3c

Finally, the third hypothesis proposed that COVID-19 vaccination in this population would be explained by lower experiences of discrimination in medical settings, lower medical mistrust, lower COVID-19 mistrust, and engagement with healthcare during the pandemic. In order to comprehensively examine this relationship, the third hypothesis was broken up into three sub-hypotheses. Specifically it was hypothesized that: (a) race would moderate the relationship between experiences of discrimination in healthcare settings and medical mistrust

wherein TGD individuals of color would be more likely to have higher medical mistrust due to experiences of discrimination in healthcare settings relative to White participants; (b) COVID-19 mistrust would mediate the predictive relationship between medical mistrust and COVID-19 vaccination behaviors; and (c) engagement with healthcare during the pandemic would inhibit the relationship between high COVID-19 mistrust and low COVID-19 vaccination behaviors wherein participants who engaged with healthcare would have higher COVID-19 vaccination behaviors compared to those who did not engage with healthcare.

Exploratory Hypothesis

In order to explore the role of increased access and utilization of telehealth during the pandemic, an exploratory hypothesis was proposed. For the purpose of this exploration, participants were be grouped based on the type of healthcare modality they engaged in during the pandemic: no healthcare engagement, in-person only, telehealth only, or a combination of in-person and telehealth.

Exploratory Hypothesis

The proposed exploratory hypothesis predicted that scores for medical mistrust and COVID-19 mistrust would differ across the four types of healthcare engagement wherein those who engaged with healthcare during the pandemic would have less medical and COVID-19 mistrust compared to those who did not engage in healthcare.

METHODS

Recruitment

This study recruited a national sample of online survey participants using the survey platform Prolific (https://www.prolific.co/). Prolific was designed by academic researchers in order to connect researchers and marketing teams to individuals looking to anonymously

participate in surveys and studies for monetary compensation. One of the main benefits to utilizing Prolific is the ability for researchers to apply custom filters to their surveys to ensure that their study reaches the intended populations. Upon creation of a participant account, approximately 190 demographic and experience-based questions are presented for participants to answer in order to present them with studies that are most relevant to their identities and experiences. Crucially, these items include questions regarding race, ethnicity, sexual orientation, and gender identity. Not only does Prolific acknowledge the distinction between sex assigned at birth and gender identity, but participants are able to indicate their gender identity from a comprehensive list of identities including woman, man, trans woman, trans man, non-binary, genderqueer, and a preference to not specify. In this way, Prolific not only makes it easy for TGD health researchers to reach their intended population but also creates an online environment wherein TGD identities are represented, respected, and valued. This gives Prolific a distinct set of advantages over other survey platforms including higher data quality and a more diverse pool of participants (Palan & Schitter, 2018; Peer et al., 2017). Although there are limitations to consider when implementing a survey-based design, such as self-report bias, prior work suggests that sensitive health information is more likely to be fully reported via self-administered internet or computer-based assessments due to the increased anonymity (Newman et al., 2002). Therefore, utilizing Prolific to collect data from TGD individuals offered a number of advantages and opportunities that were not available on other internet-based survey platforms or in-person data collection methods.

Sample

Only participants who are above the age of 18 and identified as transgender or gender diverse were invited to participate in the study. A power analysis was conducted using Preacher

and Coffman's online tool for computing power and minimum sample size for RMSEA (Root Mean Square Error of Approximation) (Rigdon, 1994; Preacher & Coffman, 2006). An alpha of .05 and a desired power of .80 were specified and it was indicated that the ideal sample size for the present study was 356. In order to account for possible missingness or submissions with low data quality the total sample size was increased to 380. Prior studies with TGD individuals recruited from Prolific have produced samples that are approximately 68% White or Caucasian with the remaining 32% being people of color (Smout et al., 2022). Therefore, three surveys were launched consecutively in order to adequately assess the role of racial identity in the potential relationship between experiences of discrimination in medical settings, medical mistrust, and vaccine hesitancy.

The first survey attempted to recruit all TGD Prolific users regardless of their racial or ethnic identity. Data collection for the first survey was completed in three days and 75% (n=142) of participants indicted an exclusively White racial identity. The second survey collected data from TGD participants of color who had indicated their racial identity or identities as Black/African American, Hispanic/Latino, Asian, Middle Eastern, Mixed, or Native American. An additional Prolific filter was applied to the second survey which prevented users who participated in the first study from being invited thus eliminating the possibility of duplicate submissions. This survey ran for twenty-two days and collected responses from 108 exclusively BIPOC participants. Due to the time sensitive nature of the study, this second survey was paused and a third survey was created using the same criteria as the first study wherein no race or ethnicity filters were applied. The same filter applied in the second study which prevented users who participated in the prior studies from participating in this third study was also applied. This third study ran for two days and collected data from the 83 participants needed to meet the pre-

established sample size requirements. The majority of participants in this third study (90%; n=75) reported an exclusively White identity. Full demographic data for the final sample is presented and discussed in the Results section.

For all analyses that include race, Asian participants were grouped with other BIPOC participants. Although Asian Americans have the highest COVID-19 vaccination rates in the country (CDC_a, 2022), Asian participants were categorized as BIPOC for two key reasons. Firstly, Asian participants only accounted for 8.6% of the sample compared to the 56% White participants and thus it was unlikely that vaccination rates among Asian participants would impact the overall vaccination rate among the White category. Secondly, given that Asian identities are distinct from White identities thus contributing to an inherently different racialized experience within American society, it was more appropriate to group Asian participants as BIPOC. Furthermore, there were a number of reported hate crimes and acts of violence against Asian Americans during the COVID-19 pandemic which may have impacted their perceptions of discrimination in healthcare settings and feelings of medical mistrust relative to the years prior to the pandemic (Tessler et al., 2020).

Procedure

The proposed study was advertised on the Prolific site where participants self-selected to take the survey. Only participants who had a 95% approval rating for their participation on prior Prolific studies were invited to participate. Once they chose to take the survey, participants were redirected to the Qualtrics site where they needed to read and accept the consent form in order to continue to the survey items. As part of a larger study assessing the state of health and experiences of TGD individuals during the pandemic, the present study aimed to focus on predictors of COVID-19 vaccination among this population. The primary constructs that were

assessed included experiences of discrimination in healthcare settings, medical mistrust, COVID-19 mistrust, healthcare engagement, COVID-19 vaccination behaviors, HBM constructs within the context of COVID-19 vaccination, and demographic information. The study consists of a 186 item survey and took on average 17 minutes to complete. Participants were paid $1.20 once their survey had been submitted, reviewed for completion, and correct responses to attention check questions had been confirmed. A captcha question needed to be completed at the beginning of the survey and two items were incorporated in order to determine participant authenticity such as, “Please type the second word in this sentence”. All identifying participant information remained confidential and participants were able to contact researchers using the Prolific messaging feature in the event they had additional questions or comments.

Measures

Demographics

Participants were asked to provide information such as age, gender, racial/ethnic identity, sexual orientation, and relationship status. The only demographic variables that were used to determine eligibility were age and gender identity which required the participants to be 18 or older and have indicated that their gender identity falls under the transgender and gender diverse umbrella (i.e., transgender, genderqueer, agender, etc.). Racial identity was only used to determine eligibility in the second survey in order to maximize the number of participants of color in the study.

COVID-19 Diagnosis and Vaccination Behaviors

Participants were asked whether they have received at least one dose of a COVID-19 vaccine with response options including “yes” and “no” and were also asked to report the month and year they received their first dose. Participants who indicate they received their first dose in

July 2021 or after were given a selection of options to indicate why they experienced a delay in vaccination. Response options included “I could not get an appointment before then”, “I could not arrange transportation to get vaccinated”, “I wanted to wait and see how the vaccine affected others”, and an option to specify their reason in a free response format. As of April 19th 2021, all adults nationwide were officially eligible for COVID-19 vaccines and concerns about the Delta variant were discussed at a White House briefing on June 23rd 2021 (American Journal of Managed Care, 2021).). Therefore, July 1st 2021 was used as the benchmark to assess for a delay in COVID-19 vaccination. Participants were then asked which COVID-19 vaccine they received (Moderna, Pfizer, or Johnson & Johnson). Participants who responded with “Moderna” or “Pfizer” were asked to report whether they have received a second dose and a booster shot with the same response options as the first question as well as the month and year they received it. Participants who indicated they received the Johnson & Johnson vaccine skipped the question about receiving a second dose and were only presented with the question about receiving a booster. Vaccination status was coded as 0 for no doses, 1 for one dose or partial vaccination, 2 for two doses or full vaccination, and 3 for three doses or full vaccination plus a booster. Participants were also be asked whether they had ever been tested for COVID-19, whether they had ever been diagnosed with COVID-19, and whether they had experienced any COVID-19 symptoms.

Healthcare Engagement

Participants were asked to report whether they had utilized healthcare during the pandemic. If participants respond with “yes” they were asked to report whether they had utilized in-person and telehealth services for general health services, gender transition-related services,

and mental health services. For each type of healthcare service utilized, participants were asked to rate their experience on a scale of 1 (very poor) to 10 (excellent).

Discrimination in Medical Settings

Discrimination in medical settings was assessed with a measure adapted from the Everyday Discrimination Scale for use in medical settings (Peek et al., 2011). In the present sample, the measure demonstrated good internal consistency ($\alpha = .91$). Participants were asked to indicate how often experiences of discrimination in medical settings occur to them with responses ranging from "Never" to "Always". Items from the measure include "A doctor or nurse acts as though they are afraid of you" and "You are treated with less respect than other people".

Vaccination Attitudes Examination (VAX) Scale

The Vaccination Attitudes Examination (VAX) scale was developed to assess general vaccination attitudes and has demonstrated good internal consistency and test-retest reliability (Martin & Petrie, 2017). The measure consists of four subscales that are based on constructs developed from focus groups of self-identified vaccine supporters as well as those who identified as vaccine hesitant. In the present sample, the measure demonstrated good internal consistency ($\alpha = .91$). Participants were asked to indicate their level of agreement with twelve statements with response options ranging from strongly disagree to strongly agree. Items from the measure include "I feel protected after getting vaccinated" and "I worry about the unknown effects of vaccines in the future".

Medical Mistrust Index

The Medical Mistrust Index was developed based on themes identified in telephone interviews conducted with 401 Baltimore residents of varying race, gender, and socioeconomic

status (LaVeist et al., 2009). In previous studies, the measure was predictive of four medical underutilization behaviors: failure to take medical advice (b = 1.56, p<.01), failure to keep a follow-up appointment (b = 1.11, p=.01), postponing receiving needed care (b = 0.939 p=.01), and failure to fill a prescription (b = 1.48, p=.002). In the present sample, the measure demonstrated good internal consistency (α = .85). Participants were asked to indicate their level of agreement with various statements with response options ranging from strongly disagree to strongly agree. Items from the measure include "When health care organizations make mistakes they usually cover it up" and "Patients have sometimes been deceived or misled by health care organizations."

COVID-19 Related Medical Mistrust

This 10-item measure was developed and tested within a sample of 101 HIV positive African Americans during the COVID-19 pandemic (Bogart et al., 2021). This measure has also demonstrated significant associations with scales assessing HIV-related mistrust (r=.50) and general medical mistrust (r=.42) (Bogart et al. 2021). Although initially developed within a small subset of the American population, this measure has since been used in a number of studies assessing vaccine hesitancy among diverse populations during the COVID-19 pandemic (Bogart et al., 2022). In the present study, the measure demonstrated good internal consistency (α = .89). Participants were asked to indicate their level of agreement with statements such as "When it comes to COVID-19, doctors have the best interests of patients in mind" with response options ranging from strongly disagree to strongly agree. For the purpose of this study, items that referred to that participant's racial identity were adapted to reflect the participant's gender identity such as "When it comes to COVID-19, trans and gender diverse individuals cannot trust healthcare providers".

Health Belief Model Constructs

In order to adequately address the four key constructs outlined by the HBM, additional items were included in the survey that addressed perceived barriers and benefits to COVID-19 vaccination as well as perceived susceptibility to and severity of COVID-19. These items were adapted from their initial use to assess vaccine hesitancy for H1NI and was used in previous studies to assess predictors of intention to receive a COVID-19 vaccination among a racially diverse sample of Americans (Guidry et al., 2021; Myers & Goodwin, 2011). All items for each respective construct were averaged to create an single score for perceived barriers, benefits, susceptibility, and severity.

Barriers

This measure consisted of four items that assessed perceived barriers to COVID-19 vaccination. Using a 6-point Likert scale ranging from "strongly disagree" to "strongly agree", participants were asked to indicate their level of agreement with the following statements: "I am scared of needles", "I am concerned about the side effects of the COVID-19 vaccination", "It is inconvenient to get the COVID-19 vaccine or booster", and "The development of the COVID-19 vaccines and boosters has been too rushed to properly test their safety". Upon initial assessment, the items did not indicated good internal consistency ($\alpha = .59$). Item-Total Statistics indicated that internal consistency would be improved if the "I am scared of needles" item was deleted. Once this item was removed from the overall barriers score, internal consistency was improved ($\alpha = .72$). Therefore, this 3-item version of the barriers measure was used in all relevant analyses wherein higher scores indicate greater perceived barriers to COVID-19 vaccination

Benefits

This measure consisted of three items that assessed perceived benefits to COVID-19 vaccination. Using a 6-point Likert scale ranging from “strongly disagree” to “strongly agree”, participants were asked to indicate their level of agreement with the following statements which follow the prompt “If I get a COVID-19 vaccination/booster, it will...”: “...help me feel less worried about getting COVID-19”, “...decrease my chance of getting COVID-19 and its complications”, and “...protect those around me from COVID-19”. Higher scores indicated greater perceived benefits to COVID-19 vaccination and the measure demonstrated good internal consistency ($\alpha = .93$).

Susceptibility

This measure consisted of two items that assessed perceived susceptibility to contracting COVID-19. Using a 6-point Likert scale ranging from “strongly disagree” to “strongly agree”, participants were asked to indicate their level of agreement with the following statements: “I am worried about the likelihood of getting COVID-19 in the near future” and “Getting COVID-19 is currently a possibility for me”. Higher scores indicated greater perceived susceptibility to contracting COVID-19 and the measure demonstrated adequate internal consistency ($\alpha = .70$).

Severity

This measure consisted of three items that assessed perceived severity of contracting COVID-19. Using a 6-point Likert scale ranging from “strongly disagree” to “strongly agree”, participants were asked to indicate their level of agreement with the following statements: “Complications from COVID-19 are serious”, “I will be very sick if I get COVID-19”, and “I am afraid of getting COVID-19”. Higher scores indicated greater perceived severity of contracting COVID-19 and the measure demonstrated adequate internal consistency ($\alpha = .78$).

RESULTS

Demographics

The present sample (N=385) had a mean age of 26 (SD=7.57). Of these participants, 56.6% (n=218) were White, 6.2% (n=24) were Black or African American, 14% (n=54) were Latinx, 8.6% (n=33) were Asian, 1.3% (n=5) were Native American, 2.9% (n=11) were Middle Eastern or American Arab, 9.9% (n=38) reported a mixed racial identity, and 0.5% (n=2) indicated a racial identity not listed. With regards to gender identity, 5.7% (n=22) were women, 8.3% (n=32) were trans women, 5.7% (n=22) were men, 16.9% (n=65) were trans men, 43.6% (n=168) were nonbinary, 6.0% (n=23) were genderfluid, 7.8% (n=30) were genderqueer, and 6.0% (n=23) indicated a gender identity not listed. The majority of participants (58.8%, n=224) indicated they identify as a Democrat, 29.6% (n=114) were Independent, 1.6% (n=6) were Republican, and 10.6% (n=41) indicated a political party affiliation not listed.

Vaccination Behaviors

The majority of participants (93%; n=358) indicated they had received at least one dose of a COVID-19 vaccine at the time of the study. Of those who had received a COVID-19 vaccine, 79% (n=304) had received their first dose prior to July 2021 while 15.1% (n=58) had received their first dose on or after July 1st 2021. Of the three possible vaccinations they could have received, 49.9% (n=192) received Pfizer, 33.0% (n=127) received Moderna, and 10.1% (39) received Johnson & Johnson. Additionally, the majority of participants (70.9%; n=273) had received a COVID-19 booster at the time of the study.

Healthcare Engagement

The majority of participants (87.5%; n=337) indicated they had some type of health insurance at the time of the study. In turn, the majority of the sample (84.9%; n=327) reported

that they had seen a doctor or healthcare provider in the past year. Of those participants, 60.0% (n=231) indicated they had utilized telehealth in the past year. Most participants reported utilizing telehealth for general healthcare (60%; n=231) and roughly half the sample (44.7%; n=172) reported utilizing telehealth for mental or psychological healthcare. Fewer participants (19%; n=73) reported using telehealth for gender related healthcare (e.g., HRT, surgery consultations).

Table 1. Descriptive Statistics

Characteristic	**Frequency**
	Means (SD)/percentages (*n*)
Age (years)	Mean = 26 (SD = 7.57)
Race/ethnicity	
Caucasian/White	56.6% (*n* = 218)
African American/Black	6.2% (*n* = 24)
Latino/Latina/Latinx	14% (*n* = 54)
Asian	8.6% (*n* = 33)
Middle Eastern	2.9% (*n* = 11)
Native American	1.3% (*n* = 5)
Not Listed	0.5% (*n* = 2)
Multiracial	9.9% (*n* = 38)
Gender	
Woman	5.7% (*n* = 22)
Trans Woman	8.3% (*n* = 32)
Man	5.7% (*n* = 22)
Trans Man	16.9% (*n* = 65)
Nonbinary	43.6% (*n* = 168)
Genderfluid	6.0% (*n* = 23)
Genderqueer	7.8% (*n* = 30)
Identity not listed	6.0% (*n* = 23)
Vaccination Status	
One dose	93% (*n* = 358)
Fully vaccinated	70.9% (*n* = 273)
Vaccination Date	
Before July 2021	79% (*n* = 304)
After July 2021	15.1% (*n* = 58)
Vaccine Type	
Pfizer	49.9% (*n* = 192)
Moderna	33.0% (*n* = 127)
Johnson & Johnson	10.1% (*n* = 39)

Correlations

Correlations for all variables used in analyses are included in table 2. Notably, vaccination hesitancy was positively correlated with medical mistrust, COVID-19 mistrust, and barriers to vaccination and negatively correlated with perceived benefits of vaccination, perceived severity of COVID-19 symptoms, perceived susceptibility to COVID-19, receipt of first vaccination prior to July 1st 2021, and receipt of a booster at the time of the study. Experiences of discrimination in healthcare settings was positively correlated with medical mistrust and COVID-19 mistrust. Additionally, COVID-19 mistrust was positively correlated with perceived barriers to vaccination and negatively correlated with perceived benefits to vaccination, perceived severity of COVID-19 symptoms, receipt of first vaccination prior to July 1st 2021, and receipt of a booster at the time of the study.

Hypothesis 1a

In order to address hypothesis 1a which assumed a positive, predictive relationship between vaccine hesitancy and COVID-19 mistrust, a linear regression was conducted. Results from the regression were significant, $R^2 = .31$, $F(1, 383) = 171.94$, $p < .001$, indicating that higher vaccine hesitancy predicted higher COVID-19 mistrust.

Hypothesis 1b

In order to address hypothesis 1a which assumed a positive, predictive relationship between experiences of discrimination in healthcare settings and medical mistrust, a second linear regression was conducted. Results from the regression were significant, $R^2 = .18$, $F(1, 383) = 85.24$, $p < .001$, indicating that greater experiences of discrimination in healthcare settings predicted higher levels of medical mistrust.

Table 2. Correlations

	Vaccine hesitancy	Discrimination	Medical mistrust	Group medical mistrust	COVID-19 mistrust	Barriers	Benefits	Severity	Susceptibility	Booster	Vaccination date
Vaccine hesitancy	1										
Discrimination	-.02	1									
Medical mistrust	.11*	.43**	1								
Group medical mistrust	.09	.56**	.57**	1							
COVID-19 mistrust	.56**	.22**	.37**	.43**	1						
Barriers	.67**	-.01	.07	.09	.43**	1					
Benefits	-.72**	.08	-.02	-.05	-.42**	-.56**	1				
Severity	-.39**	.29**	.17**	.21**	-.11**	-.21**	.44**	1			
Susceptibility	-.30**	.28**	.15**	.20**	-.03	-.14**	.34**	.59**	1		
Booster	-.42**	.04	.03	.01	-.25**	-.43**	.39**	.20**	.24**	1	
Vaccination date	-.44**	-.01	-.02	-.02	-.24**	-.38**	.43**	.17**	.26**	.44**	1

N=385
* <.05
**<.01

Hypothesis 2a

A hierarchical logistic regression was conducted to test hypothesis 2a which posited that race, experiences of discrimination, medical mistrust, and COVID-19 mistrust would predict a delay in receipt of first COVID-19 vaccination. The regression predicted membership in one of two groups: individuals who received their first vaccination prior to July 2021 (n=304) and those who received their first dose on or after July 1st 2021 (n=81). For the purpose of this analysis, gender was dichotomized as 0 for nonbinary gender identities (i.e., nonbinary, genderqueer, genderfluid, etc.) and 1 for binary gender identities (i.e., trans women, trans man, etc.) and race was dichotomized as 0 for White and participants and 1 for BIPOC participants which. The demographic variables of age, gender, and race were entered into the first step of the model and significantly predicted delayed receipt of an initial COVID-19 vaccination, $\chi 2$ (3, N = 385) = 13.46, $p < 0.01$. Of the three demographic variables entered into the first step of the model, only gender was significant wherein individuals with a binary gender identity were 2.38 times more likely to have experienced a delay in receipt of an initial COVID-19 vaccination. Medical mistrust and experiences of discrimination in healthcare settings were entered into the second step of the model but did not contribute to overall significance, $\chi 2$ (2, N = 385) = 0.67, p=0.71. COVID-19 mistrust was entered into the third and final step of the model and contributed to the overall significance of the model, $\chi 2$ (1, N = 385) = 22.87, $p < 0.001$, wherein participants with higher COVID-19 mistrust were 2.1 times more likely to have reported a delay in receipt of an initial COVID-19 vaccination. Gender remained a significant predictor wherein participants with a binary gender identity were 2.4 times more likely to report a delay in initial vaccination. Results from the Hosmer and Lemeshow Test were not significant, $\chi 2$ (8, N = 385) = 6.93, p = .55, suggesting that the model was an adequate fit for the data.

Table 3. Hypothesis 2a Logistic Regression

Step	Variable	OR	CI	*B*	SE	*p*
1	Age (years)	1.01	(.98, 1.04)	.01	.02	*ns*
	Gender (nonbinary gender as reference group)	2.43	(1.43, 4.13)	.89	.27	<.01
	Race (Whites as reference group)	2.13	(.71, 2.13)	.21	.28	*ns*
2	Medical Mistrust	.70	(.39, 1.26)	-.36	.30	*ns*
	Healthcare Discrimination	1.04	(.74, ,147)	.73	1.60	*ns*
3	COVID-19 Mistrust	2.08	(1.52,2.84)	.73	.16	<.001

N = 385
ns not significant

Hypothesis 2b

A hierarchical logistic regression was conducted to test hypothesis 2b which posited that race, experiences of discrimination, medical mistrust, and COVID-19 mistrust would predict incomplete vaccination uptake at the time of the study. The regression predicted membership in one of two groups: individuals who had received a booster at the time of the study (n=273) and those who had not (n=112). Dichotomized race and gender variables from the first logistic regression were also utilized in this analysis. The demographic variables of age, gender, and race were entered into the first step of the model and significantly predicted delayed receipt of an initial COVID-19 vaccination, $\chi 2$ (3, N = 385) = 14.87, $p < 0.01$. Of the three demographic variables entered into the first step of the model, only gender was significant wherein individuals with a binary gender identity were 2.1 times more likely to have not received a COVID-19 booster at the time of the study. Medical mistrust and experiences of discrimination in healthcare settings were entered into the second step of the model but did not contribute to overall

significance, $\chi 2$ (2, N = 385) = 0.18, p=0.91. COVID-19 mistrust was entered into the third and final step of the model and contributed to the overall significance of the model, $\chi 2$ (1, N = 385) = 29.99, p < 0.001, wherein participants with higher COVID-19 mistrust were 2.18 times more likely to have not received a booster at the time of the study. Gender remained a significant predictor wherein participants who had a binary gender identity were 2.05 times more likely to have not received a booster at the time of the study. Results from the Hosmer and Lemeshow Test were not significant, $\chi 2$ (8, N = 385) = 5.50, p = .70, suggesting that the model was an adequate fit for the data.

Table 4. Hypothesis 2b Logistic Regression

Step	**Variable**	**OR**	**CI**	***B***	**SE**	***p***
1	Age (years)	1.03	(.99, 1.06)	.03	.02	*ns*
	Gender (nonbinary gender as reference group)	2.05	(1.26, 3.33)	.72	.25	<.01
	Race (Whites as reference group)	1.30	(.79, 2.15)	.25	.26	*ns*
2	Medical Mistrust	.58	(.34, .99)	-.55	.27	*ns*
	Healthcare Discrimination	.91	(.66, ,1.25)	-.09	.16	*ns*
3	COVID-19 Mistrust	2.18	(1.62, 2.93)	.78	.15	<.001

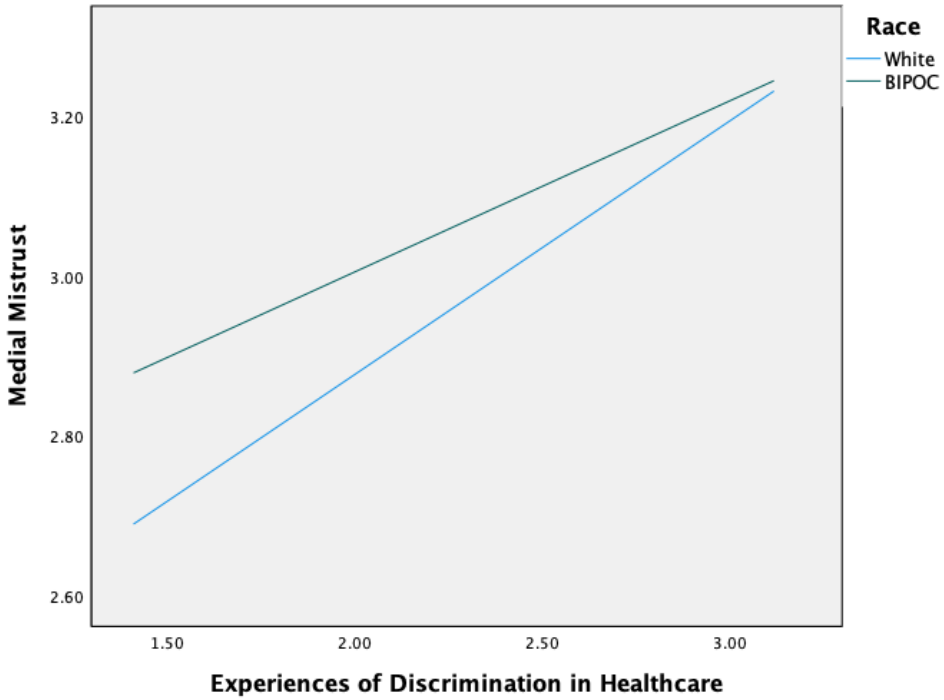
N = 385
ns not significant

Moderation

Hypothesis 3a assumed that the relationship between experiences of discrimination in healthcare settings and medial mistrust would be moderated by race wherein BIPOC participants would have greater experiences of discrimination which would contribute to higher medical mistrust. Using Hayes' (2021) PROCESS macro (Model 1) a moderation was conducted. For the

purpose of this analysis, race was dichotomized wherein White participants were coded as 0 and BIPOC participants were coded as 1. Experiences of discrimination positively predicted medical mistrust (B=0.32, p<.001) and race positively predicted medical mistrust (B=0.34, p<.05) wherein BIPOC participants reported greater medical mistrust. However, findings for race as a moderator between experiences of discrimination and medical mistrust were only marginally significant (β = -.10, ΔR^2 = .01, $F(3, 381) = 9.84$, $p = .07$).

Figure 3. Moderation for Hypothesis 3a



Although White participants reported greater experiences of discrimination (M=2.36) than BIPOC participants (M=2.13), BIPOC participants scored higher on medical mistrust (M=3.03) compared to White participants (M=2.99). These results suggest that other factors may need to be considered when assessing potential contributors to medical mistrust among BIPOC TGD individuals.

Mediation

To assess hypothesis 3b, that COVID-19 mistrust would mediate the relationship between medical mistrust and vaccination behavior, a mediation using Hayes' (2021) PROCESS macro (Model 4) was conducted. For this analysis, receipt of a booster at the time of the study was used as the outcome variable. The initial path between medical mistrust and receipt of a booster was significant (β=.67, p<.001, 95% CI [.48, .80]). Once COVID-19 mistrust was entered into the model, both the mediated pathway (β=-.78, p<.001, 95% CI [-1.07, -.50]) and the initial pathway (β=.67, p<.01, 95% CI [.18, 1.17]) were significant. Results suggest COVID-19 mistrust partially mediates the relationship between medical mistrust and receipt of a booster at the time of the study. Although participants who had received a booster had slightly higher medical mistrust (M=3.02) than those who were not boosted (M=2.99), those who were boosted had lower COVID-19 mistrust (M=2.45) than those who were not boosted (M=2.95). These results suggest that COVID-19 mistrust may partially explain participants' choice to get a booster and is also conceptually different than general medical mistrust as demonstrated by the difference in directionality of the pathways.

PATH Model

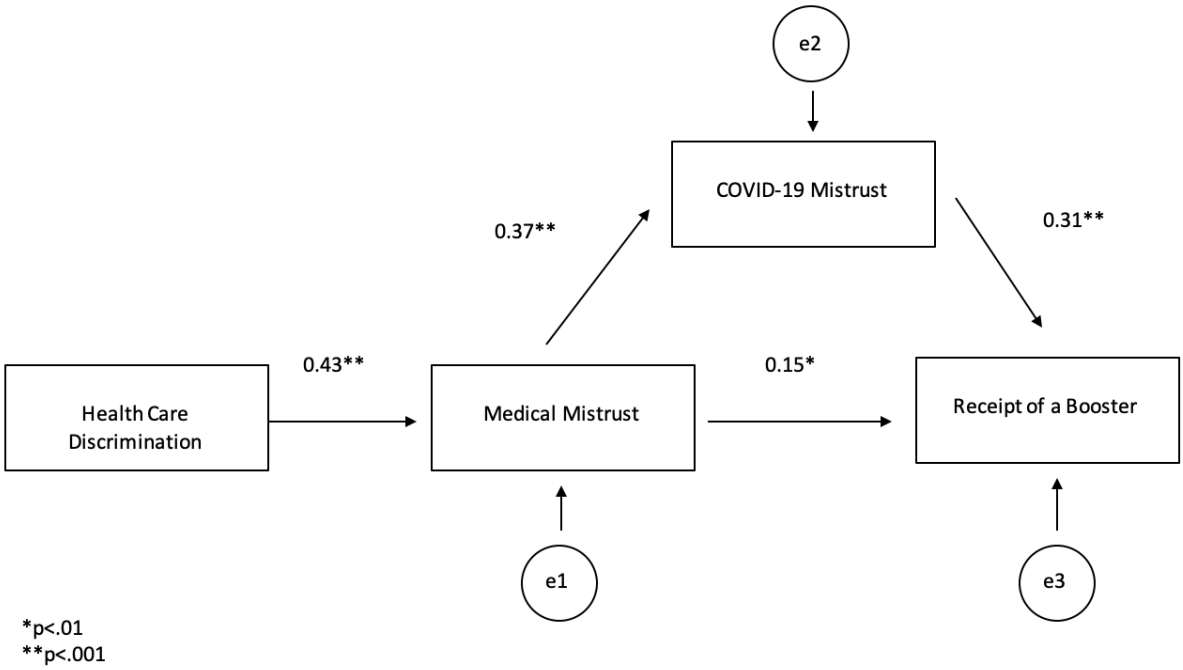
In order to test the final step of hypothesis 3, a path model was developed using AMOS 21.0 (Arbuckle, 2007) to test hypothesis 3c which asserted that experiences of healthcare discrimination would predict greater medical mistrust and that this relationship would be moderated by race wherein participants of color would experience greater discrimination thus contributing to greater medical mistrust. Additionally, greater medical mistrust would predict greater COVID-19 mistrust which would then predict lower vaccination behaviors. This final pathway would also be moderated by engagement with healthcare wherein participants who

reported engagement with healthcare during the pandemic would be more likely to have higher vaccination behaviors compared to those who reported no engagement with healthcare. For the purpose of this model, receipt of a booster at the time of the study was used as the vaccination behavior variable. The following criteria were used to assess goodness of fit for the models: ratio of chi-square to degrees of less than 3.0 (Schlermelleh-Engel et al. 2003; Vandenberg 2006); traditional fit indices including comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), incremental fit index (IFI), and Tucker-Lewis index (TLI), higher than .90 which would indicate adequate fit (Byrne, 1994; Hu & Bentler, 1999); and a root mean square error approximation (RMSEA) of .08 or less (Tabachnick & Fidell, 2001).

Model 1

In order to adequately explore the variables in the proposed model, a preliminary pathway was explored prior to incorporating the moderating variables (Model 1). All pathways in the model were significant at the $p<.001$ level except for the direct pathway between medical mistrust and receipt of a booster which was significant at the $p<.01$ level (Figure 4). Additionally, the overall fit for the model was adequate, $\chi^2/df = 1.63$, CFI = .99, GFI = 1.00, NFI = .98, IFI = .99, TLI = .98, AGFI = .98 and RMSEA = .04. In turn, the proposed model was further explored by incorporating the proposed moderating variables.

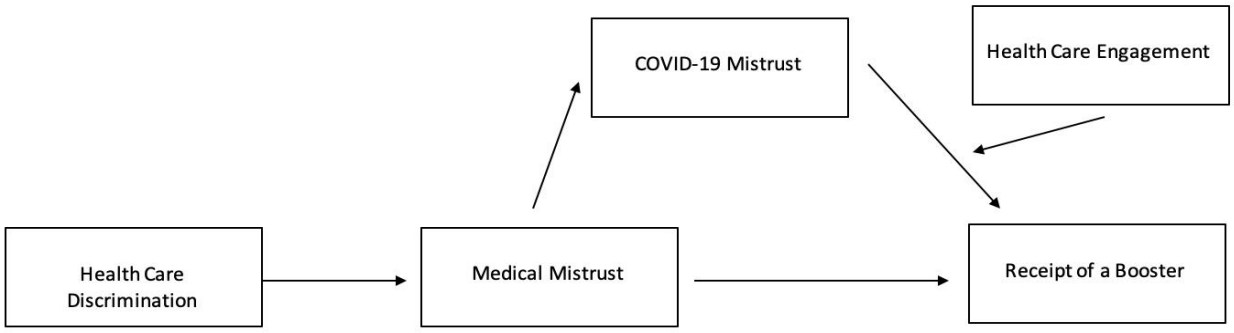
Figure 4. Path Model 1



Model 2

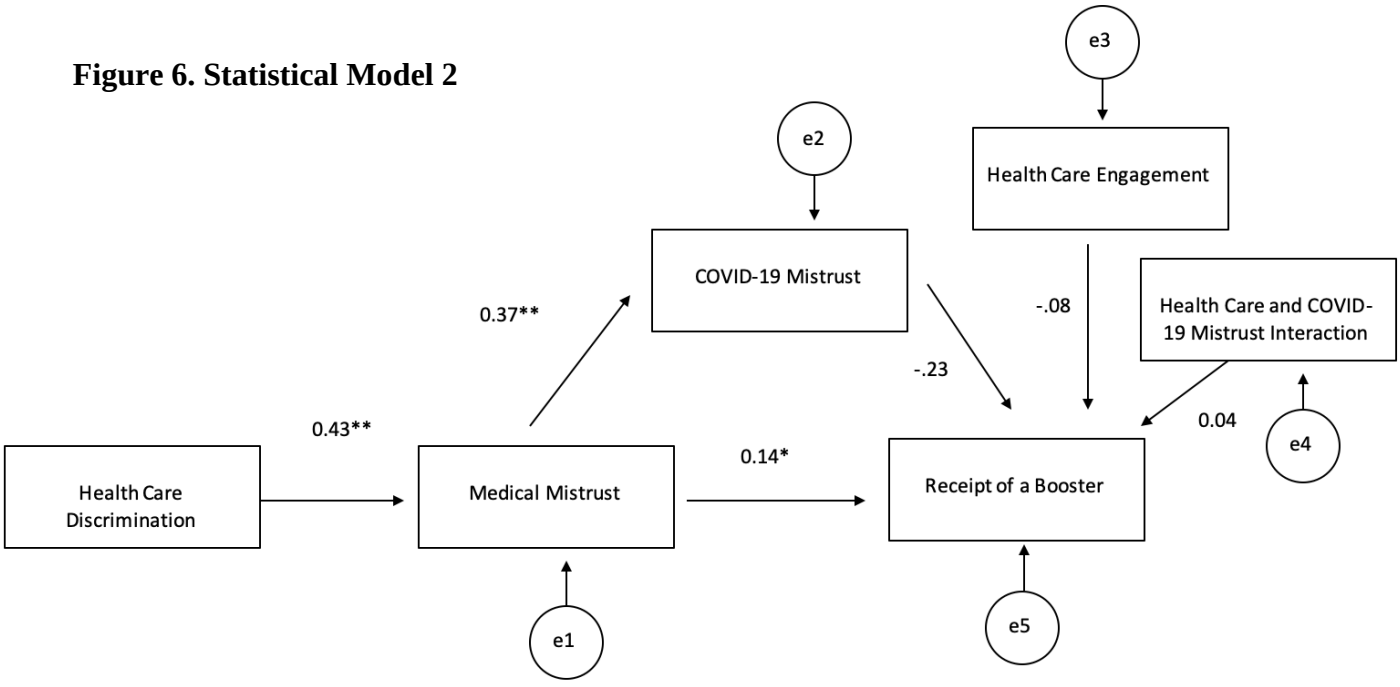
The first moderating variable entered into the model was engagement with healthcare. Engagement with healthcare was entered into the model with a direct pathway to receipt of a booster as well as an interaction variable between COVID-19 mistrust and healthcare engagement wherein the COVID-19 mistrust scores were centered and multiplied by engagement with healthcare which was coded as 0 for no engagement and 1 for reported engagement (Figure 5). Although the pathways from the preliminary model remained significant, the pathways between healthcare engagement, the interaction variable, and receipt of a booster were not significant (Figure 6). Additional analyses indicated that overall fit for the model was inadequate, χ^2/df = 85.73, CFI = .18, GFI = .77, NFI = .18, IFI = .18, TLI = -.38, AGFI = .47 and RMSEA = .47, suggesting that engagement with healthcare did not moderate the relationship between COVID-19 mistrust and receipt of a booster at the time of the study.

Figure 5. Theoretical Model 2



*p<.01
**p<.001

Figure 6. Statistical Model 2



*p<.01
**p<.001

Exploratory Pathway: Barriers

Although not proposed in the initial model, correlational analyses indicated a significant correlation between COVID-19 mistrust, receipt of a booster, and experiencing barriers to vaccination (table 2). Therefore, barriers to vaccination were entered as an additional pathway between COVID-19 mistrust and receipt of a booster. The pathway was negative and significant (β = -.17, p <.001). Overall model fit was adequate, χ^2/df = 3.14, CFI = .96, GFI = .99, NFI = .95, IFI = .97, TLI = .93, AGFI = .95 and RMSEA = .08, indicating that greater experiences of barriers to vaccination contributed to lower rates of receiving a booster at the time of the study (Figure 7). Additionally, the pathway between medical mistrust and receipt of a booster was no longer significant suggesting that the incorporation of barriers within the path between COVID-19 mistrust and receipt of a booster was fully mediated. When this pathway is trimmed from the model, fit was improved, χ^2/df = 2.89, CFI = .96, GFI = .98, NFI = .94, IFI = .96, TLI = .94, AGFI = .96 and RMSEA = .07, indicating that greater experiences of barriers to vaccination contributed to lower rates of receiving a booster at the time of the study. As a result, this trimmed, exploratory pathway was maintained (Figure 8).

Figure 7. Statistical Model 2 Version 2

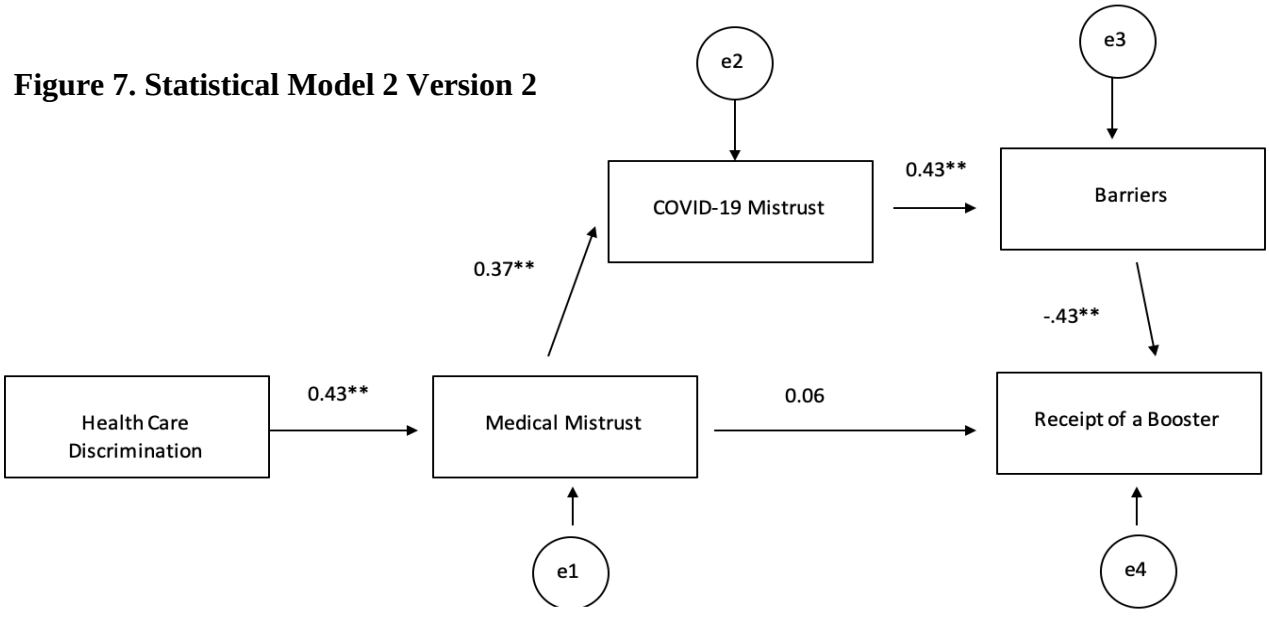
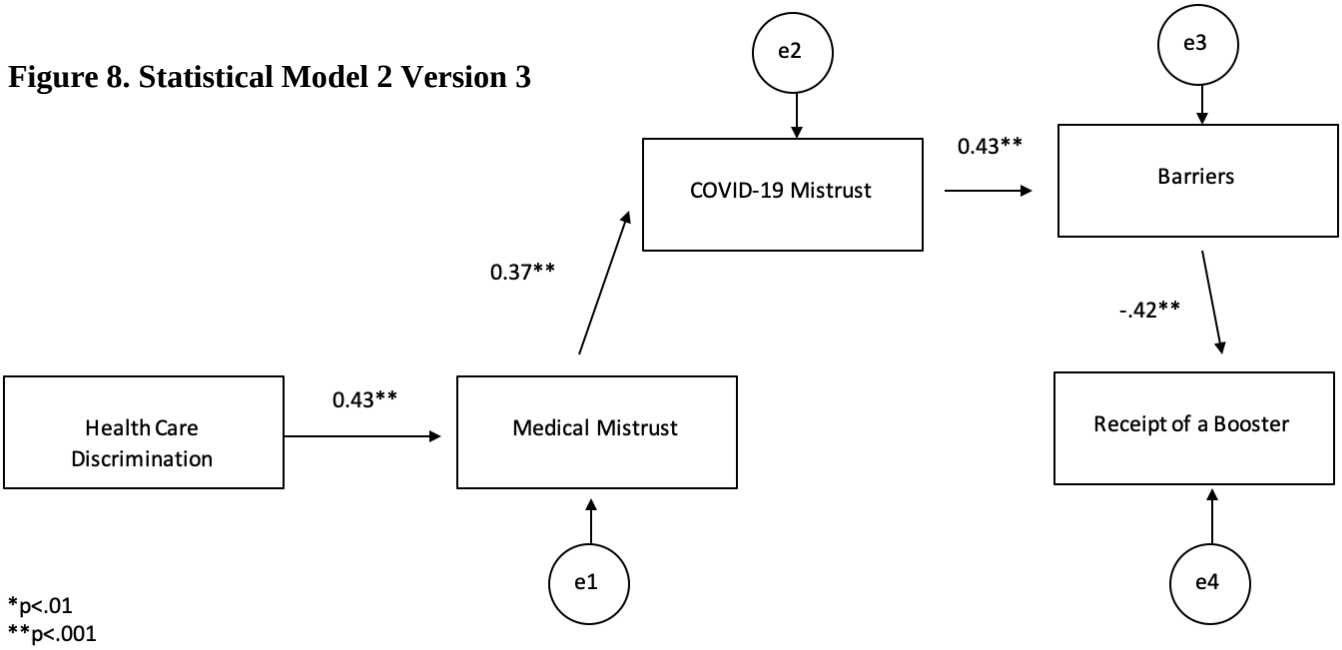


Figure 8. Statistical Model 2 Version 3

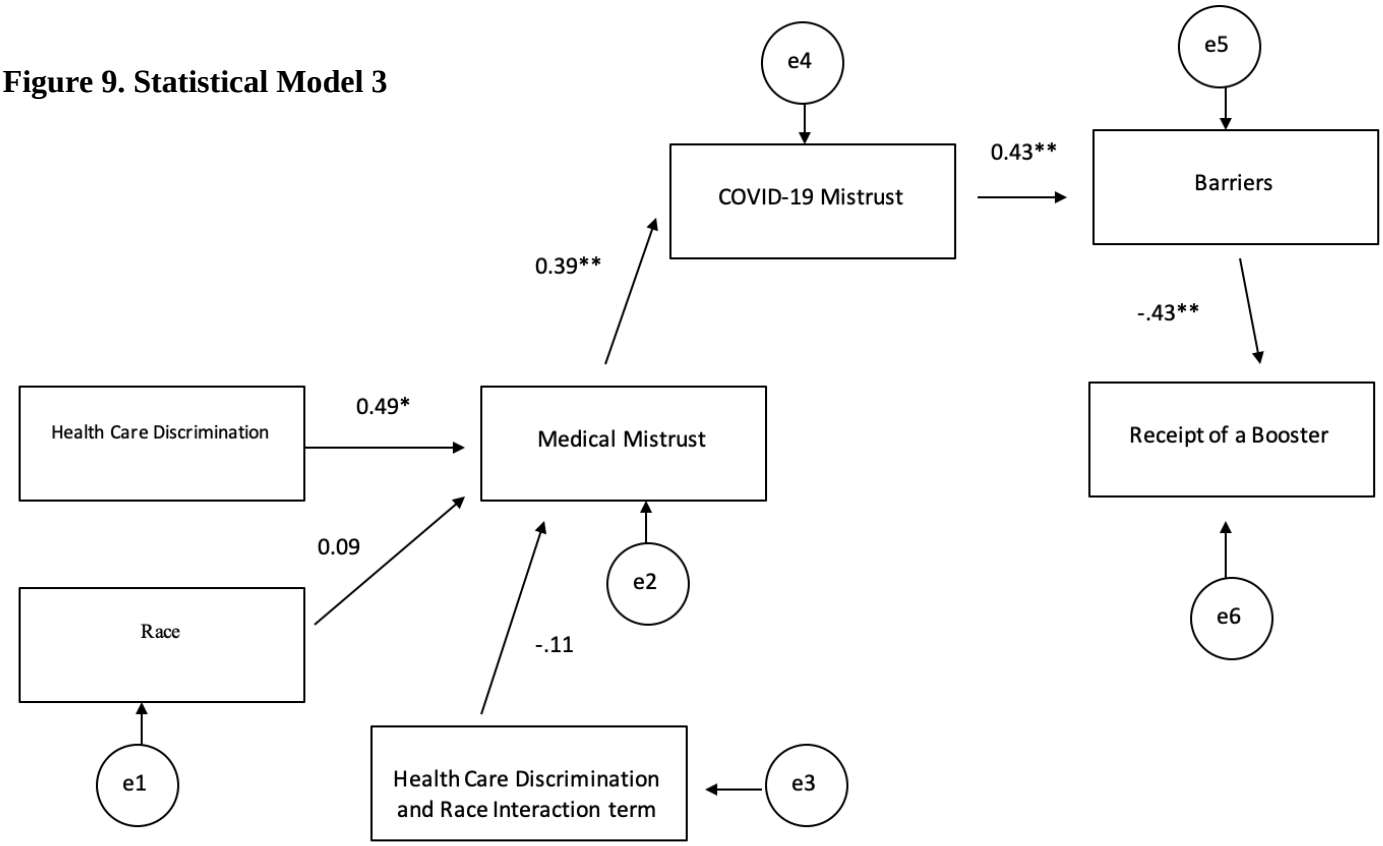


Model 3

Finally, race was entered as a moderating variable on the significant pathway between experiences of discrimination in healthcare and medical mistrust. This was done by creating a direct pathway between race and medical mistrust, computing an interaction term between experiences of discrimination and race, and creating a direct path between the interaction term and medical mistrust. The interaction term was created by centering experiences of discrimination and multiplying it by race which was coded as 0 for White participants and 1 for participants of color. Neither pathway between race and medical mistrust or the interaction term and medical mistrust were significant (Figure 9). Additional analyses indicated that the overall fit for the model was inadequate χ^2/df = 17.65, CFI = .54, GFI = .87, NFI = .53, IFI = .54, TLI = .35, AGFI = .75 and RMSEA = .21. Results suggest that race, when dichotomously categorized

into White and BIPOC, does not function as a moderator between experiences of discrimination and healthcare among TGD populations. Implications of these results will be further discussed below.

Figure 9. Statistical Model 3

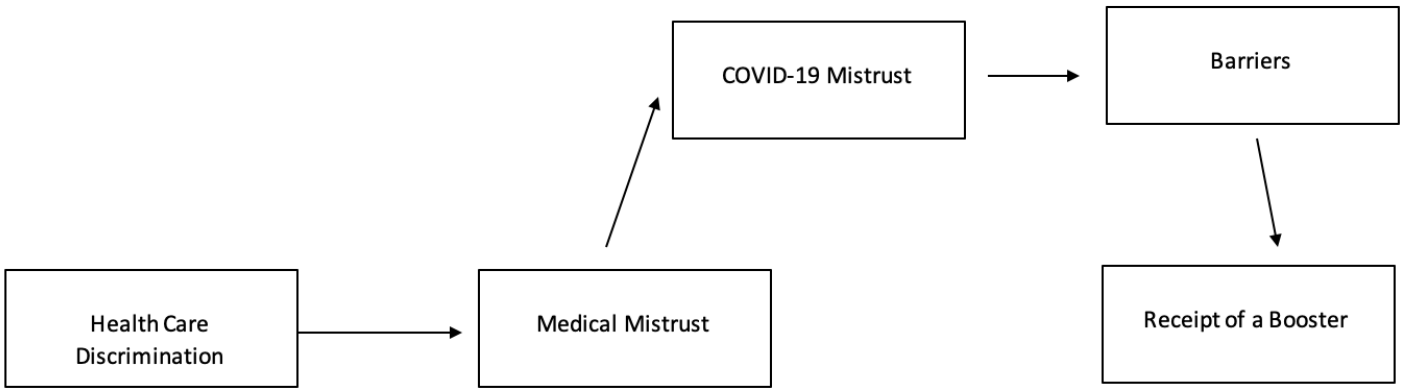


Final Path Model: Model 2 Version 3

Based on the progression of the proposed PATH analyses as informed by variable correlations, Model 2 Version 3 demonstrates the finalized, trimmed model (Figure 10). This final model demonstrates a significant relationship among the variables wherein, for all participants, greater experiences of discrimination in healthcare are associated with higher

measures of medical mistrust, which is significantly and positively related to COVID-19 mistrust. Finally, higher COVID-19 mistrust was positively related to greater reported experiences of barriers to vaccination which was associated with lower receipt of a booster at the time of the study as indicated by the negative beta weight. Hypotheses 3 was partially supported based on the mix of positive and negative findings. Implications for these results are discussed.

Figure 10. Theoretical Model 2 Version 3



Exploratory Hypothesis 1: Healthcare Engagement Modality

To address exploratory hypothesis 1, that there would be differences in mistrust and experiences of discrimination based on the method of healthcare engagement, a One-Way ANOVA was conducted. Overall satisfaction ratings for telehealth were high for general healthcare (M=7.06, SD=2.24), mental/psychological healthcare (M=7.53, SD=2.28), and gender

related healthcare (M=7.75, SD=2.26). Chi-square analyses indicated that there were no significant differences in telehealth utilization based on the dichotomized race variable, $\chi 2$ (1, N = 385) = 2.47, p =.12. Type of healthcare engagement was split into four groups: no reported healthcare engagement (n=58), in-person only (n=96), telehealth only (n=128), and a combination of in-person and telehealth engagement. The variables entered into the ANOVA included vaccine hesitancy, COVID-19 mistrust, experiences of healthcare discrimination, medical mistrust, barriers, benefits, severity, and susceptibility. Significant differences based on engagement type were detected for vaccine hesitancy score $F(3, 381)= 3.51$, $p=.02$, COVID-19 mistrust $F(3, 381)= 2.93$, $p=.03$, experiences of discrimination in healthcare $F(3, 381)= 4.10$, $p=.01$, barriers $F(3, 381)= 2.83$, $p=.04$, and perceived susceptibility to COVID-19 $F(3, 381)= 3.23$, $p=.02$. In order to further explore these comparisons, a Tukey post-hoc test was conducted. As demonstrated in table 5, participants who utilized telehealth only had significantly lower vaccination hesitancy compared to those who utilized in-person care only. However, participants who reported in-person care only had significantly lower experiences of discrimination compared to those who reported telehealth only. Participants who reported no engagement with healthcare during the pandemic perceived themselves as less susceptible to COVID-19 compared to those who use telehealth only or a combination of in-person and telehealth. Telehealth only compared to a combination of engagement type did not significantly differ from each other.

Although significant differences across engagement type were detected for COVID-19 mistrust and experiences of barriers to vaccination, the Tukey test did not indicate which groups significantly differed from each other. Therefore, a least significant difference test (LSD) was conducted as a follow up. Results indicated that participants who reported telehealth only engagement and a combination of in-person and telehealth had significantly lower COVID-19

mistrust compared to those who reported in-person only engagement. Finally, participants who reported telehealth only engagement reported experiencing significantly fewer barriers to vaccination compared to those who reported no healthcare engagement and in-person only engagement.

Table 5. One-Way ANOVA

	No Engagement	**In-person Only**	**Telehealth Only**	**Combination**	
Post-hoc Tukey test					
Vaccine Hesitancy	*M*=2.20 *SD*=.79	***M*=2.31$_a$** ***SD*=1.0**	***M*=1.95$_b$** ***SD*=.78**	*M*=2.02 *SD*=.08	***F*(3, 381)= 3.51***
Healthcare Discrimination	*M*=2.14 *SD*=.91	***M*=2.07$_a$** ***SD*=.88**	***M*=2.46$_b$** ***SD*=.87**	*M*=2.31 *SD*=.76	***F*(3, 381)= 4.10****
Medical Mistrust	*M*=2.90 *SD*=.56	*M*=3.03 *SD*=.50	*M*=3.04 *SD*=.51	*M*=3.01 *SD*=.55	*F*(3, 381)= .90
Benefits	*M*=4.94 *SD*=1.10	*M*=4.92 *SD*=1.28	*M*=5.26 *SD*=1.05	*M*=5.16 *SD*=1.10	*F*(3, 381)= 2.03
Severity	*M*=4.40 *SD*=1.03	*M*=4.59 *SD*=1.15	*M*=4.70 *SD*=.94	*M*=5.16 *SD*=1.07	*F*(3, 381)= 1.35
Susceptibility	***M*=3.81$_a$** ***SD*=1.22**	*M*=4.16 *SD*=1.15	***M*=4.30$_b$** ***SD*=1.06**	***M*=4.35$_b$** ***SD*=1.27**	***F*(3, 381)= 3.22***
Post-hoc LSD test					
COVID-19 Mistrust	*M*=2.73 *SD*=.88	***M*=2.73$_a$** ***SD*=.95**	***M*=2.44$_b$** ***SD*=.91**	***M*=2.51$_b$** ***SD*=.87**	***F*(3, 381)= 2.93***
Barriers	***M*=2.52$_b$** ***SD*=1.12**	***M*=2.49$_b$** ***SD*=1.30**	***M*=2.12$_a$** ***SD*=1.09**	*M*=2.20 *SD*=1.01	***F*(3, 381)= 2.83***

Note. Mean scores with different subscripts within rows are significantly different
**p<.01
*p<.05

DISCUSSION

The goal of the present study was to address possible contributors to COVID-19 vaccination behaviors within a sample of TGD individuals. Specifically, experiences of discrimination in healthcare settings and general medical mistrust were hypothesized to contribute to COVID-19 mistrust which may have informed decisions regarding receipt of a COVID-19 vaccination and/or booster (Brenick et al., 2017; Teixiera da Silva et al., 2021). Both experiences of discrimination in healthcare settings and medical mistrust are factors that are disproportionately experienced by TGD individuals and particularly TGD BIPOC given the history of mistreatment within the American medical system towards TGD individuals and BIPOC respectively (Underhill et al., 2015; Brenick et al., 2017). Additionally, key constructs defined in the HBM were assessed which have been shown to inform vaccination intentions within the general public (Guidry et al., 2021). General engagement with healthcare during the pandemic, as well as healthcare modality, was also assessed given the challenges to healthcare delivery brought on by the pandemic (Weber et al., 2020**)**. TGD individuals already experienced significant barriers to healthcare prior to the pandemic and thus the ability to engage with healthcare was considered an important factor to consider. Within the present sample, COVID-19 vaccination was generally high with the majority of the sample indicating they had received at least one dose of a COVID-19 vaccine at the time of the study (93%, n=358). Additionally, the majority of participants indicated they had received a booster at the time of the study (70.9%; *n* = 273) meaning that they were fully vaccinated according to CDC guidelines (CDC_b, 2022). Given the rates of vaccination within the present sample, receipt of a booster was utilized as the primary vaccination behavior variable in analyses.

This is one of the first studies to collect COVID-19 vaccination data from exclusively TGD individuals. Additionally, the present study implemented a targeted sampling methodology so as to invite as many TGD BIPOC as possible through the chosen survey platform, Prolific. Although 56% of the sample reported an exclusively White identity, the representation of BIPOC identities is a notable improvement from prior studies conducted on Prolific with an exclusively TGD sample (Smout et al, 2021). The present study is also one of the first to utilize path modeling to comprehensively assess factors that may have informed participants' COVID-19 vaccination decisions. This method of data collection and analysis provides the ability to thoroughly examine 1) vaccination status among TGD individuals, 2) potential differences and/or disparities in vaccination across racial identity, 3) the role of discrimination in healthcare and medical mistrust on COVID-19 vaccination decisions, and 4) HBM constructs that have been demonstrated to predict COVID-19 vaccination intention within the general public.

Hypotheses 1a-1b

Hypothesis 1a and 1b examined the predictive relationship between foundational constructs within the study. Specifically, hypothesis 1a asserted that general vaccine hesitancy would positively predict COVID-19 mistrust while hypothesis 1b asserted that experiences of discrimination in healthcare would positively predict medical mistrust. Both hypotheses were supported as demonstrated by positive, linear regressions. These findings are in line with prior research which has demonstrated positive, predictive relationships between vaccine hesitancy and COVID-19 mistrust, and experiences of discrimination in healthcare and medical mistrust (Teixiera da Silva et al., 2021; Thompson et al., 2021). Although vaccine hesitancy was a growing topic of concern prior to the onset of the COVID-19 pandemic, the combination of misinformation and political turmoil prompted national discourse regarding the safety and

efficacy of a possible COVID-19 vaccine (Boulton & Wagner, 2021; May. 2020; Ndugga et al., 2022; Nguyen et al., 2021). While many of the general concerns regarding COVID-19 vaccination safety were empirically tested and COVID-19 vaccines were successfully developed and distributed, trust in the American medical system was tested and the topic of medical mistrust was brought to the forefront (Bogart et al., 2021). Medical mistrust had been studied in the decades prior to the COVID-19 pandemic and specifically its presence within communities of color given the historical mistreatment of such communities at the hands of medical researchers and the American medical system at large (Jaiswal & Halkitis, 2019; Kolar et al., 2015). However, research on medical mistrust among TGD communities and its intersections with race and ethnicity began more recently and thus additional research is necessary (Davanzo et al., 2019; Owens-Smith et al., 2016). The medical mistrust research that had been conducted within TGD communities demonstrated similar findings to the research conducted within communities of color wherein experiences of discrimination in healthcare often predicted feelings of medical mistrust (Garg et al., 2021; Ojeda-Leitner et al., 2019; Underhill et al., 2015). In turn, early research on COVID-19 vaccination intentions among TGD individuals demonstrated that past experiences of discrimination in healthcare settings predicted intention to receive a COVID-19 vaccine wherein those with greater experiences of discrimination were less likely to express intention to receive a vaccine (Garg et al., 2021; Smith et al., 2021). However, research on whether vaccination intention translated to vaccine receipt was limited and thus the present study accounted for both the date the initial COVID-19 vaccination was received as well as receipt of a booster at the time of the study.

Hypotheses 2a-2b

Hypotheses 2a and 2b predicted that COVID-19 mistrust would predict COVID-19 vaccination behaviors over and above demographic information as well as medical mistrust and experiences of discrimination in healthcare. Hypothesis 2a used date of initial vaccination as the outcome variable while hypothesis 2b used receipt of a booster at the time of the study. For hypothesis 2a, date of initial vaccination was organized into two groups: either participants had received their first vaccination prior to July 1st 2021 or they received their first vaccination on or after July 1st 2021 which was considered to be delayed vaccination. Hypothesis 2a and 2b were partially supported wherein COVID-19 mistrust predicted lower COVID-19 vaccination behavior over and above race and age but not gender. In both instances, participants with a binary gender (i.e., man, woman, trans man, trans woman) were more likely to experience a delay in vaccination and to have not received a booster at the time of the study. Additionally, neither medical mistrust nor experiences of discrimination in healthcare were significant at any point in either model. Overall, greater COVID-19 mistrust and a binary TGD gender identity significantly predicted a delay in COVID-19 vaccination and having not received a booster at the time of the study.

These findings are line with previous findings regarding COVID-19 mistrust and vaccination and also shed light on underexplored topics within TGD samples and communities. Firstly, these findings support the notion that COVID-19 mistrust is a form of medical mistrust that is distinct from prior measures or conceptions of medical mistrust that were developed prior to the pandemic (Bogart et al., 2021). Not only does this provide support for including assessments of COVID-19 mistrust in future studies related to COVID-19 vaccination, but also suggests that the pandemic may have greatly reshaped medical mistrust research for the

foreseeable future. Much of the medical mistrust research conducted prior to the pandemic cited specific instances and/or events wherein patients and communities were harmed by the action or inaction of the medical system (Strathdee et al., 2021; Underhill et al., 2015). Although well established, research on the behavioral health implications of medical mistrust may have been part of the discourse within smaller communities but was seldom present within the national discourse on American medicine. In the years following the onset of the COVID-19 pandemic, medical mistrust and the recent history associated with it have become part of the COVID-19 zeitgeist with more people becoming aware of the events that have contributed to medical mistrust within minoritized communities (Brenick et al,. 2017; Ojeda-Leitner et al., 2019; Quinn et al., 2018). With this awareness comes responsibility on the part of American medical and government systems to address these concerns and make a concerted effort to deconstruct oppressive and discriminatory practices built into the foundation of these systems.

Secondly, these findings highlight the importance of collecting data from diverse TGD identities and preserving these distinct identities within analyses when possible. Although the present study was only able to group TGD identities as binary (i.e., women, trans woman, man, trans man) and nonbinary identities (i.e., nonbinary, genderqueer, genderfluid), making this distinction allowed for observed differences in vaccination behaviors to be noted. Specifically, in both analyses, gender remained a significant predictor of vaccination behavior wherein binary TGD participants were more likely to have experienced a delay in vaccination and to have not received a booster at the time of the study compared to nonbinary TGD participants. A possible explanation for this finding might be related to having documentation that aligns with one's identity and name. For instance, prior research has indicated that transgender men and women are more likely than nonbinary individuals to be denied services or benefits when their

documentation did not match their provided gender or name (James, 2016). Official federal government mandates dictated that identification documents were not require to receive a COVID-19 vaccine or booster (CT.gov, 2021). However, the enforcement of this mandate varied from state to state and resulted in reports from individuals saying they were turned away for not having appropriate identity documentation or for not having identity documentation at all (Johnson, 2021). Additional research is necessary in order to determine whether identity documentation may have been a perceived barrier to vaccination for TGD individuals and specifically TGD individuals with a binary gender identity.

In line with previous research, these findings demonstrate that intergroup disparities exist within TGD communities and differing experiences within medical systems may contribute to differences in COVID-19 mistrust or vaccine hesitancy (James, 2016; Jarrett et al., 2020; Underhill et al., 2015). Additionally, healthcare needs within TGD communities vary across identities and thus the restricted access to healthcare services early on in the pandemic impacted these various identities differently (Koehler et al., 2021). In order to better understand these differences, gender inclusive demographics should continue to be implemented so as to distinguish TGD individuals from cisgender individuals and ideally distinguish TGD identities from each other.

Hypotheses 3a-3c

Hypothesis 3 was broken down into three phases (a, b, and c) in order to construct an informed path model which assessed the relationship amongst experiences of discrimination in healthcare, race, medical mistrust, COVID-19 mistrust, healthcare engagement, and receipt of a COVID-19 booster at the time of the study. Hypothesis 3a predicted that race, when dichotomized as White and BIPOC, would function as a moderator between experiences of

discrimination in healthcare and medical mistrust wherein BIPOC participants would report greater experiences of discrimination in healthcare settings and thus have greater feelings of medical mistrust. Hypothesis 3a was not fully supported as the moderation was only marginally significant and although BIPOC participants reported greater medical mistrust compared to White participants, they reported lower experiences of discrimination in healthcare. Hypothesis 3b predicted that COVID-19 mistrust would mediate the relationship between medical mistrust and receipt of a booster at the time of the study wherein higher medical mistrust would be associated with higher COVID-19 mistrust which would be inversely associated with receiving a booster at the time of the study. In other words, those with greater COVID-19 mistrust would be less likely to have received a booster at the time of the study. Hypothesis 3b was supported wherein COVID-19 mistrust partially mediated the relationship between medical mistrust and receipt of a booster.

Finally, hypothesis 3c, as informed by hypotheses 3a and 3b, predicted that receipt of a booster at the time of the study would be fully explained by a path model wherein greater experiences of discrimination in healthcare settings would be associated with greater medical mistrust, greater medical mistrust would be associated with greater COVID-19 mistrust, greater COVID-19 mistrust would be associated with lesser likelihood of receiving a booster at the time of the study, and that the relationship between COVID-19 mistrust and receipt of a booster would be moderated by healthcare engagement wherein those who engaged with healthcare during the pandemic would be more likely to have received a booster compared to those who had not engaged with healthcare. Hypothesis 3c was partially supported given that all variables entered into the model were significant except for healthcare engagement. Informed by the correlation matrix, an alternative pathway was explored wherein barriers to vaccination was

entered as an additional pathway between COVID-19 mistrust and receipt of a COVID-19 booster at the time of the study. This exploratory pathway was significant and rendered the direct pathway between medical mistrust and receipt of a booster as not significant which indicated that accounting for both COVID-19 mistrust and barriers to vaccination fully explains the relationship between general medical mistrust and receipt of a booster at the time of the study. Race was incorporated as a moderator between experiences of discrimination in healthcare and medical mistrust however, as was the case in hypothesis 3a, these findings were not significant. Therefore, the final path model demonstrates a significant relationship amongst the independent variables wherein greater experiences of discrimination in healthcare were associated with greater feelings of medical mistrust, greater medical mistrust was associated with greater COVID-19 mistrust, greater COVID-19 mistrust was associated with greater perceived barriers to COVID-19 vaccination, and greater perceived barriers were associated with having not received a booster at the time of the study.

Prior research on racial disparities in COVID-19 vaccination within the general public were mixed with some indicating a reduced intention to receive a vaccine among BIPOC individuals and others suggesting that rates of vaccination were comparable to other racial groups despite low intention or medical mistrust (Guidry et al., 2021; Nguyen et al., 2021). Similarly, some findings that pertained to TGD individuals suggested disparities in vaccine intention at the intersection of gender and racial identity while others indicated that TGD individuals were no less likely to get vaccinated relative to their cisgender counterparts (McNaughten et al., 2022; Garg et al., 2021; Harner et al., 2021;). The present findings shed light on COVID-19 vaccination behaviors at the intersection of race and gender identity and suggest that there are a number of factors that ought to be considered. Although prior research indicated

that BIPOC, and particularly TGD BIPOC, are more likely to experience discrimination in healthcare settings the present study indicated the opposite (Smith et al., 2021). BIPOC participants reported greater medical mistrust compared to White participants but reported fewer instances of experiencing discrimination in healthcare settings. A factor not accounted for in the present study that may explain this mismatch is the role of historical and vicarious discrimination. Research on vicarious discrimination has indicated that hearing secondhand experiences of discrimination from someone with a shared identity, such as a racial or gender identity, may contribute to healthcare decisions in a way that is as salient as if the individual had experienced it firsthand (Holloway & Varner, 2021; Williamson, 2021). Given the history of collective discrimination experienced by BIPOC Americans, assessing the role of vicarious discrimination on healthcare decisions among BIPOC TGD individuals is warranted.

Results from these analyses also point to novel findings regarding the relationship amongst medical mistrust, COVID-19 mistrust, barriers to vaccination, and COVID-19 vaccination behaviors. Prior research has indicated that medical mistrust and experiencing barriers to vaccination informed vaccination decisions but the two constructs had yet to be examined together (Guidry et al., 2021; Smith et al., 2021; Thompson et al., 2021). Findings from hypothesis 3b are in line with prior research that has established a positive, correlational relationship between general medical mistrust and COVID-19 vaccination and receipt (Smith et al., 2021; Thompson et al., 2021). The present study builds on these findings by demonstrating that this relationship is partially explained by COVID-19 mistrust specifically. Similar to research on vaccine hesitancy prior to the pandemic wherein vaccine hesitancy was a primary predictor of vaccine receipt, the present study suggests evidence that COVID-19 mistrust is a strong predictor COVID-19 vaccination intention (Paul et al., 2021). When taken together with

hypothesis 2b, these findings suggest that COVID-19 mistrust is related to but distinct from general medical mistrust and aids in explaining the implications that medical mistrust has on COVID-19 vaccination behavior.

Given that the majority of the sample had received at least one dose of a COVID-19 vaccine at the time of the study, receipt of a booster was used as the primary outcome variable for vaccination behavior. As COVID-19 variants began to develop while initial phases of COVID-19 vaccination were still being rolled out, continued efforts to create and disseminate boosters became paramount (Gerretsen et al., 2021). In accordance with CDC guidelines, individuals are most protected from COVID-19 and the virus variants after having received a full dose of the initial vaccine as well as a booster (CDC_b, 2022). However, as demonstrated by the finalized path model, COVID-19 mistrust and barriers to vaccination extend to the receipt of boosters. Furthermore, the pairing of COVID-19 mistrust and barriers to vaccination fully explain the relationship between medical mistrust and receipt of a booster as indicated by this direct path becoming non-significant following the incorporation of barriers into the model. These findings support prior research that has demonstrated the disproportionate barriers to healthcare experienced by TGD Americans and extends this research to the current settings which are still being impacted by the pandemic (Jarrett et al., 2020; Klein et al., 2020; Lambrou et al., 2020). Therefore, continued health communication, delivery, and accessibility is necessary in order to encourage and enable individuals to get a booster.

Exploratory Hypothesis

In order to assess potential differences in the independent variables across healthcare modality (i.e., no healthcare engagement, in-person only, telehealth only, combination of in-person and telehealth) an exploratory One-way ANOVA was conducted. Results indicated that

telehealth-only participants had significantly lower vaccine hesitancy, COVID-19 mistrust, and perceived barriers to vaccination compared to in-person only participants. However, telehealth-only participants reported greater experiences of healthcare discrimination compared to in-person only participants. Additionally, telehealth-only participants perceived themselves as more susceptible to COVID-19 compared to those who reported no healthcare engagement. Given the significant differences in the independent variables based on healthcare modality, the exploratory hypothesis was supported.

Many of these findings are in line with recent work conducted on telehealth utilization during the pandemic. One such study in particular indicated that telehealth utilization was associated with greater trust in physicians' ability to diagnose COVID-19 and treat conditions via telehealth visits (Rovner et al., 2021). Within the present study, participants who utilized telehealth had significantly lower COVID-19 mistrust and vaccine hesitancy scores compared to those who only utilized in-person healthcare services. Additionally, participants who utilized telehealth compared to participants who reported in-person care only reported fewer barriers to vaccination and greater perceived susceptibility to COVID-19, both of which have been associated with intention to receive a COVID-19 vaccine (Guidry et al., 2021). Possibly the most notable finding in the present sample was that participants who reported utilizing care via telehealth only reported greater experiences of discrimination in healthcare compared to those who reported in-person utilization only. One possible explanation for this could be that as providers were learning to navigate telehealth platforms and modalities, they were unable to direct their attention towards gender inclusive practices and language. Many providers had not implemented telehealth prior to the pandemic which presented them with a learning curve (Kato-Lin et al., 2021; Miner et al., 2021). Additionally, current research suggests that providers

experienced significant burnout since the onset of the pandemic which may have impacted their ability to provide comprehensive care (Hilty et al., 2022). Burnout may have prompted providers to default to cis-normative language which could be perceived as discriminatory by a TGD patient. Another possible explanation for this reported difference in experiences of discrimination in healthcare is that the experiences of discrimination that telehealth users were referring to did not occur within the context of telehealth. The measure used to assess experiences of discrimination in healthcare referred to a participants experience overall and did not specify a timeframe or healthcare modality. Given the generally high rating of experiences with telehealth among participants who reported engaging with healthcare via telehealth during the pandemic, it is possible that this subset of the sample were not using their experiences with telehealth as their reference for experiences of discrimination in healthcare. Rather, their prior experiences of discrimination while using in-person healthcare may have informed their decision to only utilize healthcare via telehealth during the pandemic. Although the distinction between these two possibilities cannot be made with the present data, continued work on telehealth utilization among TGD individuals may help to clarify the role telehealth may or may not play in the improvement of access to and delivery of gender inclusive healthcare.

Limitations

Although this study presented a number of novel and pertinent findings there are also a number of limitations to consider. First, although the recruitment methodology contributed to an improvement in BIPOC representation relative to prior samples of TGD individuals collected online, the present sample was still majority White with 56% of participants reporting an exclusively White identity. Continued research on healthcare discrimination, medical mistrust, and differences in these experiences across racial identity should continue to intentionally collect

data from diverse pools of participants and employ data collection methods to improve representation. Possible methods include community-based sampling and snowball sampling (Ghabrial, & Ross, 2018). Secondly, the majority of participants reported a nonbinary TGD identity meaning that participants with a binary TGD identity were analyzed collectively. Binary transgender identities are not only distinct from one another, but their healthcare needs and experiences differ as well (Nisley et al., 2018). Prior research indicates that racial disparities exist within a given binary transgender identity (e.g., White transgender women compared to Black transgender women) which further highlights the importance of being able to separately assess binary transgender identities (Seelman et al., 2017). Collecting data from enough binary TGD individuals is necessary to detect these disparities across gender and racial identity if and when they are present

Third, this study utilized internet-based sampling which offers considerable advantages but also a number of disadvantages that ought to be considered. Mainly, that TGD individuals who don't have a Prolific account, let alone reliable access to the internet, were not able to access or be made aware of the study. Reliable access to the internet is often associated with income and prior research that indicates TGD individuals are typically within lower income brackets (James, 2016). Taken together, it is possible that the present study could not reach these pockets of TGD populations who don't have reliable internet access. Additionally, since the nature of the study was reliant on self-report measures, these measures were subject to self-report bias although there is considerable evidence to suggest that the anonymous nature of internet-based research may mitigate this threat (Newman et al., 2002). Similar to the proposed methods of collecting racially diverse samples, future studies are encouraged to use community-based sampling and snowball sampling in order to collect data from those who do not engage with

internet-based survey platforms or have reliable access to the internet (James, 2016). Finally, this study was conducted approximately two years after the onset of the COVID-19 pandemic and one year after the initial rollout of COVID-19 vaccines. In turn, the attitudes that were assessed and analyzed in conjunction with vaccination behaviors may have fluctuated or changed over time. Although dissemination of boosters occurred closer to the time of the study, and thus the majority of analyses used receipt of a booster as the primary outcome variable in analyses, retroactive assessment of attitudes that informed health behaviors should be considered as a limitation.

General Implications and Future Directions

The present study is one of few that have collected data from exclusively TGD individuals using an internet-based sampling methodology that aimed to maximize the number of BIPOC participants. TGD individuals were more likely than their cisgender counterparts to experience barriers to healthcare and discrimination in healthcare settings prior to the pandemic (James, 2016; Pampatie et al., 2020; Perl et al., 2021; Smart et al., 2020). Therefore, it is important to account for healthcare barriers and discrimination when comprehensively assessing factors that may contribute to vaccination decisions. Overall vaccination was high across gender and racial identities with the majority of participants indicating they had received a COVID-19 vaccine as well as a booster. However, detrimental factors such as experiences of discrimination in healthcare, medical mistrust, COVID-19 mistrust, and barriers to vaccination worked together to better explain the differences between those who were boosted, and thus better protected against COVID-19, and those who were not. Namely, that while COVID-19 mistrust and barriers to vaccination seem to be the primary explanations for differences in vaccination status, feelings

of medical mistrust that result from experiences of discrimination in healthcare settings aid in telling the full story.

This study also contributed novel findings to the literature on telehealth and particularly its role in delivering healthcare to vulnerable populations during the pandemic. Additionally, it presented possible contributions that telehealth made towards alleviating feelings of medical and COVID-19 mistrust. Despite initial challenges like navigating new platforms and modalities at the beginning of the pandemic, telehealth has become widely used by providers and patients alike. Telehealth provides a number of advantages to TGD individuals in particular who may not be able to access comprehensive, gender inclusive care nearby (Lock et al., 2021; Waad et al., 2019). Although in-person visits are necessary for specific tests and procedures, telehealth offers access to a variety of healthcare needs that will continue to be advantageous even as providers begin to reintegrate in-person care. This applies to mental and psychological healthcare as well which saw a sharp increase in utilization following the onset of the pandemic (Koonin et al., 2020). For TGD individuals who experience significant disparities in mental health prior to the pandemic, telehealth may prove to be a valuable resource in addressing these disparities moving forward.

Much of the early research on COVID-19 vaccine hesitancy pointed to a combination of misinformation and medical mistrust as explanations for low intention to receive a vaccine; however, for those belonging to minoritized and multiply minoritized groups, this explanation is much more nuanced (Guidry et al., 2021; Manning, 2020; Nguyen et al., 2021; Saluja et al., 2021). TGD communities and BIPOC communities have a complicated relationship with the American medical system wherein asking them to trust in healthcare providers is also asking them to ignore historical, vicarious, and firsthand experiences of mistreatment. Therefore, when

the world is presented with a problem that can only be solved by medicine, members of BIPOC communities, TGD communities, and those at their intersections find themselves at a crossroad: trust in an uncertain future or trust in a not-so-distant past. Despite this, the present study and concurrent research indicates that COVID-19 vaccination among TGD individuals is comparable to their cisgender counterparts (Harner et al., 2021). TGD individuals and the larger LGBTQ+ community have historically found ways to push back against institutional and structural barriers with prior research pointing to community connectedness as a protective factor (Frost & Meyer, 2012; Roberts & Christens, 2021). Research on LGBTQ+ health during the pandemic indicates that, despite feelings of hesitancy and mistrust, feelings of altruism and community connectedness motivated LGBTQ+ individuals to get vaccinated in order to protect not only themselves but those around them (Low et al., 2022). However, the onus should not be placed on marginalized communities to overcome these entrenched systems. The present study provides evidence to demonstrate not only how, but why science and medicine should continue to address its wrongdoings and rebuild its relationship with the American public; particularly with those who have had the most harm done to them.

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APPENDIX A

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

STUDY TITLE: Assessing Medical Discrimination, Mistrust, and Healthcare Engagement as Predictors of COVID-19 Vaccination among Racially Diverse Transgender and Gender Diverse Individuals

VCU INVESTIGATOR: Eric G. Benotsch

VCU IRB NO.: HM20018376

ABOUT THIS CONSENT FORM

You are being invited to participate in a research study. It is important that you carefully think about whether being in this study is right for you and your situation. Participants must be 18 or older to participate in this study.

This consent form is meant to assist you in thinking about whether or not you want to be in this study. Please contact the investigator to explain any information in this content document that is not clear to you.

Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled.

AN OVERVIEW OF THE STUDY AND KEY INFORMATION

WHY IS THIS STUDY BEING DONE?

The purpose of this research is to find out about how the COVID-19 pandemic has impacted transgender and gender diverse individuals. We are specifically interested in learning about your interactions with healthcare providers during the pandemic as well as how your experiences prior to the pandemic have informed your opinions about healthcare, public health issues, and your choices about healthcare utilization. You will also be asked to provide some information about your current health status and how the COVID-19 pandemic may have impacted your health or your ability to utilize healthcare.

We will also be asking you to provide the month and year that you received your COVID-19 vaccination if you received one. Please have your vaccination card on hand so that you can provide as accurate information as possible.

WHAT WILL HAPPEN IF I PARTICIPATE?

In this study, you will be asked to respond to various surveys that will ask you about your healthcare utilization, attitudes about healthcare, attitudes about public health issues, and any changes to your life that were brought on by the COVID-19 pandemic. You will be asked to provide basic demographic information at the end of the survey. Your participation in this study will last up to about 15 minutes. Approximately 380 transgender and gender diverse individuals will participate in the study.

WHAT ALTERNATIVES ARE AVAILABLE?

There are no alternatives to taking part in this survey. If you do not wish to participate you may decide not to proceed to the survey .

WHAT ARE THE BENEFITIS OF BEING IN THE STUDY?

This study is not likely to help you. However, it may help the investigators understand how the COVID-19 pandemic has impacted your ability to utilize healthcare and your attitudes about healthcare as a transgender or gender diverse person.

WHAT RISKS AND DISCOMFORTS COULD I EXPERIENCE FROM BEING IN THE STUDY?

Questionnaires may contain questions that are personal, sensitive, or upsetting such as questions about your experiences in healthcare settings or whether you have been diagnosed with a specific illness such as diabetes or HIV. You may refuse to answer any question that makes you uncomfortable.

Additionally, as is the case with all research, there is the risk of loss of confidentiality. Researchers have included instructions when appropriate to help prevent participants from divulging identifying information.

WHAT ARE THE COSTS?

There are no costs to participating in the study other than the time you will spend completing the study

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

You will be paid $1.20 that will be deposited directly into your Prolific account.

CAN I STOP BEING IN THE STUDY?

You can stop being in this study at any time. However, compensation for participation is subject to approval therefor incomplete surveys may not receive full financial compensation.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

Data being collected only for research purposes. What we find from this study may be presented VCU has established secure research databases and computer systems to store information and to help with monitoring and oversight of research. Your information may be kept in these databases but are only accessible to individuals working on this study or authorized individuals who have access for specific research related tasks.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

The investigator named below is the best person to contact if you have any questions, complaints, or concerns about your participation in this research:

Dr. Eric Benotsch
808 W. Franklin St., #208
Richmond, VA 23284
E-mail: ebenotsch@vcu.edu
Phone: 804-828-0133

If you have any general questions about your rights as a participant in this or any other research, or if you wish to discuss problems, concerns, or questions, to obtain information, or to offer input about research, you may contact:

Virginia Commonwealth University Office of Research
800 East Leigh Street, Suite 3000, Box 980568, Richmond, VA 23298
(804) 827-2157; https://research.vcu.edu/human_research/volunteers.htm

Do not agree to this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

STATEMENT OF CONSENT

I have been provided with an opportunity to read this consent form carefully. All of the questions that I wish to raise concerning this study have been answered. By signing this consent form, I have not waived any of the legal rights or benefits to which I otherwise would be entitled. My signature indicates that I freely consent to participate in this research study.

☐ I choose to participate in this study.
☐ I choose to not participate in this study.

APPENDIX B

Healthcare Engagement

Downing, J., (2021). The Oregon Trans and Gender Diverse Health Survey [unpublished raw data]. Oregon Health and Science University

These questions will help us understand how the COVID-19 pandemic impacted your health and/or ability to access care.

1. In the past year, have you seen a doctor or health care provider in person?
Yes No

2. Have you participated in a virtual or telehealth visit with a doctor in the past year?
Yes No

3. [will only be asked is answer to previous question is "Yes"] How would you rate your experience using telehealth with your doctor?

1 Very Poor 2 3 4 5 6 7 8 9 10 Excellent

4. [will only be asked is answer to question #2 is "Yes"] Have you participated in a telehealth visit with a doctor for transition related services (hormone therapy, surgical consultations, etc.)?
Yes No

5. [will only be asked is answer to previous question is "Yes"] How would you rate your experience using telehealth with your doctor for transition related services?

1 Very Poor 2 3 4 5 6 7 8 9 10 Excellent

6. Have you participated in a telehealth visit with a psychologist, therapist, or other mental health professional in the past year? Yes No

7. [will only be asked is answer to previous question is "Yes"] How would you rate your overall experience using telehealth with your psychologist, therapist, or other mental health professional?

1 Very Poor 2 3 4 5 6 7 8 9 10 Excellent

8. (IF Q2 is "yes") – Can you tell us about your experiences with telehealth since the beginning of the pandemic? Please avoid including any identifying information such as your name, your provider's name, specific locations, etc.

9. [will only be asked is answer to question #2 is "No"] What are the reasons you have not participated in a telehealth visit with a doctor in the last 12 months? Check all that apply.
(O)Too costly/not covered by my health insurance
(O)My doctors don't offer it
(O)I don't think I'd get good quality care
(O)I don't think I'd feel comfortable
(O)Too hard to communicate
(O)I have concerns about privacy
(O)I don't have the right equipment (smartphone or computer)
(O) Another reason not listed (please specify):

Discrimination in Healthcare Settings

Peek, M. E., Nunez-Smith, M., Drum, M., & Lewis, T. T. (2011). Adapting the everyday discrimination scale to medical settings: reliability and validity testing in a sample of African American patients. *Ethnicity & disease, 21*(4), 502.

These next set of questions will ask you about experiences you have had in healthcare settings and with healthcare providers. Please choose one of the five possible responses that best reflects your feelings about your experiences.

10. You are treated with less courtesy than other people
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

11. You are treated with less respect than other people
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

12. You receive poorer service than others.
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

13. A doctor or nurse acts as if they think you are not smart.
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

14. A doctor or nurse acts as if they are afraid of you.
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

15. A doctor or nurse acts as if they are better than you.
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

16. You feel like a doctor or nurse is not listening to what you were saying.
(1) Never (2) rarely (3) sometimes (4) most of the time (5) always

Vaccination attitudes examination (VAX) Scale

Martin, L. R., & Petrie, K. J. (2017). Understanding the dimensions of anti-vaccination attitudes: The vaccination attitudes examination (VAX) scale. *Annals of Behavioral Medicine, 51*(5), 652-660.

These next set of questions will ask you about your feelings and opinions towards vaccination. Please select one of the six possible responses that best reflects your feelings and/or opinion.

17. I feel safer after being vaccinated
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

18. I can rely on vaccines to stop serious infectious diseases
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

19. I feel protected after getting vaccinated
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

20. Although most vaccines appear to be safe there may be problems that we have not yet discovered.
(1)Strongly Disagree

(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

21. Vaccines can cause unforeseen problems in children
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

22. I worry about the unknown effects of vaccines in the future
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

23. Vaccines make a lot of money for pharmaceuticals companies, but do not do much for regular people.
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

24. Authorities promote vaccination for financial gain, not for people's health.
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

25. Vaccination programs are a big con.

(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

26. Natural immunity lasts longer than a vaccination.
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

27. Natural exposure to viruses and germs gives the safest protection.
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

28. Being exposed to diseases naturally is safer for the immune system than being exposed through vaccination
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

Medical Mistrust Index

LaVeist, T. A., Isaac, L. A., & Williams, K. P. (2009). Mistrust of health care organizations is associated with underutilization of health services. *Health services research*, *44*(6), 2093-2105.

These questions will ask you about your general feeling and opinions towards healthcare providers, settings, and organizations. Please choose one of the four possible responses that best reflects your feelings and/or opinions.

29. You'd better be cautious when dealing with health care organizations
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

30. Patients have sometimes been deceived or misled by health care organizations
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

31. When health care organizations make mistakes they usually cover it up
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

32. Health care organizations have sometimes done harmful experiments on patients without their knowledge
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

33. Health care organizations don't always keep your information totally private
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

34. Sometimes I wonder if health care organizations really know what they are doing
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

35. Mistakes are common in health care organizations
(1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree

COVID-19 Related Medical Mistrust

Bogart, L. M., Ojikutu, B. O., Tyagi, K., Klein, D. J., Mutchler, M. G., Dong, L., Lawrence, S.J., Thomas, D.R., & Kellman, S. (2021). COVID-19 related medical mistrust, health impacts, and potential vaccine hesitancy among Black Americans living with HIV. *Journal of Acquired Immune Deficiency Syndromes (1999), 86*(2), 200.

(Measure adapted from use with HIV positive, black Americans)

Below are questions about your general feelings of confidence and trust in the way the government and medical community have handled the COVID-19 pandemic. Please choose one of the six possible responses that best reflects your opinion about each statement.

36. A lot of information about COVID-19 is being held back by the government
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

37. The government cannot be trusted to tell the truth about COVID-19
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

38. The government is hiding information about COVID-19
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

39. Trans and gender diverse individuals should be suspicious of the information from the government about COVID-19
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

40. When it comes to COVID-19, the government is lying to us.
(1)Strongly Disagree
(2)Disagree

(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

41. COVID-19 is manmade
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

42. There is a cure for COVID-19 but it is being withheld from trans and gender diverse individuals
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

43. When it comes to COVID-19, trans and gender diverse individuals cannot trust healthcare providers
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

44. When it comes to COVID-19, doctors have the best interests of patients in mind
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

45. When it comes to COVID-19, trans and gender diverse individuals will receive the same medical care from healthcare providers as people from other groups
(1)Strongly Disagree
(2)Disagree
(3) Somewhat disagree
(4) Somewhat agree
(5) Agree
(6) Strongly Agree

HBM Construct: Barriers

Guidry, J. P., Laestadius, L. I., Vraga, E. K., Miller, C. A., Perrin, P. B., Burton, C. W., Ryan, M., Fuemmeler, B.F., & Carlyle, K. E. (2021). Willingness to get the COVID-19 vaccine with and without emergency use authorization. *American journal of infection control*, *49*(2), 137-142.

Please indicate your agreement with the following opinions about the COVID vaccine.

46. I am scared of needles
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

47. I am concerned about the side effects of the COVID-19 vaccination
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

48. It is inconvenient to get the COVID-19 vaccine or booster
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

49. The development of the COVID-19 vaccines and boosters has been too rushed to properly test their safety.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

HBM Construct: Benefits

The following questions ask you your opinions about getting a COVID-19 vaccine/booster.
If I get a COVID-19 vaccination/booster, it will...

50. ...help me feel less worried about getting COVID-19
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

51. ...decrease my chance of getting COVID-19 and its complications.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

52. ...protect those around me from COVID-19
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

HBM Constructs: Susceptibility
Please indicate your agreement with the following statements.

53. I am worried about the likelihood of getting COVID-19 in the near future.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

54. Getting COVID-19 is currently a possibility for me.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

HBM Construct: Severity
Please indicate your agreement with the following statements.

55. Complications form COVID-19 are serious.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

56. I will be very sick if I get COVID-19.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

57. I am afraid of getting COVID-19.
(1)Strongly Disagree (2)Disagree (3) Somewhat disagree (4) Somewhat agree
(5) Agree (6) Strongly Agree

Demographics
Instructions: Please answer the following questions to the best of your ability:

58. Age: ___

59. Gender Identity:

- Woman
- Trans Woman
- Man
- Trans Man
- Nonbinary
- Gender Fluid
- Genderqueer
- Another Gender Identity not listed Above (please specify) _____

60. Which racial or ethnic identities best describe you (You may select all that apply):
    - White
    - Black or African American
    - Hispanic, Latin(a/o), or Latinx
    - Asian or Asian American
    - American Indian or Alaskan Native
    - Native Hawaiian or Other Pacific Islander
    - American Arab, Middle Eastern, or North African (AMENA)
    - Multi-Racial/Ethnic
    - Another race/ethnic identity not listed (please specify)_____

61. Sexual Orientation:
    - Heterosexual
    - Gay
    - Bisexual
    - Pansexual
    - Asexual
    - Another sexual orientation not listed (please specify)_____

62. What is your highest level of formal education?

    - Middle school
    - High school
    - GED
    - Vocational school
    - Associate's Degree
    - Bachelor's Degree
    - Graduate Degree (Master's, Doctorate, etc.)

63. What is your household annual income?

- $0 - $20,000
- $20,001 - $40,000
- $40,001 - $60,000
- $60,001 - $80,000
- $80,001 - $100,000
- More than $100,000

64. Relationship Status:
- Not currently dating or in a relationship
- In a newer relationship with 1 person (less than 12 months)
- In a long-term relationship with 1 person (12 months or longer)
- Married
- Dating/ in a relationship with more than 1 person

65. In general, what is your political affiliation?
- Democrat
- Republican
- Independent
- Other (write in)

66. Where would you place yourself along the political spectrum?
- Conservative
- Moderate
- Liberal
- Other (write in)

COVID-19 Diagnosis and Vaccination Behaviors

67. Did you receive a flu shot in the past year? Yes No

68. Do you plan on receiving the flu shot next year? Yes No

69. Have you ever refused or elected to forgo a doctor recommended vaccine? Yes No

70. Have you received at least one dose of a COVID-19 vaccine?
- Yes
- No

71. [will only be asked if answer to question #58 is “Yes"] What month and year did you receive your initial vaccination? (Drop down menu of months and years).

72. [will only be asked if answer to previous questions is on or after July 2021] What was the primary reason you did not get vaccinated sooner?

- I could not get an appointment before then
- I could not take off work
- I could not arrange transportation to a vaccination site
- I could not get someone to watch my children/dependents while I went to get vaccinated
- I wanted to wait to see how the vaccine affected others
- Another reason not listed (please specify)

73. [will only be asked if answer to question #58 is “Yes"] Which COVID-19 vaccine did you receive?

- Moderna
- Pfizer
- Johnson & Johnson

74. [will only be asked if answer to previous questions is “Moderna” or “Pfizer”] Have you received the second dose of a COVID-19 vaccine?

- Yes
- No

75. [Will only be asked if answer to previous question is “Yes”] What month and year did you receive your second dose? (Drop down menu of months and years).

76. [will only be asked if answer to previous question is “Yes” OR answer to question #61 is “Johnson &Johnson”] Have you received a COVID-19 booster vaccine?

- Yes
- No

77. Have you ever been tested for COVID-19?

- Yes, I tested positive
- Yes, I tested negative
- No, but I felt I needed to be tested
- No, and I did not need to be tested

78. [will only be asked if answer to previous questions is “Yes, I tested positive”] What was the month and year that you received your positive COVID-19 test results? (Drop down menu of months and year)

79. [Will only be asked if answer to question #181 was “Yes, I tested positive” or “Yes, I tested negative”] Was your most recent COVID-19 test conducted with an at home test or through a healthcare provider (pharmacy, clinic, primary care provider, etc.)?

- At home test
- Test conducted by a provider

80. If you wanted to be tested for COVID-19 how easy would it be for you to locate a test (either at home test or a test at a healthcare facility)?

- Easy
- Somewhat easy
- Somewhat difficult
- Difficult
- Not sure

81. Have you experienced symptoms of COVID-19 to include but not limited to: fever or chills, cough, shortness of breath, fatigue, muscle and body ache, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea?

- Yes
- No
- I don’t know

82. Please use the space below to tell us anything else you would like us to know about you or your experiences during the pandemic, experience with vaccination, or experiences in with healthcare professionals. Please avoid describing any identifying information such as your name, the names of others, specific places, etc.