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Smoking and the Likelihood of HIV Testing Among Transgender Women of Color

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
2023

Abstract

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MPH, Florida International University, 2006

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

For the past 2 decades, transgender women (male to female) of color have experienced a systematic increase in human immunodeficiency virus (HIV) incidence and prevalence. Studies show that HIV testing rates among transgender women of color are meager compared to other groups with a high risk for HIV infection, and it is unknown if smoking impacts HIV testing among them. This quantitative cross-sectional research study aimed to determine if there is an association between smoking and the likelihood of HIV testing among transgender women of color compared to cisgender women (people who identify with their sex assigned at birth) of color. The social-ecological and minority stress models served as the framework for this research study. Using the 2020 CDC Behavior Risk Factor Surveillance Survey (BRFSS) questionnaire, a complex samples logistic regression analysis was conducted using a sample of 171 transgender women of color. G power analysis indicated a minimum sample size of 87 participants to obtain 80% power at the $\alpha = 0.05$ level of significance. Results showed no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color. However, it may be that this study lacked the statistical Power, with only 171 transgender women to detect a difference. This research study contributes essential information and brings attention to a community that continues to be understudied and underrepresented. The findings can help inform public health professionals and policymakers in developing targeted and gender specific prevention HIV testing and smoking cessation programs for transgender women of color.

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Dedication

I am dedicating my research study to all transgender women of color in the US and worldwide, especially to my former teenage friend, who dreamed of one day being able to openly live as she was felt inside. Most importantly, her family and friends should recognize who she is and accept her. You inspired this work, and I just want to tell you that I **See** You.

To my grandma/ma in the heavens, you were my first public health teacher. You taught me the value of prevention and service, but also gave me strength and resiliency and encouraged me to never give up on my dream, no matter how hard it gets. Your teachings, life lessons, and unconditional love always carry me through each day.

To my children, Kyle and Riva, and grandson, Kamden; you are my world and my drive. To my mom, Milagros, and my siblings, Johann, Jill, Raida, Junior, Yahaira, and Daynis. And, my heart sisters Brenda and Dr. Virgen Dominguez, Ph.D. To my nieces and nephews Oscar, Axel, Xamil, Janiel, Emily, Victor, Camil, Sofia, Alaihya, Milihanys, Ariana, Jiovanni, Zia, Yome, Alexa, Amaia, and Jayla. And godchildren Shirley, Ivan, Antonio, and Amanda. Each of you gives me a reason for living, and you are all my source of inspiration. Thank you!

To **ALL** my friends, especially Mobruka, Dr. Raejon Makonnen, Dr. Genevive Meyers Kyarimpa, Niurka, Arleen, Pamela, Elsie, Sylvia, and Dr. Martin Mendoza. Thank you for your unwavering support and for believing in me even when I didn't. My life is better and blessed because you all are in it.

To Dr. Leslie Barbour, my best friend and sister. Many years ago, we started this journey together. The day you graduated was one of the happiest days of my life because your accomplishment was my accomplishment. However, life took you from this earth and from all the people who loved you too soon. I hope that you are smiling down on me and that I can make you proud. Until I see you again!

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Thank you to my former chairs, Dr. Ernest Ekong, MD, MPH, Ph.D., FACP, and Dr. Amany Refaat, MD, MSc, MHPE, Ph.D., and to my committee member, Dr. Claire Robb, Ph.D., and former committee member, Dr. Aimee Ferraro, Ph.D., MPH.

Finally, a profound thanks and endless debt of gratitude to Dr. Paul Rogers, Ph.D. Because of you, I made it this far.

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Section 1: Foundation of the Study and Literature Review

Introduction

For the past 2 decades, transgender women (male to female) of color have experienced a systematic increase in human immunodeficiency virus (HIV) incidence and prevalence (Hirshfield et al., 2019). Recent estimates say that one in four transgender women in the United States is living with HIV (Lippman et al., 2016). Studies show that the risk for transgender women of color of becoming infected with HIV is as high in the United States (22%) as it is worldwide (Becasen et al., 2019; Gamarel et al., 2020; Nuttbrock & Hwahng, 2017; Smart et al., 2020). Around the world, HIV prevalence is 66 times higher among transgender women than any other group regardless of the country gross domestic product (Stutterheim et al., 2021). Experts agreed that there is a great need for more culturally appropriate HIV prevention interventions that target transgender women of color to increase HIV testing (Becasen et al., 2019; Gamarel et al., 2020; Nuttbrock & Hwahng, 2017; Smart et al., 2020).

No studies were found looking at transgender women of color, smoking, and the likelihood of HIV testing. However, there is one study by Conserve et al. (2014) focusing on cisgender people that demonstrated that among the full sample of African Americans, cigarette smoking and alcohol use were significantly associated with HIV testing, thus providing support for the need to explore smoking and the likelihood of HIV testing in transgender women of color.

During the first 25 years of the HIV epidemic, the Centers for Disease Control and Prevention (CDC) did not fund HIV prevention programs targeting transgender

women of color despite their high HIV prevalence. According to Xavier (2021), even with the launch of a National Transgender HIV Testing Day, efforts to increase testing among this group are still inadequate. Studies show that HIV testing rates among transgender women of color are meager compared to other groups with a high risk for HIV infection. Discrimination, immigration status, lack of access to healthcare services, and stigma contribute to the lack of knowledge of their HIV status and can lead to deleterious health results and increased AIDS prevalence. Reports showed that the HIV prevalence among Black/African American transgender women is 56% compared to 17% among White transgender women (MacCarthy et al., 2020).

Each year, one in five people dies from smoking-related conditions in the United States; data shows that cigarette smoking kills more people than HIV (CDC, 2021n). The prevalence of smoking among transgender women of color ranges between 31% and 83%, higher than any other sexual minority group (Culbreth et al., 2022). Tan et al. (2021) explained that other social determinants of health (e.g., absence of healthcare insurance, joblessness, and low socioeconomic status) are some of the indicating stressors contributing to the high prevalence of smoking. Culbreth et al. (2022) agreed with Tan et al.'s observations that cigarette smoking among sexual gender minorities (SGMs) like transgender women of color is higher compared to other populations (Tamî-Maury et al., 2020; Tan et al., 2021). According to Jannat-Khah et al. (2018), one key component contributing to the high prevalence of smoking is the marketing maneuvers tobacco companies employ to engage transgender people and other SGM groups. Researchers have pointed out that company's prey on these groups' vulnerabilities, like health

inequities, lack of social support, and homelessness. Tobacco companies contribute to LGBT charities by sponsoring events and providing easy access to free alcohol and low-cost tobacco products to entice people into smoking as a form of socialization (Jannat-Khah et al., 2018). Researchers explained that efforts to decrease the prevalence of smoking among SGM like transgender women of color had not been successful due in part to the normalization of smoking by society at large (Max et al., 2019). According to Max et al. (2019), 1,200 people die every day from smoking-related conditions; however, the lack of public outcry makes it difficult for LGBT communities, for example, to raise the alarm against a practice that, for many, seems normal. This research study examined the effects of smoking, its potential association with the likelihood of HIV testing among transgender women of color.

This research study analyzed and evaluated the data to respond to three research questions. The analysis aimed to establish an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status in adult transgender women of color compared to cisgender women of color. This research study recognized a person of color as someone who is of American Indian/Alaska Native (AI/AN), Asian American (AA), Black/African American, Hispanic/Latina, or Native Hawaiian/Pacific Islander (NH/PI) heritage.

The results contribute critical information and bring attention to a community that continues to be largely understudied and underrepresented. Specifically, this study provided an in-depth analysis of other potential risk factors (smoking) that can increase a

transgender woman of color lack of HIV testing and the risk for HIV infection. Section 1 of the research study includes background information, a statement of the problem, the purpose of the study, the research questions and hypotheses, the theoretical framework, and information on the nature of the study. Section I also provided an in-depth analysis of the literature review, the study definitions, scope and delimitations, and significance, plus a summary and conclusion.

Background

Transgender women of color face discrimination, social stigma, low socioeconomic status, homelessness, alcohol and substance abuse, poor access to healthcare, mental health illnesses, smoking, and HIV at higher rates than other groups (Gonzalez et al., 2017; LaMartine et al., 2020; Pitasi et al., 2019; Ryan, 2020; Smart et al., 2020). A study in the City of New York found the HIV incidence rate among Black/African American and Hispanic/Latina transgender women to be an alarming 49.6% and 48.1%, respectively, compared to other racial and ethnic groups (Nuttbrock & Hwahng, 2017). Studies on transgender women of color have shown that the inequalities and discriminatory practices they suffer can push them into seeking sex work and engaging into other risky behaviors to earn a living, increasing their risk for HIV infection (Nuttbrock & Hwahng, 2017; Reback et al., 2019).

In 2021, the CDC released the first National HIV Behavioral Surveillance report among Transgender Women. The report is a compendium of data collected from 1,608 transgender women across the country and the District of Columbia (D.C.) between 2019 and 2020. The CDC recognizes that transgender women, particularly transgender women

of color, are disproportionately impacted by the HIV epidemic due to inadequate access to HIV testing and prevention services (CDC, 2021m). CDC guidelines recommend that people with a high risk for HIV infection get tested every year. However, 96% of participants in this survey had never been tested for HIV (CDC, 2021c). MacCarthy et al. (2020) explained that one of the significant barriers affecting transgender women is that HIV testing is often seen as the result of an issue or a problem that could increase a person risk for HIV infection rather than as a prevention tool. In contrast, cisgender women of color HIV incidence decreased by 6% between 2015 and 2019 (CDC, 2022b), though this does not apply to those of NH/PI heritage, whose incidence rate increased by 67% during the same time period (CDC, 2022b).

Cigarette smoking is closely related to recurrent substance abuse and a detrimental physical and mental state of being. Researchers reported that cigarette smoking is directly related to alcohol and marijuana use and intense anxiety episodes that add to their mental health load (LoSchiavo et al., 2020; Ryan, 2020; Tan et al., 2021). Cigarette use has been widely studied among other SGMs for the past 2 decades. A study by Conserve et al. (2014) looking at the relationship between substance use (alcohol and smoking) and HIV testing among cisgender people found that Black/African Americans who were drinkers and smokers were more likely to get tested for HIV because they perceived themselves as having a higher risk for HIV infection. The study also found that doctors were more likely to suggest HIV testing to their patients if they were drinkers and smokers (Conserve et al., 2014).

Culbreth et al. (2022), Tan et al. (2021), and Buchting et al. (2017) concurred that research on tobacco uses trends and behaviors among transgender women of color is limited. LoSchiavo et al. (2020) and Ryan (2020) concurred that more studies are needed to examine both the psychosocial trauma and the smoking behavior that impact transgender women of color (see also Gamarel et al., 2016; Solomon, 2020). The high prevalence of smoking among transgender people has been associated with harmful health outcomes (Buchting et al., 2017). A study by Tamî-Maury et al. (2020) found that transgender women of color who were current smokers were also more likely not to have healthcare coverage.

Problem Statement

For years, transgender women of color have suffered immeasurable health disparities, health inequities, and inequalities (James et al., 2016). These factors have increased their risk of becoming infected with HIV at a disproportionate rate; it is 34 times higher than it is for the rest of the nation adult population of any race and ethnicity (Holder et al., 2018; Reback et al., 2019). In contrast, new HIV cases for cisgender (people who identify with their sex assigned at birth (Fennie et al., 2016)) women of color have seen a decline (CDC, 2022b). The Human Rights Watch (McLemore, 2018) released a report of the most significant difficulties impacting transgender women of color. Among them are inadequate access to healthcare services, cultural barriers, immigration status, lack of social support, low socioeconomic status, mental health illnesses, and lack of HIV testing (MacCarthy et al., 2020). In 2015, 36% of transgender

women of color (AI/AN, Black/African American, Hispanic/Latina, and multiracial)

reported having negative experiences with a healthcare provider (James et al., 2017a).

A study by Reback et al. (2019) found that lack of social support can also provoke

negative effects on transgender women of color, causing them to engage in unsafe sex

practices and reckless behaviors. Like smoking and substance use, and feelings of

shaming by the healthcare system these practices and behaviors discriminately raise their

risk of HIV infection (Muessig et al., 2020; Reback et al., 2019). Mental health illnesses

like depression and post-traumatic stress disorder (PTSD) have prompted transgender

women of color to contemplate suicide (41%) at a higher rate compared to the rest of the

population (LaMartine et al., 2020). Although alcohol and drug use correlate with the risk

of HIV infection among transgender women of color, the HIV epidemic continues to

strike transgender women of color at an alarming rate (Gonzalez et al., 2017). Muessig et

al. (2020) explained that the low rate of HIV testing among transgender women of color

results from society and the healthcare system acts of microaggressions toward this

group. This can lead them into seclusion, inability to build positive relationships, and

exposure to unsafe sexual practices, posing significant impediments for transgender

women of color accessing preventive HIV services like testing and PrEP. Researchers

agreed that more studies on this population are needed to raise awareness and understand

the behavioral and social determinants of their risk of infection and other health

inequities (Tan et al., 2021).

Cigarette smoking prevalence among transgender women is 1.3 to 2.5 times

higher (30%) than among cisgender women (14%; U.S. Department of Veterans Affairs,

n.d.). A study by Buchting et al. (2017) reported that transgender women of color living in HIV hotspots in the United States had a higher percentage of tobacco use (43.2%) than those living outside HIV hotspots (34.3%). The study by Conserve et al. (2014) found that cisgender women who are smokers were more sexually active than nonsmoker cisgender women. This practice can lead them to an increased risk for HIV infection (Conserve et al., 2014).

Data show that smokers can engage in more risky behaviors than nonsmokers. Researchers also explained that HIV testing increases a person's opportunity to begin using antiretroviral therapy immediately and reduces the risk of infecting another person. According to Conserve et al. (2014), this is the first study looking at HIV testing, smoking, and alcohol use among cisgender people. However, the study has not yet been replicated to evaluate whether there is an association between smoking and HIV testing among transgender people, and specifically among transgender women of color (Conserve et al., 2014). The literature searched supports the importance of identifying elements for transgender women of color to help them quit smoking (Culbreth et al., 2022; Delahanty et al., 2019; Tan et al., 2021).

Purpose of the Study

This quantitative cross-sectional research study aimed to determine if there is an association between smoking among transgender women of color and the likelihood of HIV testing compared to cisgender women of color. This study is essential because only a limited number of studies have examined smoking while controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare

coverage, and mental health status (James et al., 2017). In addition, no previous research study has examined how these variables impact the likelihood of HIV testing among transgender women of color compared to cisgender women of color.

Research Questions and Hypothesis

I selected nine variables from the CDC 2020 Behavioral Risk Factor Surveillance System (BRFSS) Codebook. The variables are HIV testing, smoking, cisgender women of color, five sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status.

RQ1: Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status in transgender women of color?

Null H_{01}: There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color.

Alternate H_a1: There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color.

RQ2: Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and

race/ethnicity), healthcare coverage, and mental health status in cisgender women of color?

> Null H_{02}: There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), health care coverage, and mental health status in cisgender women of color.

> Alternate H_{a2}: There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), health care coverage, and mental health status in cisgender women of color.

> RQ3: Is there a difference in the association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status between transgender women of color and cisgender women of color?

> Null H_03: There is no difference in the association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status between transgender women of color and cisgender women of color.

> Alternate H_a3: There is no difference in the association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status between transgender women of color and cisgender women of color.

Theoretical Foundation for the Study

The Social-Ecological Model

The social-ecological model (Figure 1) was created in the 1970s by Urie Bronfenbrenner to explain human behaviors and the influences that impact them (Kilanowski, 2017). The modified social-ecological model (MSEM; Figure 2) is framed around five areas of HIV infection risk: individual, network, community, policy, and stage of the HIV epidemic (Baral et al., 2013). According to Baral et al. (2013), a successful HIV prevention program requires a targeted method beyond the old one-size-fits-all approach. The MSEM looks at diverse groups with a higher risk of HIV infection. Stokols (1996) explained that initiatives directed to modify people ways of life by examining their behavior to understand the root causes of their problems failed to investigate people surroundings, which provide valuable insight into the fundamental causes of those problems.

The MSEM applies an assimilation of evidence-based biomedical, behavioral, and structural interventions (Baral et al., 2013). The model explains that a person behavior is influenced by both internal and external factors. External factors include things such as culture, personal relations, residential community, government, and other institutional structures (Dyson et al., 2018). The model was selected because it will provide a deeper understanding of how the different levels of risks are interconnected and contribute to transgender women of color increased risk of acquiring HIV. However, the model also helps explain how programs can best utilize the different stages to develop effective and efficient smoking cessation and HIV prevention programs (Baral et al., 2013).

Figure 1

The Social-Ecological Model
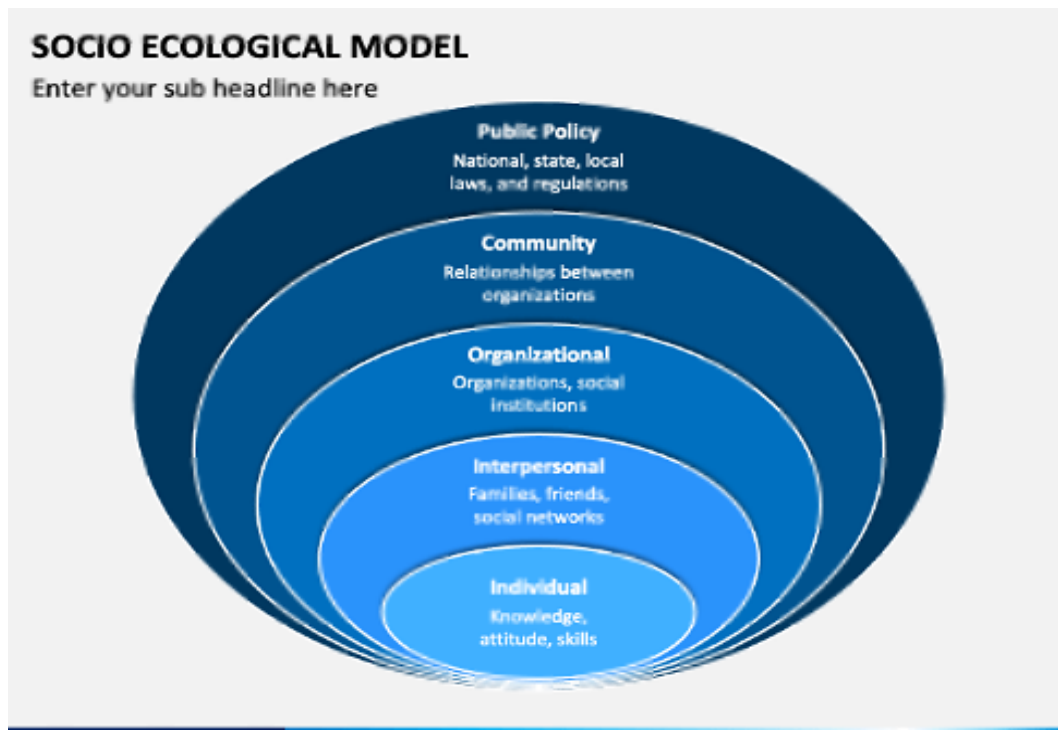
Note. The diagram was developed to explain how the complexities between the various branches of society intertwined to better understand the influence that one branch has over the other and the negative and positive outcomes that can occur to some populations. From "National Center for Injury Prevention and Control, Division of Violence Prevention" by the CDC, *The social-ecological model: A framework for prevention,* 2022a.

Figure 2

The Modified Social-Ecological Model of Transgender Stigma and Stigma Interventions

Structural
Types of Stigma
- Gender conformity to natal sex norms
- Stigmatizing policies and enforcement practices
- Lack of provider training and education
- Healthcare access barriers
- Economic inequality
- Gender inequality

Interventions
- Non-discrimination policies
- Access to care policies
- Transgender health content in medical school curricula

Interpersonal
Types of Stigma
- Healthcare discrimination
- Workplace discrimination
- Family rejection
- Hate crimes
- Sexual assault
- Physical assault

Interventions
- Family/partner support groups
- Healthcare provider trainings
- Intergroup contact

Individual
Types of Stigma
- Concealment of stigma
- Avoidance of stigma
- Internalization of stigma

Interventions
- Counseling/therapy
- Self-affirmation
- Transgender support groups
- Collective activism

Note. Diagram explaining the different levels of stigma that transgender people experience and the different ways it impacts them, depending on the operationalized level on which it happens. From "Journal of Social Science & Medicine" by J. M. White Hughto, S. L. Reisner, J. E. Pachankis, *Transgender stigma and health: A critical review of stigma determinants, mechanisms, and interventions* (p. 223) 2015. Copyright 2015 Elsevier Ltd.

The Minority Stress Model

The minority stress model (Figure 3) refers to the increased stress and pressures caused by the heterosexism; groups in the majority can exert these pressures on sexual minority individuals, causing them to suffer discrimination, stigma, and violence that can lead to poor health outcomes and mental health illnesses (e.g., discrimination, depression, thoughts of suicide; Velez et al., 2022). It was first introduced as a theory by Dr. Winn Kelly Brooks (formerly known as Virginia Rae Brooks) in 1981 (Figure 4;Rich et al., 2020). Dr. Brooks's work first started looking at the social inequities that gay and lesbian people are exposed to compared to cisgender people. His theory explains that, compared to cisgender people, sexual minority people like transgender women suffer disparate access to essential services like housing and job opportunities (Rich et al., 2020). Dr. Brooks developed the minority stress theory to point out critical variables for measuring sexual minority people mental and physical health outcomes and how those variables contribute to or impact stress reduction and improved health for sexual minority groups (Rich et al., 2020). Through time, the theory developed by Dr. Brooks in 1981 evolved into a model later introduced by Dr. Ilan Meyer (1995).

Meyer's model originally included lesbian, gay, and bisexual people; over time, the model added other groups like queer, transgender, and other sexual minority people (Meyer, 1995). His model explained that episodes of social stress suffered by these groups are caused by experiences of homophobia, rejection, stigma, prejudice, and raised coping mechanisms, which can lead to increased mental health illnesses among this population (Meyer, 2007). Meyer also explained that knowledge and understanding of the

model could help healthcare and public health professionals and policymakers develop, plan, and evaluate targeted programs to address the unique health needs of this population (Meyer, 2007). The model tries to encapsulate other sociological and psychological theories into one place to give a more in-depth explanation of how unconscious bias, prejudice, and stigma impact the lives and health of sexual minority groups (Meyer, 2007). The model divides external and internal factors into distal stressors (e.g., bias, inequities, intolerance, microaggressions, and stigma). These stressors can lead to internal sentiments or proximal stressors (e.g., hiding sexual orientation, feelings of embarrassment, seclusion, and trauma; Flentje et al., 2020). Studies show that these stressors detrimentally impact sexual minorities physical and mental health and overall well-being (Flentje et al., 2020; Shipherd et al., 2019; Velez et al., 2022).

Figure 3

Minority Stress Processes in Lesbian, Gay, and Bisexual Populations
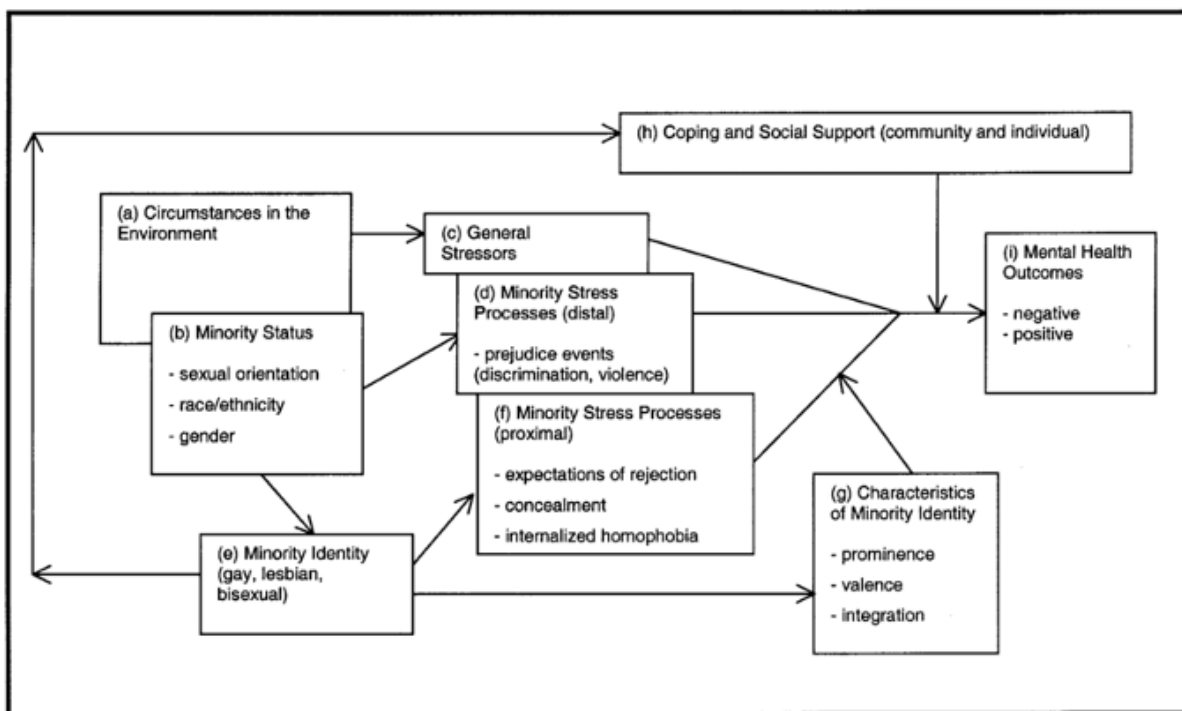
Note. The diagram was developed to explain the proximal and distal stressors that

suffered by sexual minorities that can lead to poor physical and mental health outcomes.

From "Psychological Bulletin", by Ilan Meyer, *Prejudice, social stress, and mental*

health in lesbian, gay, and bisexual populations: Conceptual issues and research

evidence (p. 35), 2007, Columbia University.

Figure 4

Systems Sequence of Minority-Stress Antecedents (from Brooks[7 (p .85).]; reprinted with permission, all rights reserved).
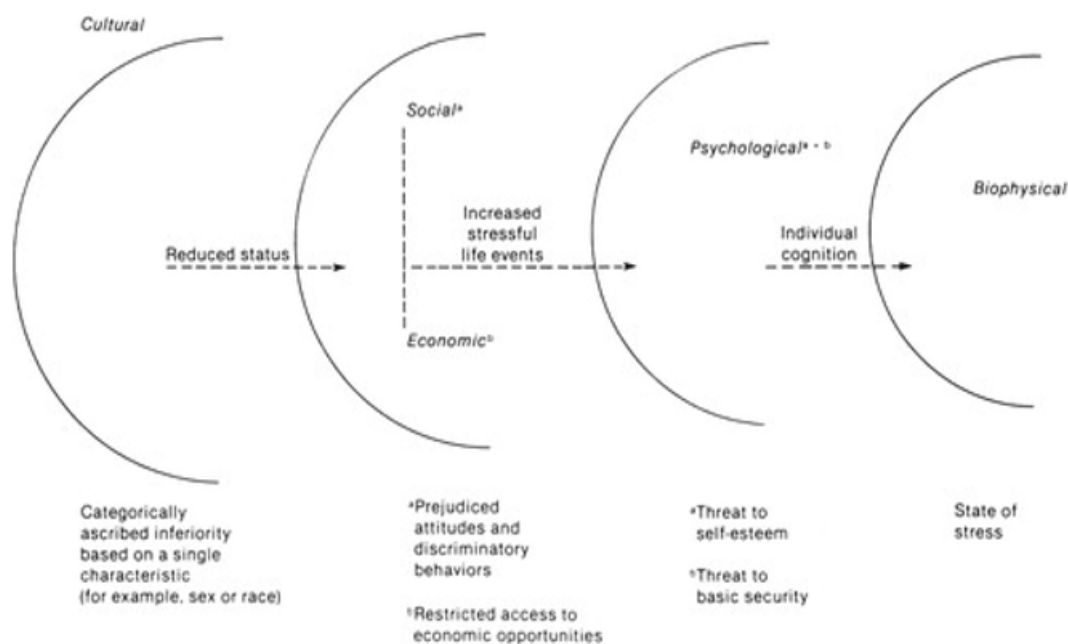
Note. The diagram demonstrates the latitude of the multilevel theory to explain how sexual minority stressors influence biophysical and psychological outcomes. From "LGBT Health" by A. J. Rich, T. Salway, A. Scheim, and T. Poteat, *Sexual minority stress theory: Remembering and honoring the work of Virginia Brooks* (p. 125) 2020. Copyright Mary Ann Liebert, Inc. 2020.

Nature of the Study

This quantitative cross-sectional research study utilized secondary data from the 2020 BRFSS survey (CDC, 2021e). The data set was analyzed using complex logistic regression analysis, looking at the independent variables of smoking in two populations, transgender women of color and cisgender women of color. The dependent variable is

HIV testing, and the control variables are sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color compared to cisgender women of color.

Literature Search Strategy

A literature review was conducted to analyze and evaluate the risk factors such as smoking that impact transgender women of color likelihood of HIV testing. The review began with an in-depth evaluation of the secondary data source from the CDC BRFSS 2020 Codebook Report (CDC, 2021j). A review was also conducted on the theoretical models that best aligned with the study research questions. The following search engines were used to research the data and find studies related to the research study topic: PubMed, EBSCO, ProQuest, SAGE, Mary Ann Liebert, Inc., and The Williams Institute. Government agencies that were also part of the research criteria, the Center for Disease Control and Prevention (CDC), the Department of Health and Human Services (HHS), the Health Resources Services Administration (HRSA), and the National Institutes of Health (NIH) National Library of Medicine MedlinePlus. Peer-reviewed journal articles from January 2017 through August 2023 were included in the search criteria to narrow the results.

The following keywords were used for the literature review: *HIV, HIV prevention, HIV risk, HIV testing, transgender women of color, transwomen of color, trans female, transgender women, cisgender women of color, women of color,* and *minority transgender women.* Other keywords used along with the listed words to narrow the search were *smoking, tobacco use, alcohol use, drug use, healthcare coverage, mental*

health status or illnesses, and *sociodemographic.* This study focused on transgender women of color (AI/AN, AA , Black/African American, Hispanic/Latina, and NH/PI) behavior and disparities risk factors like sexual conduct and smoking prevalence; HIV prevention interventions and the prevalence of HIV among transgender and cisgender women of color; culturally and linguistically targeted programs for transgender women; and sociocultural factors that impact transgender women of color.

Section 1 reviews the literature, looking at the risk factors and sociocultural and health determinants that increase transgender women of color risks of becoming infected with HIV. The critical role of other external factors like healthcare coverage and mental health illnessess could also potentially impact their risk for infection when compared to cisgender women of color. Seven databases were used to conduct the literature review to answer and support the research questions: EBSCO, Google Scholar, Mary Ann Liebert, Inc., ProQuest, Pub Med, SAGE, and The Williams Institute. The literature review identifies 235 articles related to transgender women of color, cisgender women of color, HIV prevention, and tobacco use. Due to the limited amount of research available on transgender women of color, articles that looked at all transgender women were also included in this review.

Literature Review Related to Key Variables and Concepts

Transgender People in the United States

In the United States, more than one million people identify as transgender (male to female, female to male, and non-gender binary) (Becasen et al., 2019; Meerwijk & Sevelius, 2017). This is a significant increase from 700,000 transgender adults in 2011

(Flores et al., 2016). However, researchers agreed that the numbers are incongruent, and that the number of transgender adults in the country is larger than has been reported (Becasen et al., 2019; Flores et al., 2016; Meerwijk & Sevelius, 2017). For example, Meerwijk and Sevelius (2017) conducted a meta-regression analysis looking at national surveys between 2007 and 2015 to better estimate the size of the transgender population in the United States. A similar study was published a year earlier by Flores et al. (2016). Both groups analyzed several national population-based surveys like the BRFSS and the National College Health Assessment (NCHA) (Flores et al., 2016; Meerwijk & Sevelius, 2017).

Researchers in both studies found that most respondents were young adults between the ages of 18 and 24 years old. They concluded that the increase in participation and openness about their gender identity is due in significant part to a shift in view and acceptance from society (Flores et al., 2016; Meerwijk & Sevelius, 2017). Another study looked at the differences and similarities between transgender and cisgender people when accessing healthcare services. Researchers concluded that transgender people were three times more likely to postpone medical care than cisgender people (Herman et al., 2017). Koch et al. (2020) validated Herman findings by looking at healthcare services for transgender people in four countries, including the United States. They concluded that the high cost of healthcare services is prohibitive for transgender people.

Researchers and community advocates have explained that it is difficult to collect accurate data on this population because of the way that gender identity questions are formulated on the questionnaires and surveys that people fill in at government and other

healthcare institutions. Often, transgender people are misclassified into other categories, which has led to a lack of disaggregated data, which is an exponential problem (Becasen et al., 2019; Buchting et al., 2017; Flores et al., 2016; Meerwijk & Sevelius, 2017). For example, transgender women are often classified as MSMs (men who have sex with men) (Sevelius et al., 2016). Disaggregated data on the race and ethnicity of transgender women of color is minimal as well. Information on the race and ethnicity of other groups outside Black/African American or Hispanic/Latina is less than 1%, whereas the other groups are aggregated into one category labeled "Other" (James et al., 2017b). A report from The Williams Institute recommended that institutions adopt a two-step approach when asking transgender people about their gender identity (e.g., assigned sex at birth and current gender identity), to mitigate misclassification errors (Badgett et al., 2014). Inadequate data collection can impact the development of competent, equitable, and sensible laws, better allocation of funding for initiatives and programs in targeted areas, and access to comprehensive healthcare services for transgender people (Meerwijk & Sevelius, 2017).

Transgender Women of Color

The term transgender women of color is used to identify transgender women of minority race and ethnicity backgrounds like AI/AN, AA, Black/African American, Hispanic/Latina, and NH/PI (LaMartine et al., 2020). Transgender women of color face gender identity discrimination, social stigma, low socioeconomic status, homelessness, alcohol and substance abuse, smoking, inadequate access to healthcare services, and mental health issues at higher rates than other groups (Gonzalez et al., 2017; LaMartine et

al., 2020; Smart et al., 2020, Pitasi et al., 2019; Ryan, 2020). Studies on transgender women of color have shown that the inequalities and discriminatory practices they suffer can push them into engaging in sex work and other risky behavior as a means to earn a living, which exposes them to HIV risk (Nuttbrock & Hwahng, 2017; Reback et al., 2019). One study in Massachusetts found that transgender women with a high school diploma are reported for excessive alcohol consumption less often than transgender women with a college degree (Gonzalez et al., 2017). However, another study examining the risk behaviors of young transgender women in Boston and Chicago did not find a notable association with alcohol consumption after having been released from prison (White Hughto et al., 2018).

These findings coincide with other studies that link stress factors impacting transgender women of color, like being rejected by family and friends, isolation, prejudice, self-deprecation, and stigma, among other influencers, to poor health, mental health issues, and HIV prevalence (Gonzalez et al., 2017; Hernandez et al., 2020; Reback et al., 2019; White Hughto et al., 2018;). The high incidence and prevalence of substance abuse and violence against transgender women of color are well known. A study found an increased use of cannabis among transgender women (Gonzalez et al., 2017; Smart et al., 2020). Another study found that transgender women of color are much more likely to experience abuse and violence from their partners than cisgender women of color (Arayasirikul et al., 2017). In 2021, the CDC released the survey results on transgender women, reporting that four in 10 transgender women living in seven major cities across the country were HIV positive. Most cases involved Black/African American and

Hispanic/Latina transgender women. In the same report, the CDC called for the critical need to develop strategic and targeted HIV prevention programs for this population (CDC, 2021c).

Figure 5

Race and Ethnicity of Transgender Women of Color in the United States
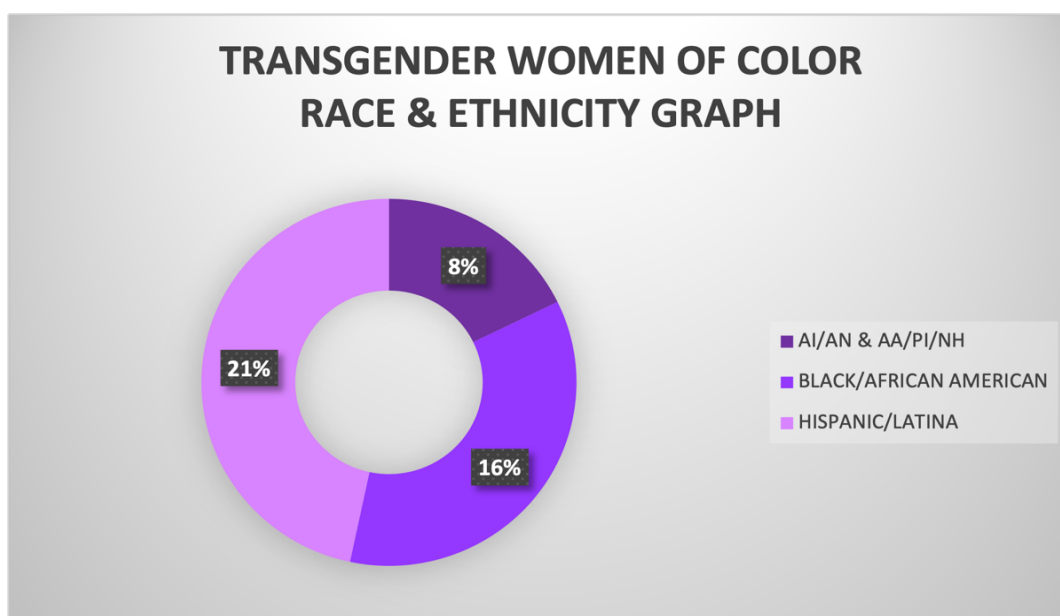
Note. "[Statistical data on transgender people of color in the United States]", by S. LaMartine, M. Brennan-Ing, and N. Nakamura, *Transgender women of color and HIV*. Copyright 2020 by American Psychological Association (APA).

Cisgender Women of Color

Between 2015 and 2019, HIV incidence among all cisgender women declined by 6%. However, HIV incidence among some cisgender women of color increased (refer to Figure 6). It decreased in most other groups, AA (19%), Black/African American (11%), Hispanic/Latina (7%), and multiple races (18%), except NH/PI where it increased (67%)

and AI/AN in which remained stable (CDC, 2022b). Another study found that 56% of cisgender people suffered a terrifying event in their lifetime compared to 98% of transgender people (Gonzalez et al., 2017). Transgender parents revealed many more barriers and difficulties during the adoption process than cisgender parents (Rothblum et al., 2017). A probability-based study looking at the alcohol consumption of transgender and cisgender women did not find any significant difference in alcohol consumption between the two groups (Gonzalez et al., 2017). Cisgender women of color see alcoholism as usual due to a shared history of sexual abuse. The same study also reported higher drug use among racial and ethnic minority transgender women (Talley et al., 2016). A national sample found that 10% of transgender people reported poor health compared to 5% of cisgender people (Koma et al., 2020). However, Gonzalez et al. (2017) found similarities between transgender women of color and cisgender women of color and poor health outcomes (Gonzalez et al., 2017).

Figure 6

HIV Trends Among Cisgender Women of Color by Race and Ethnicity
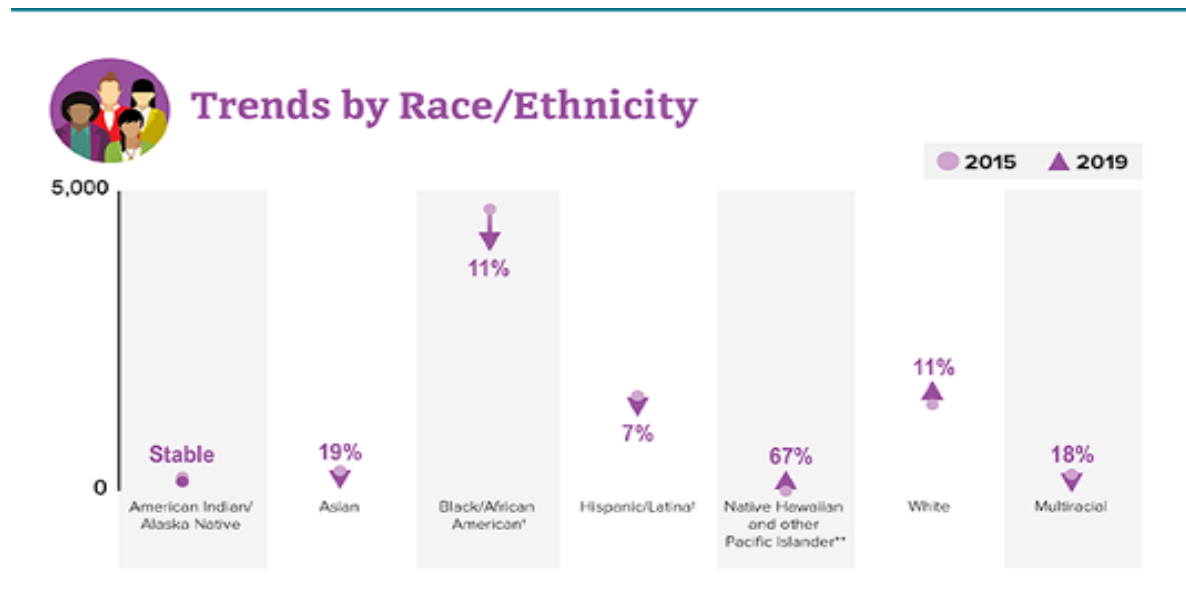
Note. From the "HIV and women: HIV diagnoses," by the Division of HIV Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention. (https://www.cdc.gov/hiv/group/gender/women/diagnoses.html). Copyright 2022 by the CDC.

HIV Testing and Infection

For the past 2 decades, transgender women of color have experienced a systematic increase in HIV incidence and prevalence (Hirshfield et al., 2019). Recent estimates showed that 1 in 4 transgender women in the United States is living with HIV (Lippman et al., 2016). Of these, 49% (Figure 7) are Black/African American transgender women (CDC, 2021b). In 2018, the CDC reported that, from 2009 to 2014, 84% of newly diagnosed HIV cases were among transgender women (CDC, 2018). It is also estimated that almost 28% of transgender people have HIV, and transgender women are reported as

having the highest infection incidence (14.1%; CDC, 2019). In the United States, one in five transgender women of color under age 25 is HIV positive (Arayasirikul et al., 2017; Becasen et al., 2019).

Despite this population's high HIV incidence rate, the HIV testing rate remains low. In 2019, only 1 in 10 transgender women was tested for HIV. Most cases happened among Black/African American transgender women (Pitasi et al., 2020). In 2020, a study sponsored by the CDC across seven major U.S. cities reported that 4 in 10 transgender women tested positive for HIV. Most cases were among transgender women of color; 42% of Black/African American transgender women tested positive for HIV (CDC, 2021c). Overall, the CDC reported that more AI/AN (65%), AA (20%), Black/African American (62%), and Hispanic/Latina (35%) transgender women tested positive for HIV, compared to White (17%) transgender women (CDC, 2021c). Further, researchers have identified several factors that explained the lack of HIV testing among transgender women of color even when they have access to health insurance, including things like assault, displacement, gender and racial discrimination, intimate partner violence (IPV), mistreatment by healthcare providers, sex work, stigma, and violence (Bukowski et al., 2018; Pitasi et al., 2020).

Figure 7

New HIV Diagnoses Among Transgender Women of Color
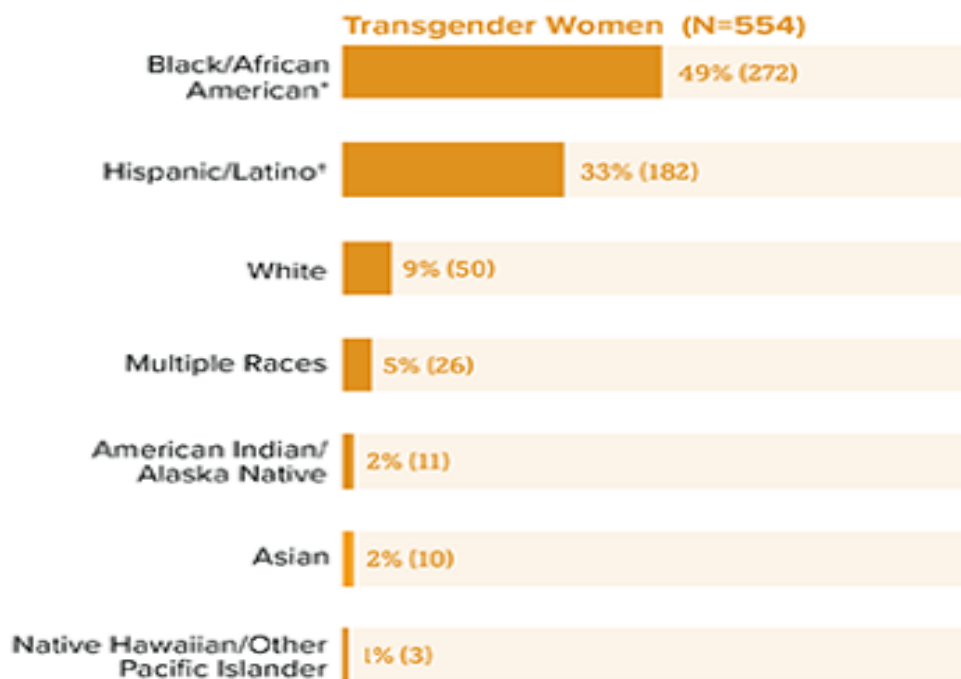
Note. From the "HIV and Transgender People: HIV diagnoses," by the Division of HIV Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention. (https://www.cdc.gov/hiv/group/gender/transgender/hiv-diagnoses.html) Copyright 2021m by CDC.

Two different studies by Gamarel et al. (2020b) and Bukowski et al. (2019) described how other minority stressors, like gender dysphoria, violence at the hands of cisgender male partners, substance abuse, and engaging in sexual activities without protection, disproportionately increased the risk of HIV infection. Researchers replicated

a study in the City of New York conducted previously in Brazil, Mexico City, Mexico, and San Francisco. Researchers found that HIV impacted Black/African American and Hispanic/Latina transgender women at an alarming rate—49.6% and 48.1%, respectively—compared to other racial and ethnic groups (Nuttbrock & Hwahng, 2017). In comparison, AI/AN transgender woman have more than twice (4.6%) the risk of living with HIV of other AI/AN people (James et al., 2017a). Among AA and NH/PI transgender women, the HIV rate is 0.5%, which is 0.4% higher than among the AA and NH/PI population, and only 0.2% higher than the U.S. estimates (James & Magpantay, 2017b).

Studies show that the risk for transgender women of color of becoming infected with HIV is as high in the United States (22%) as it is worldwide. Around the world, transgender women HIV prevalence is 66 times higher than any other group (Stutterheim et al., 2021). In 2019, HIV prevalence was highest among Black/African American (44.2%) and Hispanic/Latina (25.8%), compared to White transgender women (6.7%) (Bass et al., 2022).

The CDC has reported that knowledge of pre-exposure prophylaxis (PrEP) among transgender women of color is high at 92%; however, that does not translate into use of PrEP among the same group, which is low, at 32% (CDC, 2021c). It is a conclusion that Bass et al. (2022) agree with; they explain that researchers had largely overlooked transgender women of color in PrEP clinical trials. A 2019 report from the U.S. Preventive Services Task Force found that transgender women of color are not enrolled in clinical trials and are counted as MSMs (Bass et al., 2022). Experts agreed that there is

a great need for more HIV prevention interventions that target transgender women of color and their cisgender male partners (Becasen et al., 2019; Gamarel et al., 2020a; Nuttbrock & Hwahng, 2017; Smart et al., 2020).

Smoking

Worldwide, the high incidence rate of cigarette smoking among transgender women is associated with the same issues impacting transgender women in the United States, namely, mental, physical, and social trauma (Castaldelli et al., 2021). Experts have also emphasized that tobacco companies bear an incredible responsibility for targeting transgender people (Solomon, 2020). Unfortunately, little data exist that focuses on transgender women and smoking. Cigarette smoking prevalence among transgender women is 1.3 to 2.5 times higher (30%) than among cisgender women (14%; U.S. Department of Veterans Affairs, n.d.). The cigarette smoking rate among SGMs is significantly higher compared to other racial and ethnic minority and tribal groups (Tamî-Maury et al., 2020). Cigarette smoking is closely related to recurrent substance abuse and a detrimental physical and mental state of being. Researchers also found that cigarette smoking is directly related to alcohol and marijuana use and intense anxiety episodes that add to mental health load (Lo Schiavo et al., 2020; Ryan, 2020). A study by Buchting et al. (2017) reported that transgender women of color living in HIV hotspots had a higher percentage of tobacco use (43.2%) than those living outside HIV hotspots (34.3%) (Buchting et al., 2017).

Another study showed that transgender women of color reported having their first cigarette at age 14, which is 2 years younger than the national average (Gamarel et al.,

2016; Kidd et al., 2018; Menino et al., 2018). This issue can be highly problematic for this population as they are going through their developmental years; furthermore, they are impacted by feelings of pressure from family, friends, and society to fit in and abide by societal norms (Gamarel et al., 2016). Wheldon and Wiseman (2019) also pointed out the significant sociodemographic gaps between the two groups, for instance in education and income. Transgender women of color had less education and lower socioeconomic status than cisgender women of color. In one area, 44% of Black/African American transgender women reported trying to quit smoking compared to 55% of White transgender women from the same area. They were also more likely to drink (66%); only 34% of participants quit smoking successfully (Gamarel et al., 2016).

Transgender women of color who consume alcohol and drugs, suffer discrimination and stigma, and do not have adequate access to healthcare services or insurance coverage showed a higher prevalence of smoking (Buchting et al., 2017; Gamarel et al., 2016). Researchers looked at cigarette smoking and the behaviors and openness about trying to stop smoking among transgender women in the Bay Area (San Francisco). The excessiveness of smoking among this population was found to cause transgender women of color to engage in other high-risk behaviors like alcohol abuse, heightening their risk of becoming infected with HIV (Gamarel et al., 2016). These findings correlate with Buchting et al. (2017), Culbreth et al. (2022), and Tan et al. (2021).

Smoking behaviors among transgender women of color are higher than among cisgender women of color (Buchting et al., 2017; Culbreth et al., 2022; Tan et al., 2021).

Menino et al. (2018) and Tan et al. (2021) reported that stressors like depression, discrimination, and IPV impacting transgender women of color could hinder their chances of quitting smoking. Stressors like experiencing abuse as a child and high levels of violence have not been further analyzed in correlation with high incidence of smoking (Culbreth et al., 2022). Culbreth et al. (2022) and Tan et al. (2021) found that transgender women of color who struggled with their gender identity showed a higher smoking rate than those who did not. Culbreth et al. (2022) also reported a lack of social support compared to that available to transgender women of color who did not smoke.

One of the most significant barriers to stopping smoking that transgender women of color face, according to researchers, is the relentless advertisement of tobacco companies across all LGBT communities and the places where they gather—adding to the burden of discrimination and their mental health status (Tamî-Maury et al., 2020; Tan et al., 2021). A similar study found that the prevalence of tobacco use among transgender women of color over the past 3 months was 36.1% (Buchting et al., 2017). A second study published 2 years later looking at cigarette smoking attitudes found that cigarette smoking prevalence among transgender women of color had decreased to 30.9% (Tamî-Maury et al., 2020).

The first study looking at transgender women undergoing hormone therapy and cigarette smoking found that transgender women did not feel encouraged about quitting smoking. Researchers also noted that doctors did not educate enough transgender women about cigarette smoking dangers when prescribing hormone therapy (Kidd et al., 2018). Transgender women undergoing gender-affirming surgery were associated with a higher

rate of smoking cessation or intention to quit smoking (Kidd et al., 2018; Menino et al., 2018). These findings aligned with Tan et al. (2021) study about transgender women not quitting smoking before having gender-affirming surgery, which can interfere with their recovery.

The health risks of cigarette smoking are well documented. Health conditions like chronic obstructive pulmonary disease or COPD, heart disease, and cancer are the most known to be caused by smoking. However, cigarette smoking can also interfere with HIV treatments. Transgender women undergoing estrogen therapy could be at higher risk of developing blood clots and having a stroke (Tan et al., 2021). SGMs like transgender women of color do not perceive smoking as an immediate health concern like other health disparities such as HIV infection, violence, or chronic diseases. The Tobacco in Changing Media Environment Study data showed that the BRFSS report from 2016 never evaluated any form of tobacco use among transgender and cisgender women (Wheldon & Wiseman, 2019). The study findings contradicted those of other researchers (Buchting et al., 2017; Culbreth et al.,2022; Kidd et al., 2018; Menino et al., 2018; Tan et al., 2021) stating that the final analysis did not support the notion that transgender women of color use of tobacco products at a higher rate than cisgender women of color.

For the past 2 decades, cigarette use has been widely studied among people of different sexual orientations. However, research into tobacco use trends and behaviors among transgender women of color is limited (Buchting et al., 2017). For example, a study focused on using tobacco products among LGBT young adults wanted to use the National Adult Tobacco Survey for its analysis. Due to the limited data reported about

LGBT, the researchers had to oversampled and combined data from other surveys (Delahanty et al., 2019). Researchers agreed that more studies are needed to look at the relation between psychosocial trauma and smoking behavior that impacts transgender women of color. They all agreed that targeted prevention programs are essential to reach this population and positively impact it (Buchting et al., 2017; Delahanty et al., 2019; Gamarel et al., 2016; Kidd et al., 2018; Menino et al., 2018; Wheldon & Wiseman, 2019). Few studies have evaluated the health impact of smoking among transgender women living with HIV. However, no study has examined smoking and the likelihood of HIV testing among transgender women of color.

Healthcare Coverage

In the United States, 19% of transgender people do not have healthcare insurance, and 51% receive insurance through their employer (Koch et al., 2020). Approximately 51,000 transgender women participate in the Medicaid program. Medicaid is a state-run program that provides healthcare services to people and children living below the poverty threshold. In recent years 18 states have expanded Medicaid eligibility coverage for gender-affirming surgery for transgender people (Mallory & Tentindo, 2019). In 2017, 40% of AI/AN transgender women had healthcare insurance through their employer, 23% had Medicaid, 13% received care through Indian Health Service clinics, and 18% did not have any healthcare coverage (James et al., 2017). Furthermore, 11% of AA transgender women are uninsured, compared to 14% of NH/PI transgender women (James & Magpantay, 2017), 20% of Black/African American and, 17% of Hispanic/Latina transgender women do not have healthcare coverage. These percentages are almost twice

as high as the percentage of the entire U.S. population that does not have healthcare

coverage, that is, 11%. However, 46% and 50%, respectively, had health insurance

through employment; 18% and 16% were covered by Medicaid, respectively (James et

al., 2017; James & Salcedo, 2017).

For transgender people, adequate access to healthcare services like gender-

affirmation surgery involves a much deeper process than sex reassignment surgery; it

signifies receiving gender identity and expression validation from family, friends, and

society. It legitimizes one's authentic self-identity (Garcia & Crosby, 2020; Koch et al.,

2020). Koch et al. (2020) explained that lack of healthcare insurance increases

transgender peoples delays in seeking care 5 times over compared to other groups.

Oregon is one of few states with a gender-affirming policy. However, transgender women

of color have reported inequities in accessing healthcare services. Those living outside

large cities are more likely to experience discrimination and be refused hospital services

because those institutions do not service transgender patients (Garcia & Crosby, 2020). A

literature review by Das and Drolet (2023) revealed that by 2021, 35 states introduced

over 100 Bills denying gender-affirming healthcare services and human rights access to

transgender people, including transgender women of color. Under U.S. federal and state

laws, it is illegal to deny healthcare coverage to transgender people. Only under a few

exceptions can health insurance companies refuse access to care, including gender-

affirming surgery (Farmer, 2017). Furthermore, under the Patient Protection and

Affordable Care Act, Section 1557 prohibits federally funded health programs from

discriminating individuals based on their age, color, disability, national origin, race, sex, or gender identity (e.g., people who identify as transgender) (Farmer, 2017).

The prevalence of HIV among transgender women is reported to be at 14%; however, researchers argued that the HIV rate is much higher (Bass et al., 2022). In recent years, eligibility to access PrEP treatment has expanded to reach this population; unfortunately, use of PrEP is still significantly low for transgender women of color compared to other groups. For example, AA transgender women experienced lower eligibility for PrEP when compared to non-Hispanic Whites (Shover et al., 2018). Lippman (2016) study showed that one of the significant barriers to accessing HIV prevention services or programs that transgender woman of color face it is targeting transgender women as MSMs. The misclassification of the data and the lack of trans-targeting messaging hinder transgender women of color from accessing adequate care and prevention services (Bass et al., 2022; Lippman, 2016).

The intersection between medical care and access to social services is an area that continues to be underexamined. Healthcare professionals, health inequities, cost (Feldman et al., 2021), stigma, and bias deter transgender women of color from adhering to HIV antiretroviral treatment (ART) or HIV care after diagnosis (Bockting et al., 2020). Access to specialized care and medical professionals that understand how to provide compassionate care to this population is critical to help significantly decrease the incidence of diseases like cancer, HIV, and mental health illnesses (Hafeez et al., 2017; Park & Safer, 2018). A study among transgender women of color found that having adequate access to gender-affirming healthcare services was more critical than receiving

HIV care (Lacombe-Duncan et al., 2019). Public health professionals suggest providing a comprehensive level of care for this population to increase engagement in HIV prevention efforts and the HIV care continuum (Bass et al., 2022; Lacombe-Duncan et al., 2019).

Transgender people have a myriad of unique medical needs compared to cisgender people. Researchers have documented the need for adequate medical instructions at medical schools, including cultural competency and exposure during clinical rotations (Park & Safer, 2018). Another study showed that 37% of AI/AN transgender women refused medical care due to fear of mistreatment. At least 50% of patients have reported a negative experience at a clinic (Leston et al., 2020). Park and Safer (2018) looked at the impact of teaching culturally specialized clinical care for transgender people to medical students. They found that proper training increased students' confidence. Researchers also recommended combining instruction with hands-on training to boost students trust (Park & Safer, 2018). Advocates call for a revision of medical school instruction guidelines to help improve and promote positive outcomes while diminishing the minority stressor impacting transgender people (Breslow et al., 2020).

Historically, transgender women of color have faced more significant barriers to HIV prevention programs when compared to cisgender women of color (Turan et al., 2019). According to researchers, one area that needs attention is how the stigma of being HIV positive could potentially add to the already stigmatized transgender experience (Smart et al., 2020; Turan et al., 2019). A lack of access to healthcare services also means

a lack of access to mental health services (Feldman et al., 2021; Koch et al., 2020). This inequity adds another roadblock for transgender women of color who need medical care and treatment (Koch et al., 2020; Smart et al., 2020).

Mental Health Status

Studies have shown that transgender people experience higher prevalence of mental health illnesses (e.g., anxiety, depression, self-harm, and suicide) than cisgender people (Jackman et al., 2018). Particular issues are feelings of being rejected by family, friends, and community (e.g., church and school) and a lack of recognition of their gender identity. These issues are contributing to the rising mental health crisis impacting transgender women of color (Smart et al., 2020). Transgender women of color experience higher levels of psychological distress due to victimization and violence than cisgender women of color (Jackman et al., 2018). The health disparities and social inequities that transgender women of color face can lead them to a depressive disorder and trigger other dangerous reactions (Pitasi et al., 2017). For example, transgender women of color incarceration rate is higher than for other gender minority groups (White Hughto et al., 2018).

White Hughto et al. (2018) explained that being homeless, dropping out of school, engaging in sex work, and/or having a criminal record exacerbate transgender women of color mental health illnesses and substance use and abuse (Arayasirikul et al., 2018). This problem creates the perfect storm for an already battered person, who becomes trapped in a never-ending abuse cycle. Other factors like immigration status, language and acculturation barriers, and inadequate access to services and treatment can also weigh

heavily on mental health outcomes (Allen & Leslie, 2020). A recent CDC (2021c) report found that 70% of HIV-negative young transgender women of color were victims of abuse and harassment compared to older transgender women of color. Byne et al. (2018) found that 47% of transgender women of color have suicidal ideation. Experts have explained that the high rate is partly due to transgender women of color struggle with gender identity and acceptance. CDC researchers also found a direct correlation between performing gender-affirmation surgery and low suicide and psychological distress rate among transgender women of color (CDC, 2021c).

Transgender women of color working as sex workers are increasingly engaged in sexually risky behaviors. The detrimental conditions they experience (e.g., depression, IPV, sexual abuse from an early age, substance abuse) often exacerbate these behaviors compared to cisgender women of color sex workers (Jackman et al., 2018). Heterosexual relationships with cisgender men are among transgender women of color risk factors for HIV infection. Researchers are proponents of conducting outreach prevention efforts for transgender women of color with their partners rather than alone (Gamarel et al., 2020b). Experts also recommend that primary care facilities include IPV screening as part of their primary level of care. It has also been recommended for HIV prevention programs to develop IPV education and training and targetted outreach efforts (Peitzmeier et al., 2020).

It has been widely reported that transgender women suffer higher rates of IPV compared to cisgender women. However, reports suggest that violence against this group does not end when transgender women leave the home and seek shelter elsewhere. One

study found that AI/AN, Hispanic/Latina, and multiracial transgender women were being victimized, abused, and discriminated against at shelters for domestic violence victims (Arayasirikul et al., 2018; Peitzmeier et al., 2020). A survey by Arayasirikul et al. (2018) looking at HIV risk factors for infection among transgender women of color in San Francisco coincided with findings from other national studies from Jackman et al. (2018), Peitzmeier et al. (2020), and Owen-Smith et al. (2017). Alcohol and substance abuse, IPV, mental health illness, and not completing higher education can potentially lead transgender women of color to engage in risky sexual behaviors (Arayasirikul et al., 2018).

Lack of immigration status is a social determinant of health; without immigration status, transgender women cannot access adequate healthcare and mental health services or legally change their name and gender identity (Yamanis et al., 2018). A study by Allen and Leslie (2020) among Hispanic/Latina transgender women immigrants found that this group barriers and inequalities are more profound and challenging to overcome than those of their counterparts born in the United States. Factors like acculturation, language barriers, and lack of immigration status aggravate their situation, increasing their risk of and exposure to HIV infection.

Yamanis et al. (2018) found that Latina transgender women without immigration status suffered from higher rates of depression compared to Latina transgender people born in the United States. Yamanis et al. (2018) also explained that most participants fled their native countries to the U.S. to escape prejudice, violence, and war. Researchers confirmed that the results aligned with the minority stress framework; obtaining

immigration status and social support is a priority for Hispanic/Latina transgender women over receiving services like HIV prevention (Adams et al., 2017; Allen & Leslie, 2020; Owen-Smith, 2017). In tribal communities, acceptance of using two-spirit preferred pronouns for AI/AN transgender women has resulted in a 56% decrease in suicide cases (Jim et al., 2021). Another study showed that implementing changes like gender-affirming training and preferred pronouns has helped decrease thoughts of suicide among young AI/AN transgender women by 65% (Leston et al., 2020).

Definitions

AIDS: This is the result of the bodys inability to continue fighting HIV because the infection has severely battered the persons immune system (HIV.gov, 2020).

Cisgender: It's a term for people who identify with their sex assigned at birth (Fennie et al., 2016).

Healthcare coverage: This is the permissible right to pay or be reimbursed for the cost of healthcare services. Typically, it is obtained through a health insurance company, the person's employer, or a government subsidy program like Medicare/Medicaid and the Children's Health Insurance Program (CHIP) (HealthCare.gov, n.d.)

HIV (human immunodeficiency virus): This is an infection caused by a virus that invades human cells, impeding the body's ability to fight infections and leaving the person susceptible to attack from opportunistic infections (HIV.gov, 2020).

HIV testing: This is a test used to detect if a person is positive for the human immunodeficiency virus (HIV) (MedlinePlus, 2022).

Mental health: This is the state of being of a person that involves cognitive, emotional, and social welfare (Andersen et al., 2022).

Smoking: This is the term for people that inhale and exhale the fumes of flaming components mostly nicotine (Leone et al., 2010).

Transgender: It is a term used to describe a person whose gender identity does not correspond with their assigned sex at birth (e.g., male-to-female [MTF]) (Tami-Maury et al., 2020).

Assumptions

An assumption accepts a statement as factual that has not been proven true. An assumption can drive a research study (Moroi, 2020). Several key assumptions guided this study: (1) transgender women of color have the exact same healthcare needs as cisgender women of color; (2) the inequities impacting transgender women of color are the same as those impacting all transgender women and transgender people; (3) the respondents answered the BRFSS questionnaire truthfully and accurately; (4) the data was recorded accurately and adequately to facilitate the analysis of the sample populations. Proper data collection increases the validity of any study analysis and can contribute important information that can potentially lead to future studies.

Scope and Delimitations

This research study evaluated smoking as a potential barrier to the likelihood of getting tested for HIV among transgender women of color. All transgender women of color from all racial and ethnic minority groups–-AI/AN, AA, Black/African American, Hispanic/Latina, NH/PI–-will be included in this study. The literature review identified

transgender women of color as an underrepresented and understudied population and their likelihood for HIV testing, although it found the prevalence of HIV infection among transgender women of color was found to be significantly higher than among cisgender women of color (Holder et al., 2018; Reback et al., 2019). No studies were found looking at the relationship between smoking and the likelihood of HIV testing in this population. Factors like healthcare coverage and mental health status have also been identified as risk factors that increase this population risk of HIV infection. Secondary data analysis from the 2020 BRFSS survey will be conducted to answer the research questions. One of the research study challenges was having an adequate sample size for the target population to enable drawing statistically significant results. The survey included responses from people that identified as transgender women (CDC, 2021i).

Another delimitation is that other forms of smoking (e.g., hookah, pipe) and tobacco chewing and marijuana use were excluded from this study. Future research could include these forms of smoking and marijuana use among these populations.

Limitations

One of the study limitations was the lack of disaggregated data on transgender women of color across the two largest racial and ethnic minority groups, Black/African American and Hispanic/Latina transgender women. Data collection on AI/AN, AA, NH/PI is often aggregated because the population size is too small to be counted, which limits learning opportunities and proper sample collection for public health professionals as well as access to critical programs and services for the other groups.

Another limitation of the study was the misclassification of transgender women as MSMs at clinics and other health department records. This constitutes an ongoing challenge for public health professionals seeking to understand this population health issues (Bass et al., 2022; Lippman et al., 2016; Sevelius et al., 2016). In addition, only 32 states and D.C. collected data on gender identity and sexual orientation for the 2020 BRFSS survey. This makes data on this population, including HIV rates, miscalculated and increases the likelihood of bias, generalizability, and underestimation (Bass et al., 2022; Cicero et al., 2020).

A significant limitation for researchers is collecting appropriate and significant data on smoking prevalence among transgender women of color. Inefficiency in how the data is collected or the lack thereof complicates obtaining accurate information or numbers of the study population (Buchting et al., 2017; Culbreth et al., 2022; Delahanty et al., 2019; Tan et al., 2021). Other researchers expressed similar challenges in collecting critical data on healthcare coverage and information on mental health status impacting AI/AN, AA, and NH/PI transgender women.

Significance

This study contributed important information on and brings attention to a community that continues to be largely understudied and underrepresented. It provides an in-depth analysis of other potential barriers that can impact the likelihood of HIV testing among transgender woman of color. That has largely been overlooked, but it also has the potential to contribute to HIV prevention and smoking cessation programs that target transgender women of color. The literature search supports the importance of identifying

positive elements for transgender women of color to help them quit smoking. By identifying the reasons for the low HIV testing rate in transgender women of color, we can find ways to decrease or mitigate their risk of becoming infected with HIV or developing other chronic illnesses like cancer, COPD, and emphysema (Culbreth et al., 2022; Max et al., 2019; Xavier, 2021).

Summary and Conclusion

According to Garcia and Crosby (2020), gender inequity is a critical social determinant of health. Other minority stress determinants like racism, sexism, transphobia, and xenophobia potentially lead to poor health outcomes and risky behavior and contribute to the high prevalence of HIV among this community (Arayasirikul et al., 2017). Inadequate access to healthcare services, cultural barriers, lack of social support, low socioeconomic status, and mental health illnesses are among the most significant social determinants impacting transgender women of color (Garcia & Crosby, 2020;). These determinant factors have contributed to a lack of testing and increased transgender women of color's risk of becoming infected with HIV at a disproportionate rate; transgender women of color are 34 times more likely to become infected with HIV than the rest of the nation adult population of any race and ethnicity and sexual orientation (Garcia & Crosby, 2020; Holder et al., 2018; Xavier, 2021).

Lack of social support and economic hardships can provoke transgender women of color into engaging in unsafe sex practices and reckless behaviors, like smoking and drug and substance use, discriminately raising their risk of HIV infection. Mental health illnesses like depression and PTSD have prompted a higher number of transgender

women of color to contemplate suicide (41%) than in the rest of the population (Culbreth et al., 2022; LaMartine et al., 2020). The prevalence of smoking among transgender women of color ranges between 31% and 83%, which is higher than for any other sexual minorities (Culbreth et al., 2022). For the past 2 decades, cigarette use has been widely studied among people of different sexual orientations. However, research on tobacco use trends and behaviors among transgender women of color is limited (Buchting et al., 2017; Culbreth et al., 2022).

Buchting et al. (2017) also found that one of the most significant barriers for researchers is the inefficiency of data collection, with inappropriate questions being used in surveys and interviews. Researchers also agreed on the need for more data looking at the psychosocial trauma and smoking behaviors that impact this population. Targeted prevention programs involving the use of apps and social media are essential to reach this population and positively impact it (Buchting et al., 2017; Culbreth et al., 2022; Gamarel et al., 2016; Lo Schiavo et al., 2020; MacCarthy et al., 2020; Ryan, 2020; Solomon, 2020). Providing adequate care must be a top-down decision and effort, from administrators to healthcare staff. Studies show that the lack of specialized multifaceted instructions that medical students are faced with translates into poor care and lack of HIV education and testing for transgender people. Bockting et al. (2020) reported that transgender women are the least tested group for HIV infection. Healthcare professionals' reports of abuse and mistreatment have led transgender women of color not to want to seek preventive care like HIV testing or to delay starting ART (Bockting et al., 2020; Byne et al., 2018; Hafeez et al., 2017; MacCarthy et al., 2020).

Worldwide, the high incidence of cigarette smoking among transgender women is associated with the same issues impacting transgender women of color in the United States: mental, physical, and social trauma. Experts have also emphasized that tobacco companies are responsible for relentlessly targeting transgender women of color. Unfortunately, limited data exists on transgender women of color and smoking (Solomon, 2020). Furthermore, no studies have examined the impact of smoking and the likelihood of HIV testing among transgender women of color. In Section 2, I discussed the research study design plan, the rationale for selecting the dataset, the background of the original dataset, the instrumentation and the analysis test. I also delineated, the threats to validity and the ethical considerations, and explained how they could potentially impact the research study results.

Section 2: Research Design and Data Collection

Introduction

This quantitative cross-sectional research study aimed to determine if there is an association between smoking among transgender women of color and the likelihood of HIV testing compared to cisgender women of color. This research study is important because a limited number of studies have examined smoking while controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, mental health status. Further, no previous research has examined how these variables together help contribute to the lack of HIV testing among transgender women of color. It is estimated that the prevalence of cigarette smoking among transgender women is 1.3 to 2.5 times (30%) that of cisgender women (14%), according to the Department of Veterans Affairs (n.d.).

The target population in this study reflected data from transgender women of color from five racial and ethnic minority groups AI/AN, AA, Black/African American, Hispanic/Latina, and NH/PI. The 2020 BRFSS survey was used to perform the secondary data analysis (CDC, 2021j). The finding of any association between the variables and their correlation to HIV testing will help public health professionals to develop culturally appropriate and targeted prevention and cessation programs for this community. This section introduced the research design, rationale, and methodology used to conduct the secondary data analysis. I also presented background information on the original study and the steps followed to collect, analyze, and validate the data.

Research Design and Rationale

This research study is a quantitative cross-sectional secondary data analysis using a logistic regression test to determine if there was an association between smoking and the likelihood of HIV testing among transgender women of color, after adjusting for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status. A *cross-sectional study* is an observational study that simultaneously measures the outcomes and exposures within the study. This type of study design is appropriate for this research because participants' selection is based on their exclusion and inclusion criteria (Setia, 2016). A *binomial logit model or logistic regression* tests a dependent variable against one or more independent variables that are either categorical or continuous. The binomial logit model complex analysis establishes the independent variable's impact on the dependent variable. Furthermore, it establishes if the logit model can predict the dependent variable (Onemayin et al., 2019).

The BRFSS consists of three calculated factors: variables, intermediate variables, and variables to calculate participants (CDC, 2021g). *Variables* are used to weight or stratify the data; the BRFSS does not assess these variables. *Intermediate variables* are taken from one question and used to analyze other risk factors or variables. *Variables to calculate participants* are selected before participants are interviewed. These variables center around health behaviors that could potentially be linked to risk factors; they consist of continuous variables, such as age (CDC, 2021g). The design selection fits these criteria because I tried to determine if there is an association between smoking and the likelihood of HIV testing by measuring for access and outcome while adjusting for

multiple variables. The results could help advance the understanding of the health effects and other potential risk factors (e.g., HIV) that smoking has on transgender women of color.

Methodology

Population

In the United States, approximately 1.3 million people identify as transgender (Herman et al., 2022). An estimated 525,200 identify as transgender women (data is aggregated; Herman et al., 2022). In this study, the target population consists of transgender women of color 18 years and older living in the United States and D.C. identified in the 2020 BRFSS survey (CDC, 2021j). The study focuses on transgender women of color, such as AI/AN, AA, Black or African Americans, Hispanic/Latinas, and NH/PI. The survey showed that only 372 (0.15%) participants identified as transgender women; the results are aggregated for all racial and ethnic groups. For the 175,534 who identify as cisgender women, data results are also aggregated (CDC, 2021j). In 2020, only 32 states reported gender identity data on transgender people to the BRFSS, while all 50 states, D.C. and U.S. territories reported data on cisgender women (CDC, 2021j).

Sampling Procedure Used by Original Creators of the Data Set

The CDC BRFSS is a national annual cross-sectional complex survey that gathers population health information from states across the United States and associated areas (D.C., Guam, Puerto Rico, and U.S. Virgin Islands). The BRFSS is one of the country's most comprehensive national data repositories. The survey collects health and social data, such as sociodemographic sex and gender identity. Among other, behavioral and health

factors like chronic and communicable diseases, tobacco and vaping use, healthcare services, mental health status, and HIV testing. The BRFSS is also one of few nationally recognized surveys that collects data on transgender people (CDC, 2021f). The CDC policy on the use of their data and other tools states that publicly available information on the agency's website can be used and reproduced without requiring permission from the agency (CDC, 2018).

The BRFSS uses the Random Digit Dialing system; interviews are conducted via landlines and mobile devices (CDC, 2021e). Throughout the process, states work with the CDC to develop the survey questions and interview protocols (CDC, 2021h). Households are identified by using the American Community Survey (ACS) report; in 2019, the ACS reported that 99% of houses in the United States and dependent areas had landlines. In 2020, the National Health Interview Survey (NHIS) reported that 61.8% of people only have mobile devices. To increase participants' representation, as well as the quality and validity of the data collection and responses, state health departments used both landlines and mobile device numbers to reach respondents. The survey is available in Spanish; however, it can also be translated into other languages by states with a significant population whose native language is neither English nor Spanish (CDC, 2021f).

The BRFSS methodology uses iterative proportional fitting or raking. A disproportionate stratified sample is applied for interviews conducted via landlines, and a random sample design is applied for interviews conducted via mobile devices. The weighted methodology allows for data collection from both landlines and mobile devices. It also allows for collecting additional demographic information like education and

housing status, race and ethnicity, and gender identity (CDC, 2021h). To analyze the

survey responses, the BRFSS conducted a nondirectional statistical analysis using the

Statistical Analysis System or SAS version 9.4. A Wald chi-square analysis was done for

all the subject groups and covariates, and the significance level was set at 0.05 (CDC,

2021i). The BRFSS also applied the Benjamini-Hochberg method to ensure assumptions

were not violated by testing for Type I errors if the results were not statistically

significant. BRFSS used the sequential modified Bonferroni correction to test for

multiple hypotheses. For all the missing values that ranged below four percent per group

when the weighted analysis was completed, analysts did not include them in the

imputation methodology (CDC, 2021e).

A G*Power analysis was conducted to estimate the sample size needed to test the

research questions. The statistical power was calculated with an alpha (α err prob) = 0.05

and power (1-β err prob) = 0.80. An alpha of 0.05 (Table 1) is justified based on the

broadly defined survey questions in a cross-sectional study where the primary interest is

the association between the independent and dependent variables. The results showed that

a sample size of 87 is needed to obtain statistically significant results. The test results

showed that the sample size complied with the research study requirement of 50 to 100

participants. However, a larger sample size of participants in the 2020 BRFSS survey

could had provided more significant results in the overall analysis.

Table 1

G*Power Sample Size Output Table

Transgender women of color

Critical Z	Sample size Group 1 N1	Sample size Group 2 N2	Effect size	Alpha	Beta
1.9599640	37	50	0.2000	0.05	0.80

Cisgender women of color

Critical Z	Sample size Group 1 N1	Sample size Group 2 N2	Effect size	Alpha	Beta
1.9599640	31539	21819	0.2000	0.05	1.00

Note. (α err prob) = 0.05

Instrumentation and Operationalization of Constructs

The CDC BRFSS is a collaborative project between all of the states and participating U.S. territories and the CDC (2021f). The BRFSS's objective is to collect uniform state-specific data on health risk behaviors, chronic and communicable diseases, healthcare coverage, and preventive health services related to the leading causes of death and disability in the United States. Information is collected via a survey, and participants are contacted via landlines and mobile devices (CDC, 2021f). For this research study I used the 2020 BRFSS survey to conduct the data analysis. Most survey questions used on the BRFSS come from the NHIS and the National Health and Nutrition Examination Survey.

The BRFSS favored these questions because they have been validated; they also allow states to compare the questions against other questionnaires (CDC, 2021h). However, states wanting to include new questions must test those questions for reliability and validity before adding them to the BRFSS questionnaire (CDC, 2021h). Analysts

receive monthly reports from the states; the BRFSS team runs quality points to identify

any potential problem with the data. If data quality issues are identified, a programmer

works with the state to solve the problem (CDC, 2021h). When the final data reports are

received and validated by the CDC, data quality reports are rerun to identify any

additional problems with the data set that may have been missed. Once the data are ready,

calculated variables and weights are assigned (CDC, 2021e).

For this research study, several questions from the 2020 BRFSS survey were

selected to determine whether smoking impacts the likelihood of HIV testing among

transgender women of color compared to cisgender women of color, after adjusting for

sociodemographic factors (age, education, language, and race/ethnicity), healthcare

coverage, and mental health status. In the BRFSS survey, questions that measure sex at

birth (sex), gender identity (transgender), HIV, age, education, language, race/ethnicity,

healthcare coverage, and mental health status are classified as categorical variables. The

questions that measure smoking and language are classified as nominal variables.

Participants also had the option to refuse answering a question.

Operationalization For Each Variable Describe

In this section, I provide the operationalization for the independent, dependent

and control variables for this research study and the level of scale in which each variable

will be measured.

Table 2

Definition and Measurement of Independent Study Variables

Variable name	Definition of variable	Value label	Measure of variable
Transgender Women of Color	Do you consider yourself to be transgender	0 = Yes 1 = No	Categorical
Cisgender Women of Color	Calculated sex variable	0 = Male 1 = Female	Categorical
Smoking	Adults who are current smokers	0 = No 1 = Yes	Categorical

Table 3

Definition and Measurement of Dependent Study Variables

Variable Name	Definition of Variable	Value	Measure of Variable
HIV	Adults who have ever been tested for HIV	0 = Yes 1 = No	Categorical

Table 4

Definition and Measurement of Control Study Variables

Variable Name	Definition of Variable	Value	Measure of Variable
Age	Six-level imputed age category	0 = 18 to 24 1 = 25 to 34 2 = 35 to 44 3 = 45 to 54 4 = 55 to 64 5 = 65 and older	Ordinal
Race	Race/ethnicity categories	0 = Black, non-Hispanic 1 = American Indian/Alaska Native, non-Hispanic 2 = Asian, non-Hispanic 3 = Hispanic 4 = Native Hawaiian/Pacific Islander, non-Hispanic 5 = Multiracial, non-Hispanic 6 = Other race, non-Hispanic	Categorical
Education	Level of education completed	0 = Did not graduate High School 1 = Graduated High School 2 = Attended College or Technical School 3 = Graduated from College or Technical School	Categorical
Language	Language Identifier	0 = English 1 = Spanish	Categorical
Healthcare Coverage	Respondents aged 18-64 who have any form of health care coverage	0 = Yes 1 = No	Categorical
Mental Health Status	3 level not good mental health status: 0 days, 1-13 days, 14-30 days	0 = 0 days 1 = 1 to 13 days 2 = 14 to 30 days	Ordinal

Table 5

CDC Behavioral Risk Factor Surveillance System 2020 Codebook Description of

Variables

Variable Name	Measurement	Research Question	Item on Survey
Independent Variable 1: TRNSGNDRGE	Categorical	Do you consider yourself to be transgender?	Question page 109: question ask for the respondents' what their gender identity is to be (e.g., male-to-female, female-to-male, or gender non-conforming)
Independent Variable 2: _SEX IG	Categorical	Calculated sex variable	Questions page 138: questions ask respondents to identify their sex
Independent Variable 3: _RFSMOKE3 IV	Categorical	Adults who are current smokers	Question page 146: Question ask if the participant is a current smoker (e.g., yes or no).
Dependent Variable: _AIDTST4 JS	Categorical	Adults who have ever been tested for HIV	Question page 161: Calculated variable regarding the total of adults that have ever got tested for HIV
Control Variable 1: Sociodemographic factors 1: _AGE_G - IK 2: EDUCAG - IS 3: QSTLANG - GV 4: _RACE - IC	1: Categorical 2: Categorical 3: Ordinal 4: Categorical	1: Six-level imputed age category 2: Level of education completed 3: Language identifier 4: Race/ethnicity categories.	Questions pages 141, 145, 118, and 135: 1: Question ask in which age range category the respondent falls in 2: Never attended school or only kindergarten, Grades 1 through 8 (Elementary), Grades 9 through 11 (Some high school), Grade 12 or GED (High school graduate), College 1 year to 3 years (Some college or technical school), College 4 years or more (College graduate) 3: English, Spanish, other 4: White only, Black only, American Indian or Alaska Native only, Asian only, Native Hawaiian or other Pacific Islander only, Other race only, Multiracial, Hispanic,
Control Variable 2: _HCVU651 HP	Categorical	Respondents aged 18-64 who have any form of health care coverage	Question page 127: Question ask if the respondent has healthcare coverage (e.g., yes or no).
Control Variable 3: _MENT14D HO	Categorical	3 level not good mental health status: 0 days, 1-13 days, 14-30 days	Question page 126: Question ask the number of days within a month that a participant's mental health wasn't good (e.g., 1: zero days when mental health not good; 2: 1-13 days when mental health not good; 3: 14+ days when mental health not good).

Note. Refer to Appendix A for original table. From the CDC BRFSS *LLCP 2020 codebook report overall version data weighted with*

LLCPWT behavioral risk factor surveillance system https://www.cdc.gov/brfss/annual_data/2020/pdf/codebook20_llcp-v2-508.pdf.

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Data Analysis Plan

For this research study, the SPSS Statistics Data Software version 28 was used to

conduct the secondary data analysis (IBM, 2013). This research study was a cross-

sectional logistic regression analysis; this type of analysis allowed for establishing the

model's all-around criteria (variance) and the relative contribution of each predictor to the total variance explained. A binomial logit model or logistic regression tests a dependent variable against one or more independent variables that are either categorical or continuous. The *binomial logit model* analysis establishes the independent variable's statistically significant impact on the dependent variable. It establishes whether the logit model can predict the dependent variable (Onemayin et al., 2019).

Before running a logit model, the following four assumptions must be met a) measurement of one dependent variable is done at the dichotomous level (e.g., yes/no); b) independent variables must be categorical or continuous; c) the dependent variables need to have categories that are mutually exclusive and exhaustive, and they must be independent of observations; and d) must have linearity amid continuous independent variables and the dependent variables (Bruin, 2006). To test for assumptions, I will conduct a Box-Tidwell test; the test assumes a linear relationship between the continuous predictor and the log odds. The assumption was violated if the test result showed a significant interaction (Wuensch, 2021). To test if the complex logistic regression analysis is the correct tool for this study, I will use the Hosmer-Lemeshow test (HL test); the HL is a goodness of fit test used to predict risk models (Hosmer et al., 2013). This test is used to test the null hypothesis; it is also useful when testing a population's subgroups. The HL test is suitable for looking for the overall calibration error in the model. A good calibration happens when the rates of the expected and the observed subgroups are similar. Results of the HL test are shown as chi-square and a p-value. A small p-value result represents the model as a poor fit; however, a significant p-value is not an inference

that the model was a good fit but rather says that there is not enough evidence to confirm it (Hosmer et al., 2013).

To ensure the results from the data analysis are accurate and statistically significant results are obtained, the data needs to be screened for errors and cleaned. Steps will be followed to familiarize the data before analyzing it on SPSS. To ensure the data is entered correctly (that is, no data is missing); verifying the data distribution is correct; measuring for validity and reliability (Creswell, 2009). Frequency distribution analysis will be run, looking for errors and ensuring the results fall within the range. Any errors found during the data analysis will be deleted, and SPSS will recognize its missing value (McCormick et al., 2017).

In addition, when running the statistical analysis on SPSS, a test was run at the 95% confidence level for all variables (dependent, independent, and control). This research study evaluated the dependent and independent variables for missing values. Variables with missing values like "Do not know" or "Unknown" were not included in the data analysis for inferential statistics. However, those values are included in the report for descriptive statistics. A false-positive or Type I error (α alpha) happens when the null hypothesis is rejected and is valid. A false-negative or Type II error (β beta) happens when the null hypothesis is not rejected when in fact is false (Banerjee et al., 2009). The design selection fits these criteria, because I tried to determined whether there was a possible association between smoking and the likelihood of HIV testing by measuring for exposure and outcome while adjusting for multiple variables.

Research Questions, Hypothesis, and Study Variables

This quantitative cross-sectional research study aimed to determined if there was an association between smoking among transgender women of color and the likelihood of HIV testing compared to cisgender women of color.

RQ1:Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status in transgender women of color?

Null H_{01}:There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color.

Alternate Ha1:There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color.

RQ2:Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for cisgender women of color?

Null H_{02}:There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language,

and race/ethnicity), healthcare coverage, and mental health status for cisgender women of color.

Alternate H_{a2}:There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), access to healthcare coverage, and mental health status for cisgender women of color.

RQ3:Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color?

Null H03:There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color.

Alternate Ha3:There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color.

Table 6

Description of Variables/Research Questions

Research Questions	Independent Variables (IV) and Measurement	Dependent Variables (DV) and Measurement	Control Variables (CV) and Measurements	Statistical Analysis
RQ1	Transgender women of color (Categorical) and smoking (Categorical)	HIV (Categorical)	Sociodemographic factors (age, education, language, and race/ethnicity) (Categorical, Categorical, Categorical, and Categorical), healthcare coverage (Nominal), and mental health status (Ordinal)	Survey weighted Logistic regression
RQ2	Cisgender women of color (Categorical) and smoking (Categorical)	HIV (Categorical)	Sociodemographic factors (age, education, language, and race/ethnicity) (Categorical, Categorical, Nominal, and Categorical), healthcare coverage (Categorical), and mental health status (Ordinal)	Survey weighted Logistic regression
RQ3	Transgender women of color, cisgender women of color (Categorical), and smoking (Categorical)	HIV (Categorical)	Sociodemographic factors (age, education, language, and race/ethnicity) (Categorical, Categorical, Categorical, and Categorical), healthcare coverage (Categorical), and mental health status (Ordinal)	Survey weighted Logistic regression

Threats to Validity

In 2014, the BRFSS affixed the Sexual Orientation and Gender Identity (SOGI) Module to the list of optional modules. In 2019, the BRFSS reported that 32 states used the SOGI module; that same year, a single question was also added to the questionnaire: "sex at birth" (CDC, 2021k). The inclusion of the sex at birth module caused the respondent's "sex" variable name to change. When both questions are answered, *"sex at birth"* and *"sex,"* the first response will supersede the second in the calculated variable (CDC, 2021k). Because the three modules sex at birth, sex, and SOGI do not follow a specific pattern within the questionnaire, participants may provide different answers to

the first two sex and sex at birth questions and answer "no" when asked if they are transgender. To ensure responses are captured correctly by the surveyor, they must corroborate the responses with the participants (CDC, 2021k).

Sample data weights analysis can help increase results' generalizability. However, the BRFSS sampling weights analysis uses sex-based information from the U.S. Census Bureau ACS, and Decennial Census did not collect gender identity information during the 2020 Decennial Census (Cicero et al., 2020). Errors in collecting appropriate transgender people data by the BRFSS can create a clash between the survey participants' sex at birth and their current gender identity. In 2014, this misclassification bias resulted in 30% of transgender people being asked improper questions to transgender people about their gender identity and anatomy. In 2014, transgender people were assigned their sex identity by coordinators from hearing respondents' voice timbre (Cicero et al., 2020). The misclassification bias and data measurement errors impacted the BRFSS survey weighted sample algorithm for sex data.

The BRFSS survey intended to use the sample data results to increase the 'external validity and generalizability of the transgender population sample. However, the algorithm's accuracy depended on the adequacy of transgender people's classification in the survey responses (Cicero et al., 2020). Over 70% of transgender women had their information raked using cisgender male information; therefore, they were assigned "male" as their sex. These inaccuracies contribute to weighted data misclassification bias, leading to skewed statistical analysis results (Cicero et al., 2020).

Cicero et al. (2020) studied how the BRFSS survey uses sample weights to measure the health of transgender people. The complex logistic regression study evaluated the 2015 BRFSS report in which 22 states and Guam adopted the SOGI module. The study adjusted for age, race, and socioeconomic factors, as these factors have directly impacted transgender people's health outcomes. Results showed that to mitigate the misclassification bias, one approach BRFSS coordinators can take is to combine subject design with one transgender case and two cisgender controls (e.g., 1TW: 1CM and 1CW) (Cicero et al., 2020). Cicero et al. (2020) agreed that this approach can decrease ambiguity and increase the veracity of the parameter estimates.

The BRFSS team recognized that they are a small number of national surveys collecting data on sexual orientation and gender identity. However, the number of responses on the gender identity variable is small. The team predicted that adding other categories will not generate sufficient responses that can be analyzed (CDC, 2021k). One consideration that may potentially impact the validity and reliability of the study, according to the BRFSS team, is that although the collected data is large enough to obtain statistically significant results, they caution people who want to use the data to sample a subgroup within one year only (e.g., 2020) or people living in a particular location (e.g., rural areas); because small sampling could potentially produce unreliable results (CDC, 2021h). The BRFSS team does not report or analyze responses with a denominator of fewer than 50 participants (unweighted sample) or when the result is half the 95% confidence interval above 10. In 2011, the team changed the confidence interval

limitation with the relative standard error (RSE) to mitigate this issue. The RSE is the

standard error divided by the mean (CDC, 2021h).

Although telephone interviews are efficient and cost-effective, telephone surveys

can also be limited because people cannot be reached, or they live in an area in which

service is out of range. The BRFSS team have also acknowledged that this is true for

some subpopulations in which telephone accessibility is limited, such as people with low

socioeconomic status, living in remote areas, not graduating high school, poor health, and

people younger than 25 years of age (CDC, 2021h). It is essential to adjust for

demographic variables like age, race/ethnicity, and sex to limit its potential impact.

Another consideration is the potential of underreporting when doing telephone

interviews; self-reported information could be less accurate than face-to-face interviews

(e.g., the number of cigarettes smoked in a day). However, the BRFSS data can be seen

as one of the most reliable and valid surveys available today. The CDC conducts end-of-

year processing using the SAS program to help prepare the data to be analyzed; they also

add calculated variables, risk factors, sample design, and weighting (CDC, 2021f). The

results are well in-line with other national surveys, such as the NHIS and NHANES

(CDC, 2021f).

Ethical Procedures

The BRFSS does not collect personal data that can potentially be used to identify

any given person. All the responses are aggregated, and telephone numbers are excluded

from the report to protect people's identities (CDC, 2018). Therefore, identifiers like

names or telephone numbers are not included in the BRFSS codebook. The secondary

data analysis was conducted using only publicly available information released by the CDC. I did not use proprietary or non-publicly available data for this research study. To comply with Walden University IRB policies; I applied for ethics approval.

Summary

In section 2, I described the design and methodology, the sample population, instrumentation and constructs of the original instrument, the data analysis plan, the threats to validity, and the ethical considerations associated with conducting secondary data analysis. The original survey was collected and archived by the CDC, a federal government institution under the United States Department of Health and Human Services. The 2020 BRFSS survey collected data on transgender and cisgender women of color, 18 years of age and older. A survey allows a researcher to collect critical information about any given population, such as attitudes and behaviors, in a quantitative format (Creswell, 2009). This research study used secondary data to determine if there was an association between smoking and the likelihood of HIV testing among transgender women of color. In section 3, I presented the research study results.

Section 3: Presentation of the Results and Findings

Introduction

This research study aimed to determine if there is an association between smoking among transgender women of color and the likelihood of HIV testing compared to cisgender women of color. The quantitative cross-sectional study analyzed HIV testing (dependent variable); transgender women of color, cisgender women of color, and smoking (independent variables); and sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status (control variables) using a complex logistic regression.

This research study is essential because a limited number of studies have examined smoking while controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status. This section will present a review of the study population, descriptive statistics for the multivariate variables, the statistical results for each research question and hypothesis, and the research study findings.

Research Questions and Hypothesis

The research questions and hypotheses were analyzed using SPSS software version 28. They are:

RQ1: Is there an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status in transgender women of color?

Null $H_0$1: There is no association between smoking and the likelihood of HIV

testing after controlling for sociodemographic factors (age, education, language,

and race/ethnicity), healthcare coverage, and mental health status for transgender

women of color.

Alternate H_a1: There is an association between smoking and the likelihood of

HIV testing after controlling for sociodemographic factors (age, education,

language, and race/ethnicity), healthcare coverage, and mental health status for

transgender women of color.

RQ2: Is there an association between smoking and the likelihood of HIV testing

after controlling for sociodemographic factors (age, education, language, and

race/ethnicity), healthcare coverage, and mental health status for cisgender women of

color?

Null $H_0$2: There is no association between smoking and the likelihood of HIV

testing after controlling for sociodemographic factors (age, education, language,

and race/ethnicity), healthcare coverage, and mental health status for cisgender

women of color.

Alternate H_a2: There is an association between smoking and the likelihood of

HIV testing after controlling for sociodemographic factors (age, education,

language, and race/ethnicity), access to healthcare coverage, and mental health

status for cisgender women of color.

RQ3: Is there an association between smoking and the likelihood of HIV testing

after controlling for sociodemographic factors (age, education, language, and

race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color?

> Null $H_0 3$: There is no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color.

> Alternate $H_a 3$: There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, race/ethnicity), healthcare coverage, and mental health status for transgender women of color versus cisgender women of color.

Accessing the Data Set for Secondary Analysis

This study used a secondary data set from the 2020 BRFSS survey. In the criterion data, 171 transgender women of color and 53,358 cisgender women of color aged 18 and over responded the survey. The BRFSS is a complex survey administered by health departments nationwide, D.C., and U.S. territories (CDC, 2021e). For the 2020 BRFSS survey, only 32 states and D.C. reported data on gender identity and sexual orientation (Bass et al., 2022; Cicero et al., 2020). The target population were transgender women of color 18 years and older living in the United States, D.C., and U.S. territories identified in the 2020 BRFSS survey (CDC, 2021j). The study focused on transgender women of color from racial and ethnic minority backgrounds – AI/ANs, AAs, Black or African Americans, Hispanic/Latinas, and NH/PIs.

This research study used the CDC 2020 BRFSS survey data set for analysis. The BRFSS is one of the country's most comprehensive national data repositories. It is one of the few nationally recognized surveys that collects data on transgender people. It gathers information from the 50 states, D.C., and the U.S. territories. The survey collects information on health and social data, such as sociodemographic sex and gender identity, among other behavioral and health factors like chronic and communicable diseases, tobacco and vaping use, healthcare services, mental health status, and HIV (CDC, 2021f).

The BRFSS methodology uses iterative proportional fitting or raking. A disproportionate stratified sample is applied for interviews conducted via landlines, and a random sample design is applied for interviews conducted via mobile devices. The weighted methodology allows for data collection from both landlines and mobile devices. It also allows for collecting additional demographic information like education and housing status, race and ethnicity, and gender identity (CDC, 2021h). In the BRFSS, such weighting is a blanket adjustment for noncoverage and nonresponse. It forces the total number of cases to equal population estimates for each geographic region, which for the BRFSS sums to the state population. Regardless of state sample design, using the final weight in the analysis is necessary if users are to make generalizations from the sample to the U.S. population.

The BRFSS suervey analysis uses weight trimming to increase the value of extremely low weights and decrease the value of extremely high weights. Weight trimming aims to reduce errors in the outcome estimates caused by unusually high or low weights in some categories (CDC, 2021h). The covariates for this research study were

selected based on the question of interest. I selected the covariates before the modeling

process began. The covariates were part of the overall research questions. The modeling

process did not drive the selection of the covariates included in the model.

Version 28 of the SPSS software was used for the study's secondary data analysis.

A descriptive analysis is presented as a model test of effects and odds ratios (ORs), to

assess the association between smoking and the likelihood of HIV testing among

transgender women of color. Complex samples logistic regression was used to analyze

the categorical variables to demonstrate an association between the dependent (HIV

testing) and the independent (transgender women of color, cisgender women of color, and

smoking) variables after controlling for sociodemographic factors (education, language,

and race/ethnicity), and healthcare coverage. It was also used to analyze the ordinal

(control) variables (age and mental health status). The multivariate analysis includes

tables to summarize the study population demographics and the research findings. The

study analysis did not include responses for the dependent or the independent variables

for missing values. Values such as "Don't know" or "Unknown" and "Missing" were also

not included in the inferential statistics.

Results

Data Treatment

After submitting the research study for approval to Walden University's IRB

department, the 2020 BRFSS dataset files from the CDC website were downloaded. The

data set comprises of 219 weighted variables; for this research study, nine variables were

selected that aligned with the research questions. The research study received IRB

approval; the approval number is 04-06-23-0160131.

Evaluation of the Statistical Assumptions as Appropriate to the Study

I used the Likelihood Ratio Test to test the global hypothesis that all the

regression coefficients were equal to zero. I rejected the null hypothesis that all

regression coefficients were equal to zero, lending weight to our proposed model. In

addition, the Akaike information criterion (AIC) was employed as part of the model fit

statistics. The AIC indicated that the model was a better fit with covariates than an

intercept-only model. The model was ran with a dependent binary variable for HIV/AIDs

testing coded as either a 1 or a 0. Another indicator of fit is the "C" statistic, which was

0.723 – an indicator of an acceptable model. The "C" statistics means that the model can

correctly predict whether or not the study participants got an HIV/AIDs test 72.3% of the

time.

Statistical Analysis Findings

RQ1

A complex samples logistic regression analysis was conducted to explore if there

is an association between smoking and the likelihood of HIV testing after controlling for

sociodemographic factors (age, education, language, and race/ethnicity), healthcare

coverage, and mental health status among transgender women of color. The BRFSS

survey variables of race/ethnicity, sex, and transgender women were combined to create a

new variable, "TransWomenColor." The analysis included the following variables: HIV

testing, smoking, mental health status, healthcare coverage, and sociodemographic

factors (age, education, and language). The statistically significant results were reported in terms of ORs. Responses labeled as missing or unknown were excluded from the analysis.

Table 7 provides the sociodemographic and frequency results for transgender women of color. In total, 171 respondents identified as transgender women of color in the 2020 BRFSS survey. Of these, 40% reported they were of the Hispanic/Latina racial and ethnic group. The next largest group was multiracial at 18.2%, followed by AA and Black/African American at 14.6% and 14.0%, respectively. Then, 6.4% were NH/PI; 4% were AI/AN; and 1.7% identified as Other. In relation to smoking, 72% of transgender women of color were nonsmokers and 18.1% were smokers. While 42% of transgender women of color reported having tested for HIV, 57% did not have an HIV test in the past year.

The following are the sociodemographic analysis results for the variables of healthcare coverage, mental health status, education, ethnicity, language, and age. Most transgender women of color reported having healthcare coverage (62%) compared to 20% who did not have healthcare coverage. In terms of mental health status, 38% of transgender women reported not having mental health issues; 27% reported having 1–13 days where their mental health was not good; 33% reported having 14 days or more where their mental health was not good. Regarding education, 20% did not graduate high school; 29% graduated from high school; 26% attended college or technical school; and 22% graduated from college or technical school. In relation to language, 90% spoke English and 9.9% spoke Spanish. Regarding age, 28% were 18–24 years old; 22% were

25–34 years old; 16% were 35–44 years old; 11% were 45–54 years old; 7% were 55–64 years old; and 14% were 65 or older.

The complex sample logistic regression analysis results showed that age was statistically significant. Transgender women of color over 45 years old with OR = 12.769, $p = 0.004$ (95% confidence interval (CI): 2.150, 75.831) are more likely to get tested for HIV than younger transgender women of color at the 5% ($p \leq 0.05$) level of significance (Tables 8 and 9). The null hypothesis cannot be rejected. The analysis results showed that smoking was not statistically significant. It shows no association between smoking and HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color. I failed to reject the null hypothesis. The analysis showed no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color.

Table 7

Sociodemographic Factor Tables for Transgender Women of Color

TransWomenColor	Frequency	Weighted frequency	Percent (%)
Sex at Birth (SEX)			
Female	171	276890	100.0
Total	171	276890	100.0
Race & ethnicity (RACE)			
American Indian / Alaska Native only	7	1896	4.1
Asian American only	25	86243	14.6
Black / African American only	24	31626	14.0
Hispanic / Latina	69	124070	40.0
Native Hawaiian / Pacific Islander only	11	2450	6.4
Multiracial only	32	30155	18.2
Other Race only	3	44884097	1.7
Total	171	276890	100.0
Smoking (RFSMOK3)			
Yes	31	20802	18.1
No	124	171146	72.5
Don't know/Not sure, Refused or Missing	16	84941	9.4
Total	171	276890	100.0
HIV testing (HIV_AID)			
Yes	72	100775	42.1
No	99	176115	57.9
Total	171	276890	100.0
Healthcare coverage (HCVU651)			
Have healthcare coverage	106	206254	62.0
Do not have healthcare coverage	35	56309	20.5
Don't know/Not sure, Refused or Missing	30	14327	17.5
Total	171	276890	100.0
Mental health status (MENT14D)			
Zero days when mental health not good	66	118367	38.6
1–13 days when mental not good	47	52574	27.5
14+ days when mental health not good	57	105882	33.3
Don't know/Not sure, Refused or Missing	1	6774232	0.6
Total	171	276890	
Education (EDUCAG)			
Did not graduate HS	35	106642	20.5
Graduated HS	50	74930	29.2
Attended college or technical school	45	62954	26.3
Graduated college or technical school	39	30931	22.8
Don't know/Not sure, Refused or Missing	2	1433	1.2
Total	171	276890	100.0
Language (QSTLANG)			
English	154	233750	90.1
Spanish	17	43141	9.9
Don't know/Not sure, Refused or Missing	0		
Total	171	276890	100.0
Age (AGE_G)			
18–24	48	85291	28.1
25–34	39	43782	22.8
35–44	28	29267	16.4
45–54	19	19156	11.1
55–64	12	89596	7.0
65 and older	25	9798	14.6
Total	171	276890	100.0

Note. N = 171

Figure 8

Transgender Women of Color Age of Participants
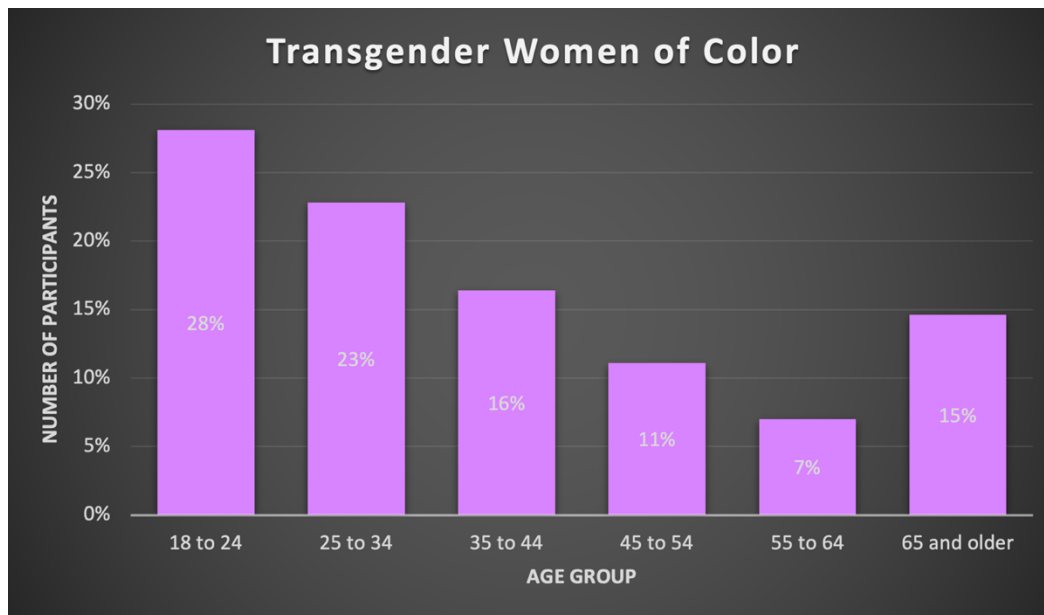
Note. $N = 171$. Frequency graph for transgender women of color.

The complex sample logistic regression results will be presented in terms of ORs. The analysis results showed that age was the only statistically significant covariate; results were 0.005 F = 3.694, at the α = 0.05 level of significance. It indicated no association between the other covariates (smoking, healthcare coverage, mental health status, education, and language) and the likelihood of HIV testing among transgender women of color.

The analysis for age had six values and was compared against the reference group "18–24" (coded as 1 in the BRFSS dataset). The results for value 2 (25–34 years old) showed that the CI was not statistically significant (OR =.998, 95% CI [0.221, 4.503]). When comparing with value 3 (35–44 years old), the results of the CI were also not

statistically significant (OR = 0.781, 95% CI [164, 0.3.715]). However, the CI results for the older age groups, values 4 (45–54), 5 (55–64), and 6 (65+), were statistically significant; each CI result was above 1. Compared with the three younger age groups (18–24, 25–34, and 35–44), these results indicated that people aged 45 and older are more likely to get tested for HIV. The ORs are not statistically significant if their CIs have a 1 within the interval. There may be no association if 1 is found in the interval. The effect size analysis showed that the larger the effect size, the greater the statistical power. The covariates were compared against multiple categories to a baseline group (i.e., age groups were compared to age group 1 [18–24]).

Results were calculated from the complex samples logistic regression analysis with HIV testing as the dependent variable; transgender women of color and smoking as the independent variables; and sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status as the control variables. Participants among values 4, 5, and 6 varied considerably: OR = 12.769, 95% CI [2.150, 75.831], OR = 102.593, 95% CI [11.559, 910.530], OR = 8.628, 95% CI [1.079, 68.955], respectively. These results aligned with the number of transgender women of color in each age group that responded to the 2020 BRFSS survey. The larger the OR, the lower the number of participants. To verified the results, I performed recursive feature elimination (RFE), which is a technique that uses feature selection to eliminate the lowest predictor(s) or variable(s) (Kuhn & Johnson, 2019). The first RFE step is to create a model that includes all the variable(s); as each model is evaluated, this process repeats until only statistically significant terms remain.

Table 8

Complex Samples Logistic Regression for Transgender Women of Color

(TransWomenColor) (N = 171)

Tests of Model Effects

Source	*F* test (df1)	*F* test (df2)	Adjusted Wald *F*	Significance
Age (AGE_G)	3.694	1478838.651	3.932	0.004

p < 0.05.

Table 9

Complex Samples Logistic Regression for Transgender Women of Color

(TransWomenColor) (N = 171)

				95% CI	
			OR	Lower	Upper
Age	1* = 18–24				
(AGE_G)	2 = 25–34	2 vs. 1	0.998	0.221	4.503
	3 = 35–44	3 vs. 1	0.781	0.164	3.715
	4 = 45–54	4 vs. 1	12.769	2.150	75.831
	5 = 55–64	5 vs. 1	102.593	11.559	910.530
	6 = 65+	6 vs 1	8.628	1.079	68.955

Note. The reference category is: 1 = 18 to 24 years old.

RQ2

A complex samples logistic regression analysis was conducted to explore if there is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status among cisgender women of color. The BRFSS survey variables of race/ethnicity and sex were combined to create a new variable. "NonTransWomenColor." The analysis included the following variables: HIV test,

smoking, sociodemographic factors (age, education, and, language), healthcare coverage, and mental health status. The complex samples logistic regression analysis results were reported in terms of ORs. Responses labeled as missing or unknown were excluded from the analysis.

Table 10 provides the sociodemographic and frequency results for cisgender women of color. In total, 53,358 respondents identified as cisgender women of color in the 2020 BRFSS survey. Of these, more than 36% reported they were Hispanic/Latina. The next largest group was Black/African American at 33%, followed by AA at 9%. Then, 7% were AI/AN, 8% were multiracial, 2% were NH/PI, and 3% identified as Other. In terms of smoking, 82% of cisgender women of color were nonsmokers and 11% were smokers. Regarding HIV test, 40% of cisgender women of color reported having tested for HIV, whereas 59% did not have an HIV test in the past year.

The following are the sociodemographic results for healthcare coverage, mental health status, education, language, and age. Most cisgender women of color reported having healthcare coverage (62%) compared to 13% who did not have healthcare coverage. Regarding mental health status, 59% of cisgender women reported not having mental health issues; 23% reported having 1–13 days where their mental health was not good; and 15% reported having 14 days or more where their mental health was not good. In relation to education, 13% did not graduate high school; 27% graduated from high school; 27% attended college or technical school; and 32% graduated from college or technical school. Regarding language, 85% spoke English and 15% spoke Spanish. In terms of age, 9% were 18–24 years old; 16% were 25–34 years old; 18% were 35–44

years old; 17% were 45–54 years old; 17% were 55–64 years old; and 23% were 65 or older.

The results were calculated from the complex samples logistic regression analysis with HIV testing as the dependent variable; transgender women of color and smoking as the independent variables; and sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status as the control variables. Due to the large sample size (n = 53,358) for cisgender women of color compared to transgender women of color (n = 171), the analysis results showed to be statistically significant across most of the variables at the $\alpha = 0.05$ level of significance (Tables 11 and 12). The null hypothesis is accepted. There is an association between smoking and the likelihood of HIV testing OR =.572, $p = < 0.001$ (95% CI [484, 0.676]) after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for cisgender women of color. The alternate hypothesis is rejected. There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for cisgender women of color.

The analysis results were then calculated for mental health status, age, education, and language. The analysis for mental health was compared against the category "Zero days when mental health was not good" (coded as 1 in the BRFSS dataset), the results of which were OR = 0.911, $p = < 0.001$, 95% CI [0.804, 1.031]. For category 2 ("1–13 days when mental health was not good") the results were OR = 0.911, $p = < 0.001$, 95% CI

[0.804, 1.031]; and for category 3 ("14+ days when mental health was not good") the results were OR = 0.679, p = < 0.001, 95% CI [0.591, 0.782] at the α = 0.05 level of significance. The analysis for the education covariate had four values and was compared against the category "Did not graduate high school" (coded as 1 in the BRFSS dataset). The results were: value 2 ("Graduated high school"), OR = 0.851, p = 0.006, 95% CI [0.708, 1.024]; value 3 ("Attended college or technical school"), OR = 0.729, p = 0.006, 95% CI [0.604, 0.880]; value 4 ("Graduated from college or technical school"), OR = 0.781, p = 0.006, 95% CI [0653, 0.934]. Compared to the number of cisgender women of color (14,275, 14,593, and 17,267, respectively) that responded to the survey, the results are consistent, and the OR is statistically significant at the α = 0.05 level of significance.

The analysis for language had two values and was compared against the category "English" (coded as 1 in the BRFSS dataset). For value 2 ("Spanish") the results showed to be statistically significant (OR = 0.847, p = 0.045, 95% CI [0.721, 0.996]). The analysis for age had six values and was compared against "18–24" (coded as 1 in the BRFSS dataset). The results were: value 2 ("25–34"), OR = 0.380, p = < 0.001, 95% CI [0.320, 0.451]; value 3 ("35–44"), OR = 0.332, p = < 0.001, 95% CI [0.279, 0.396]; value 4 ("45–54"), OR = 0.455, p = < 0.001, 95% CI [0.378, 0.547]; value 5 ("55–64"), OR = 0.767, p = < 0.001, 95% CI [0.636, 0.925]; value 6 ("65+"), OR = 0.697, p = < 0.001, 95% CI [0.490, 0.992]. The complex samples analysis results showed the OR to be statistically significant at the α = 0.05 level of significance. Furthermore, this is consistent with the number of participants that answered the survey (2 = 8,537, 3 = 9,530, 4 = 9,105, 5 = 9,027, and 6 = 12,385).

Table 10

Sociodemographic Factor Tables for Cisgender Women of Color

NonTransWomenColor	Frequency	Weighted Frequency	Percent (%)
Sex at birth			
(SEX)			
Female	53358	50462147	100.0
Total	53358	50462147	100.0
Race & Ethnicity			
American Indian / Alaska Native only	3718	1285055	7.0
Asian American only	4936	6982052	9.3
Black / African American only	18058	16449990	33.8
Hispanic / Latina	19603	23061283	36.7
Native Hawaiian / Pacific Islander only	1079	235706	2.0
Multiracial only	4372	1765926	8.2
Other race only	1592	682135	3.0
Total	53358	50462147	100.0
Smoking (RFSMOK3)			
Yes	6160	4501671	11.5
No	43816	42233976	82.1
Don't know/Not sure, Refused or Missing	3382	3726499	6.3
Total	53358	50462147	100.0
HIV Testing (HIV_AID)			
Yes	21819	21377138	40.1
No	31539	29085009	59.1
Total	53358	50462147	100.0
Healthcare coverage (HCVU651)			
Have healthcare coverage	33088	33591745	62.0
Do not have healthcare coverage	6936	8687198	13.0
Don't know/Not sure, Refused or Missing	13334	8183204	25.0
Total	53358	50462147	100.0
Mental health status (MENT14D)			
Zero days when mental health not good	31614	29213744	59.2
1-13 days when mental not good	12436	12785900	23.3
14+ days when mental health not good	8079	7283111	15.1
Don't know/Not sure, Refused or Missing	1229	1179392	2.3
Total	53358	50462147	100.0
Education (EDUCAG)			
Did not graduate HS	6986	10297066	13.1
Graduated HS	14275	12774452	27.0
Attended college or technical school	14593	14305479	27.3
Graduated college or technical school	17267	12904197	32.4
Don't know/Not sure, Refused or Missing	237	180952	0.44
Total	53358	50462147	100.0
Language (QSTLANG)			
English	45384	41581313	85.1
Spanish	7974	8880834	15.0
Don't know/Not sure, Refused or Missing	0		
Total	53358	50462147	100.0
Age (AGE_G)			
18 to 24	4774	7516997	9.0
25 to 34	8537	10582842	16.0
35 to 44	9530	100003866	18.0
45 to 54	9105	8251403	17.1
55 to 64	9027	6794581	17.0
65 and older	12385	7312458	23.2
Total	53358	50462147	100.0

Note. N = 53,358.

Figure 9

Cisgender Women of Color Age of Participants
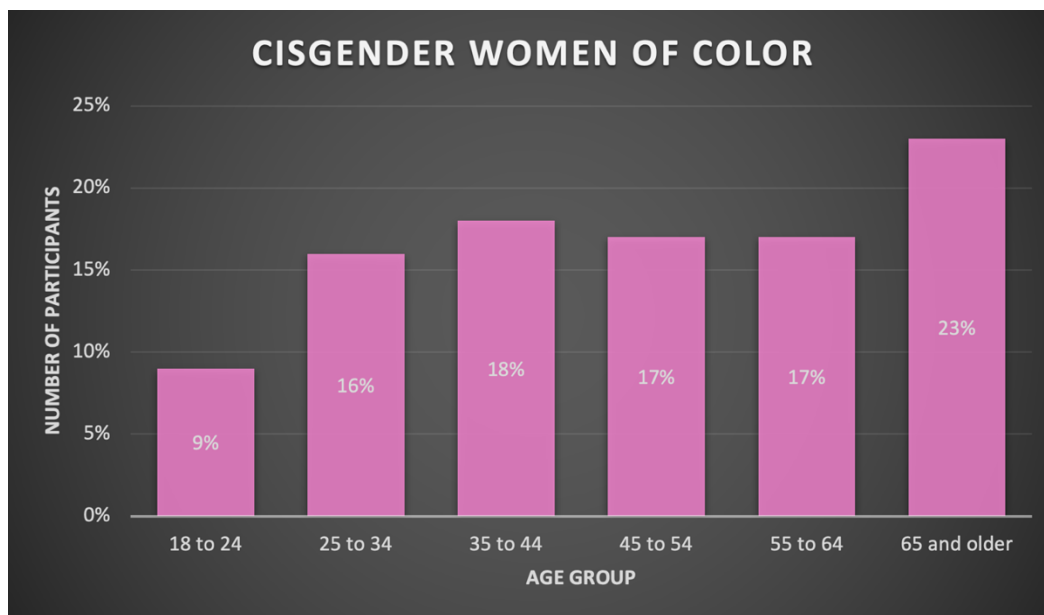
Note. N = 53,358. Frequency graph for cisgender women of color.

Table 11

Complex Samples Logistic Regression for Cisgender Women of Color

(NonTransWomenColor) (N = 53,358)

Tests of Model Effects				
Source	F test (df1)	F test (df2)	Wald F	Sig.
Smoking (RFSMOK3)	1.000	235461.000	43.078	<.001
Mental health status (MENT14D)	2.000	235460.000	14.683	<.001
Education (EDUCAG)	3.000	235459.000	4.127	.006
Language (QSTLANG)	1.000	235461.000	4.023	.045
Age (AGE_G)	4.000	235458.000	55.808	<.001

*$p < .05$

Table 12

Complex Samples Logistic Regression for Cisgender Women of Color

(NonTransWomenColor) (N = 53,358)

			Odds Ratio	95% Confidence Interval	
				Lower	Upper
Smoking (RFSMOK3)	*1 = No				
	2 = Yes	2 vs. 1	.572	.484	.676
Mental health status (MENT14D)	*1 = zero days mental health not good				
	2 = 1-13 days when mental health not good	2 vs. 1	.911	.804	1.031
	3 = 14+ days when mental health not good	3 vs. 1	.679	.591	.782
Education (EDUCAG)	*1 = Did not graduate High School				
	2 = Graduated High School	2 vs. 1	.851	.708	1.024
	3 = Attended College or Technical School	3 vs. 1	.729	.604	.880
	4 = Graduated from College or Technical School	4 vs. 1	.781	.653	.934
Language (QSTLANG)	*1 = English				
	2 = Spanish	2 vs. 1	.847	.721	.996
Age (AGE_G)	*1 = 18 to 24				
	2 = 25 to 34	2 vs. 1	.380	.320	.451
	3 = 35 to 44	3 vs. 1	.332	.279	.396
	4 = 45 to 54	4 vs. 1	.455	.378	.547
	5 = 55 to 64	5 vs. 1	.767	.636	.925
	6 = 65 or older	6 vs. 1	.697	.490	.992

Note. The reference category is: *1.

RQ3

A complex samples logistic regression analysis was conducted to find if there is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status among transgender women of color compared to cisgender women of color.

The results were calculated from the complex samples logistic regression analysis with HIV testing as the dependent variable; transgender women of color and smoking as the independent variables; and sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status as the control variables.

The analysis showed no association between smoking and the likelihood of HIV testing for transgender women of color compared to cisgender women of color. The analysis results also showed that transgender women of color over 45 years old with OR $= 12.769$, $p = 0.004$ (95% CI [2.150, 75.831]) are more likely to get tested for HIV than younger transgender women of color at the 5% ($p \leq 0.05$) level of significance. That does not mean that smoking was not statistically significant for transgender women of color. However, it is likely that we do not have the statistical power, with only 171 subjects, to detect a difference should one exist. There is an association between smoking and HIV testing for transgender women of color when compared to cisgender women of color. In contrast, the analysis results showed to be statistically significant across most of the variables for cisgender women of color at the $\alpha = 0.05$ level of significance. Except for healthcare coverage, in which the covariate results were not statistically significant: OR $= 1.152$, $p = < 0.001$ (95% CI [0.994, 1.336]).

Table 13

Sociodemographic Factor Table for Transgender Women of Color (N = 171) *and*

Cisgender Women of Color (N = 53,358)

Trans Women Color	Frequency	Weighted Frequency	Percent	NonTrans Women Color	Frequency	Weighted Frequency	Percent (%)
Sex at birth (SEX)				Sex at birth SEX)			
Female	171	276890	100%	Female	53358	50462147	100.0
Total	171	276890	100%	Total	53358	50462147	100.0
Race & Ethnicity (RACE)				Race & Ethnicity			
American Indian/ Alaska Native only	7	1896	4.1%	American Indian / Alaska Native only	3718	1285055	7.0
Asian American only	25	86243	14.6%	Asian American only	4936	6982052	9.3
Black / African American only	24	31626	14.0%	Black / African American only	18058	16449990	33.8
Hispanic / Latina	69	124070	40.0%	Hispanic / Latina	19603	23061283	36.7
Native Hawaiian / Pacific Islander only	11	2450	6.4%	Native Hawaiian / Pacific Islander only	1079	235706	2.0
Multiracial only	32	30155	18.2%	Multiracial only	4372	1765926	8.2
Other Race only	3	448.84097	1.7%	Other race only	1592	682135	3.0
Total	171	276890	100%	Total	53358	50462147	100.0
Smoking (RFSMOK3)				Smoking (RFSMOK3)			
Yes	31	20802	18.1%	Yes	6160	4501671	11.5
No	124	171146	72.5%	No	43816	42233976	82.1
Don't know/Not sure, Refused or Missing	16	84941	9.4%	Don't know/Not sure, Refused or Missing	3382	3726499	6.3
Total	171	276890	100%	Total	53358	50462147	100.0
HIV Testing (HIV_AID)				HIV Testing (HIV_AID)			
Yes	72	100775	42.1%	Yes	21819	21377138	40.1
No	99	176115	57.9%	No	31539	29085009	59.1
Total	171	276890	100%	Total	53358	50462147	100.0
Healthcare coverage (HCVU651)				Healthcare coverage (HCVU651)			
Have healthcare coverage	106	206254	62.0%	Have healthcare coverage	33088	33591745	62.0
Do not have healthcare coverage	35	56309	20.5%	Do not have healthcare coverage	6936	8687198	13.0
Don't know/Not sure, Refused or Missing	30	14327	17.5%	Don't know/Not sure, Refused or Missing	13334	8183204	25.0
Total	171	276890	100%	Total	53358	50462147	100.0
Mental health status (MENT14D)				Mental health status (MENT14D)			
Zero days when mental health not good	66	118367	38.6%	Zero days when mental health not good	31614	29213744	59.2
1-13 days when mental not good	47	52574	27.5%	1-13 days when mental not good	12436	12785900	23.3
14+ days when mental health not good	57	105882	33.3%	14+ days when mental health not good	8079	7283111	15.1
Don't know/Not sure, Refused or Missing	1	67.74232	0.6%	Don't know/Not sure, Refused or Missing	1229	1179392	2.3
Total	171	276890		Total	53358	50462147	100.0

Trans Women Color	Frequency	Weighted Frequency	Percent	NonTrans Women Color	Frequency	Weighted Frequency	Percent (%)
Education (EDUCAG)				Education (EDUCAG)			
Did not graduate HS	35	106642	20.5%	Did not graduate HS	6986	10297066	13.1
Graduated HS	50	74930	29.2%	Graduated HS	14275	12774452	27.0
Attended college or technical school	45	62954	26.3%	Attended college or technical school	14593	14305479	27.3
Graduated college or technical school	39	30931	22.8%	Graduated college or technical school	17267	12904197	32.4
Don't know/Not sure, Refused or Missing	2	1433	1.2%	Don't know/Not sure, Refused or Missing	237	180952	0.44
Total	171	276890	100%	Total	53358	50462147	100.0
Language (QSTLANG)				Language (QSTLANG)			
English	154	233750	90.1%	English	45384	41581313	85.1
Spanish	17	43141	9.9%	Spanish	7974	8880834	15.0
Don't know/Not sure, Refused or Missing	0			Don't know/Not sure, Refused or Missing	0		
Total	171	276890	100%	Total	53358	50462147	100.0
Age (AGE_G)				Age (AGE_G)			
18 to 24	48	85291	28.1%	18 to 24	4774	7516997	9.0
25 to 34	39	43782	22.8%	25 to 34	8537	10582842	16.0
35 to 44	28	29267	16.4%	35 to 44	9530	100003866	18.0
45 to 54	19	19156	11.1%	45 to 54	9105	8251403	17.1
55 to 64	12	89596	7.0%	55 to 64	9027	6794581	17.0
65 and older	25	9798	14.6%	65 and older	12385	7312458	23.2
Total	171	276890	100%	Total	53358	50462147	100.0

Note. Transgender woment of color ($N = 171$); Cisgender women of color ($N = 53,358$)

Table 14

Complex Samples Logistic Regression for Women of Color (WomenColor)(N = 53,529)

Tests of Model Effects				
Source	*F* test (df1)	*F* test (df2)	Wald F	Sig.
Smoking (RFSMOK3)	2.000	400356.000	178.154	.000
Mental health status (MENT14D)	3.000	400355.000	11.458	<.001
Healthcare coverage (HCVU651)	2.000	400356.000	15.923	<.001
Educatioin (EDUCAG)	4.000	400354.000	4.256	.002
Language (QSTLANG)	1.000	400357.000	3.485	.062
Age (AGE_G)	5.000	400353.000	47.531	.000

*$p < .05$

Table 15

Complex Samples Logistic Regression

Transgender Women of Color (*N* = 171)			Odds Ratio	Sig.	95% Confidence Interval	
					Lower	Upper
Smoking	*1 = No			.000		
(RFSMOK3)	2 = Yes	2 vs. 1	.496		.014	17.102
Mental health status	*1 = zero days mental health not good					
(MENT14D)	2 = 1-13 days when mental health not good	2 vs. 1	.882		.882	.882
	3 = 14+ days when mental health not good	3 vs. 1	.902		.902	.902
Healthcare coverage	*1 = Have healthcare coverage			.085		
(HCVU651)	2 = Do not have healthcare coverage	2 vs. 1	.605		.114	3.212
Education	*1 = Did not graduate High School			.154		
(EDUCAG)	2 = Graduated High School	2 vs. 1	1.211		.172	8.519
	3 = Attended College or Technical School	3 vs. 1	.330		.055	1.965
	4 = Graduated from College or Technical School	4 vs. 1	.593		.675	4.683
Language	*1 = English			.195		
(QSTLANG)	2 = Spanish	2 vs. 1	3.946		.496	31.422
Age	*1 = 18 to 24			.005		
(AGE_G)	2 = 25 to 34	2 vs. 1	.998		.221	4.503
	3 = 35 to 44	3 vs. 1	.781		.164	3.715
	4 = 45 to 54	4 vs. 1	12.769		2.150	75.831
	5 = 55 to 64	5 vs. 1	102.593		11.559	910.530
	6 = 65 or older	6 vs. 1	8.628		1.079	68.955
Cisgender Women of Color (*N* = 53,358)			Odds Ratio	Sig.	95% Confidence Interval	
					Lower	Upper
Smoking	*1 = No			<.001		
(RFSMOK3)	2 = Yes	2 vs. 1	.572		.484	.676
Mental health status	*1 = zero days mental health not good			<.001		
(MENT14D)	2 = 1-13 days when mental health not good	2 vs. 1	.911		.804	1.031
	3 = 14+ days when mental health not good	3 vs. 1	.679		.591	.782
Healthcare coverage	*1 = Have healthcare coverage			0.60		
(HCVU651)	2 = Do not have healthcare coverage	2 vs. 1	1.152		.994	1.336
Education	*1 = Did not graduate High School			.006		
(EDUCAG)	2 = Graduated High School	2 vs. 1	.851		.708	1.024
	3 = Attended College or Technical School	3 vs. 1	.729		.604	.880
	4 = Graduated from College or Technical School	4 vs. 1	.781		.653	.934
Language	*1 = English			.045		
(QSTLANG)	2 = Spanish	2 vs. 1	.847		.721	.996
Age	*1 = 18 to 24			<.001		
(AGE_G)	2 = 25 to 34	2 vs. 1	.380		.320	.451
	3 = 35 to 44	3 vs. 1	.332		.279	.396
	4 = 45 to 54	4 vs. 1	.455		.378	.547
	5 = 55 to 64	5 vs. 1	.767		.636	.925
	6 = 65 or older	6 vs. 1	.697		.490	.992

Note. The reference category is: *1.

Summary

A complex sample logistic regression analysis was conducted to analyze the variables and answer all three research questions. The RQ1 results failed to reject the null hypothesis. The results showed no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color. For RQ2, however, the results showed that the alternate hypothesis was accepted. There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for cisgender women of color. Although no association was found between smoking and the likelihood of HIV testing for transgender women of color compared to cisgender women of color, it is important to note that the statistical power had only 171 subjects with which to detect a difference should one exist.

In Section 4, I will present the research study findings about the theoretical frameworks, the study's limitations, and the implications and recommendations this research study can have for public health practice, social change, and future research studies.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

This quantitative cross-sectional research study aimed to determine if there is an association between smoking among transgender women of color and the likelihood of HIV testing compared to cisgender women of color. This study is essential because only a few studies have examined smoking while controlling for sociodemographic factors (age, education, language, race/ethnicity), healthcare coverage, and mental health status (James et al., 2017). In addition, no previous research has examined how these variables impact the likelihood of HIV testing among transgender women of color compared to cisgender women of color.

This quantitative cross-sectional research study used data from the CDC 2020 BRFSS survey. The BRFSS is one of the country's most comprehensive national data repositories. It is also one of the few nationally recognized surveys that collect data on transgender people (CDC, 2021f). For the 2020 BRFSS survey, 171 participants identified as transgender women of color. G power analysis indicated a minimum sample size of 87 participants to obtain 80% power at the $\alpha = 0.05$ level of significance. The data set was analyzed using complex samples logistic regression analysis, looking at the independent variables of smoking in two populations, transgender women of color and cisgender women of color. The dependent variable is HIV testing, and the control variables are sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color compared to cisgender women of color.

Summary of Key Findings

The complex sample logistic regression analysis failed to reject the null hypothesis. Results showed no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color. However, the analysis did show age to be statistically significant. Transgender women of color over 45 years old with $OR = 12.769$, $p = .004$ (95% CI: 2.150, 75.831) are more likely to get tested for HIV than younger transgender women of color. For Research Question 2, however, results showed that the alternate hypothesis was accepted. There is an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity) and mental health status for cisgender women of color. These findings do not mean that smoking was not statistically significant for transgender women of color; rather, it is more likely that there was not enough statistical power with only 171 subjects to detect a difference should one exist. There is an association between smoking and HIV testing for transgender women of color when compared to cisgender women of color.

Interpretation of the Findings

It is well documented that transgender women of color face gender identity discrimination, social stigma, low socioeconomic status, homelessness, alcohol and substance abuse, smoking, inadequate access to healthcare services, and mental health issues at higher rates than other groups (Gonzalez et al., 2017; LaMartine et al., 2020; Smart et al., 2020; Pitasi et al., 2019; Ryan, 2020). Studies on transgender women of

color have shown that the inequalities and discriminatory practices they suffer can push

them into engaging in sex work and other risky behaviors to earn a living, which exposes

them to a higher HIV risk (Nuttbrock & Hwahng, 2017; Reback et al., 2019). However,

some of the findings are incongruent with the literature review research. For example,

72% of transgender women of color reported being non-smokers, whereas almost 39%

reported having *Zero days in which their mental health was not good.* In contrast,

previous studies found that smoking behaviors among transgender women of color are

higher than among cisgender women of color (Buchting et al., 2017; Culbreth et al.,

2022; Tan et al., 2021). Menino et al. (2018) and Tan et al. (2021) reported that stressors

like depression, discrimination, and IPV impacting transgender women of color could

hinder their chances of quitting smoking. Moreover, researchers agreed that the

behavioral factors influencing the high smoking rates among transgender women of color

are the same worldwide (Castaldelli et al., 2021).

Looking at HIV testing, the results aligned with previous findings; the complex

samples logistic regression analysis showed that almost 58% of transgender women of

color have not been tested for HIV. According to Pitasi et al. (2020), despite this

population's high HIV incidence rate, the HIV testing rate among transgender women of

color remains low. In 2019, only 1 in 10 transgender women was tested for HIV. Most

cases happened among Black/African American transgender women. A study by Bass et

al. (2022) found that HIV prevalence was highest among Black/African American

(44.2%) and Hispanic/Latina transgender women (25.8%), compared to White

transgender women (6.7%). The analysis also showed 62% of transgender women of

color had healthcare coverage in 2020. However, external factors like assault, displacement, gender, and racial discrimination, IPV, mistreatment by healthcare providers, sex work, stigma and violence preclude them from getting tested for HIV (Bukowski et al., 2018; Pitasi et al., 2020).

Interpretation of Findings According to the Theoretical Framework

The Social-Ecological Model

The MSEM is framed around five areas of HIV infection risk: individual, network, community, policy, and the stage of the HIV epidemic (Baral et al., 2013). According to Baral et al. (2013), a successful HIV prevention program requires a targeted method beyond the old one-size-fits-all approach. The study findings showed that transgender women of color over the age of 45 years old are more likely to get tested for HIV than the younger age groups. The findings also aligned with the results for HIV testing; almost 58% of transgender women of color reported never being tested for HIV. These results agreed with previous studies—transgender women of color mistrust of the healthcare system due to negative experiences with healthcare providers. This also validates the high HIV incidence rate among this population due to a lack of testing and awareness of HIV status, even when 62% of participants reported having healthcare coverage. For example, transgender women of color living outside large cities are more likely to experience discrimination and be refused healthcare treatment because those institutions do not service transgender patients (Garcia & Crosby, 2020). Other factors potentially impacting HIV testing rates among this population are that PrEP use is still significantly low for transgender women of color compared to other groups (Shover et

al., 2018) and the difficulty they face accessing targeted prevention programs due to gender misclassification (Bass et al., 2022; Lippman, 2016).

The Minority Stress Model

The minority stress model refers to the increased stress and pressures caused by heterosexism; groups in the majority can exert these pressures on sexual minority individuals, causing them to suffer discrimination, stigma, and violence that can lead to poor health outcomes and mental health illnesses (e.g., depression and thoughts of suicide) (Velez et al., 2022). The model also explains how gender minorities like transgender women of color experiencing these feelings can also lead them to experiencing poor mental and physical health outcomes (Buchting et al., 2017). Culbreth et al. (2022) and Tan et al. (2021) reported that smoking behaviors among transgender women of color are higher than among cisgender women of color. Menino et al. (2018) and Tan et al. also reported that stressors like depression, discrimination, and IPV impacting transgender women of color could hinder their chances of quitting smoking. However, the research study findings contradict these study results; almost 73% of transgender women of color reported being a non-smoker.

Other areas in which the minority stress model can manifest are in accessing healthcare and mental health services (Sha et al., 2021). These stressors can also deter transgender women of color suffering from poor HIV outcomes, including a lack of HIV testing (Sarno et al., 2022). The study findings align with the model; despite the fact that 62% of participants reported having healthcare coverage and 39% reported having "Zero days in which their mental health was not good," the analysis found to be not statistically

significant for healthcare coverage and mental health status, did not produce statistically significant results.

Limitations of the Study

The CDC BRFSS is one of the most comprehensive surveillance surveys in the nation and one of the few tools that collects data on transgender people. However, a few limitations were encountered while using the survey that changed the focus of the research study. One of the limitations of using the BRFSS survey is that for the 2020 survey, only 32 states and D.C. reported data on transgender people, including people who identified as transgender women. Also, people of Arab or Middle-Eastern descent are categorized within the White race.These factors could have potentially impacted both the number of participants who answered the survey and the overall analysis. Another limitation of the research study was how some surveyors classified transgender women as MSMs due to the sound of their voices, instead of properly asking them to identify their gender. Although the BRFSS survey collects information on HIV testing, it does not collect information on HIV test results. This setback caused a change in focus on the dependent variable from HIV risk to HIV testing to allow using the dataset for analysis. In addition, the social support variable, intended to be one of the independent variables, had to be removed from the research study because the survey does not ask this question. However, data show the importance and the positive effects on their well-being of transgender women of color having social support. Also, the literature review revealed that research into tobacco use trends and behaviors among transgender women of color is limited (Buchting et al., 2017).

Recommendations

This research focused on transgender women of color and smoking and their likelihood of HIV testing. A complex samples logistic regression analysis was conducted analyzing the responses of 171 transgender women of color. Findings showed that only age was statistically significant, indicating that transgender women of color over the age of 45 are more likely to get tested for HIV. However, the results for smoking, mental health status, healthcare coverage, and other sociodemographic factors (education and language, and race/ethnicity) were found to be not statistically significant.

One recommendation is to increase the number of participants to obtain a higher sample size. The study could be replicated as a mixed-methods study instead of relying only on quantitative analysis. If a quantitative study were to be conducted using the same variables as the current study—smoking, healthcare coverage, mental health, and sociodemographic factors (age, education, language, and race/ethnicity)—and adding alcohol consumption and illicit drug use. And a qualitative study including social support, healthcare professionals' behavior, and HIV risk as variables, the information would help to deepen the understanding of the health disparities and inequities impacting the health and livelihoods of transgender women of color in the United States.

Another recommendation is to partner with community leaders to engage transgender women of color in data collection efforts. Inviting transgender women of color to the table at the early stages of the project and including them in campaign and initiative development processes would foster understanding of their culture and

traditions, their diversity, language, and other customs. For example, for transgender women who are members of an AI/AN tribal community, it is imperative first to recognize their tribe's sovereignty and to respect their ways and protocols of engaging with tribal communities before trying to reach participants.

Also, establishing a two-step identification system to distinguish their sex at birth from the gender they currently identify with could avoid mistaking transgender women for MSMs; it could also help to increase participation (Sha & Compton, 2021). Increasing outreach efforts to include transgender women of color and their partners in clinical trials and public health surveillance. A study by Frank et al. (2023) also recommended adapting research protocols designed for cisgender people to make them more inclusive and increase transgender women of color participation in clinical trials. This inequity creates barriers that prevent this vulnerable population from accessing adequate and basic services like healthcare and mental health services, and prevention services, to name but a few. It also creates a funding dilemma because money is not allocated adequately and, due to data misinformation, does not reach this population.

Transgender women of color's smoking rate is more than twice that of other groups. This is due in part to the active marketing tobacco companies engage in around this group; they make tobacco products easily accessible at the places transgender women of color mostly gather (clubs, pride festivals, etc.). A third recommendation would be to outreach at the same places where the tobacco companies target transgender women of color, to counter these tobacco marketing efforts with prevention strategies like access to

tobacco cessation programs. A fourth and related recommendation would be to support legislation to increase funding for tobacco cessation programs targeted at this group.

Implications for Professional Practice and Social Change

Researchers have explained that transgender women of color get tested by necessity instead of as a preventive method. These findings suggest an opportunity to develop a more targeted approach that is culturally appropriate and tailored to transgender women of color. For example, messages need to focus specifically on the various age groups, find them in the areas where they live, and use their preferred language. To help decrease the high incidence of HIV infection among this population, and to help increase the HIV testing rate across all ages, it is very important to meet them where they are, rather than expecting them to come to the testing centers. In the past few years, HIV incidence among cisgender women of color has been decreasing (CDC, 2022b), so a fifth recommendation is to expand the collection of data on transgender people to cover all 50 states, D.C. and all three U.S. territories. This effort would increase the number of survey participants and improve the quality of the data gathered about this population. This information would help add to the understanding of the health, needs, and risks impacting transgender women of color.

In the survey, 62% of transgender women of color reported having healthcare coverage. However, transgender women of color also reported having had a negative experience at healthcare clinics, being the victim of mistreatment, prejudice, and stigma at the hands of medical doctors and their staff; these experiences deter them from seeking medical care. A sixth recommendation would be to implement a curriculum on

transgender health and gender-affirming education at medical schools and other

healthcare professional schools (e.g., physician assistants, nurses, public health

programs). Data show the positive impact on transgender people when they receive care

from a medical doctor trained to care for them. However, it is important to provide

gender-affirming training on an ongoing basis beyond the academic setting. Creating an

inclusive and gender-affirming environment at the clinics and offices where transgender

patients can feel comfortable and seen could increase adherence to prevention practices.

This could potentially decrease the HIV risk burden impacting this population.

Community-based organizations (CBOs) focusing on HIV prevention programs

should engage transgender women of color in the prevention program process, to help

improve the prevention efforts and increase the chances of positive outcomes. They also

must implement a multifaceted approach to HIV prevention and smoking cessation

programs that includes healthcare, mental health services, and social services, and

support. It would also be critical to include their partners in the process, to move the

needle forward in decreasing the HIV incidence rate among this population. In 2019, the

CDC released a Toolkit for providing HIV prevention to transgender women of color.

The toolkit focuses on best practices and recommendations for CBOs to improve HIV

prevention and address other social factors (e.g., social support and socioeconomic

factors) that impact their overall well-being. Although the toolkit provides helpful

information to CBOs to target transgender women of color, the CDC does not offer grant

funding opportunities for CBOs to implement these recommendations adequately. A

seventh recommendation would be for the CDC to increase grant funding opportunities.

A final recommendation would be for government agencies like HRSA to expand the funding for and alocation of the Transgender Women of Color Initiative: Projects and Interventions Manual. In 2012, HRSA funded nine programs across four U.S. cities that focused only on this population and the HIV disparities impacting them. Unfortunately, HRSA has not reauthorized the program; instead, funding has been included under programs that provide services to other LGBTQ+ groups.

This research study used two theoretical frameworks (the social-ecological model and the minority stress model) to help explained the findings and the internal and external influences that informed the behavior of transgender women of color. Transgender women of color are born male and transition to female. The life path transgender women followed to transition is more complex and cumbersome than cisgender women of color (people who identified with their sex at birth). Conducting research studies with two theoretical frameworks instead of one to make the research study more robust in relation to explaining the complexities, health disparities, and inequities surrounding and affecting transgender women of color's mental and physical health and their environment.

Around the world and in the United States, the incidence of HIV infection among transgender women is 64 to 49 times higher, respectively, compared to any adult of any race and ethnicity and gender identity. Although HIV infection is preventable, transgender women of color face discrimination, stigma, victimization, and lack of social support that have alienated them from family, friends, and, in some instances, society. Transgender women of color are thus more vulnerable to engaging in risky behaviors like sex work to make a living. Increasing access to mental health services; creating safe

spaces where they can feel comfortable, safe, and seen by healthcare professionals and their staff; and increasing education efforts for cisgender people to help them understand the differences and the similarities of transgender people could all potentially help to create a positive impact and encourage transgender women of color to feel accepted and included.

Addressing the health and social needs of transgender women of color is paramount to continue building a healthy and more robust nation for all community members. The inequities and disparities transgender women of color face, like homelessness, mental health issues, trauma (physical and psychological), stigma, societal inattention, and victimization, have contributed to their lack of economic opportunities, HIV disparities, and higher smoking rates. Acknowledging that we live as a society not in a silo but in a communal environment is one of the first steps toward helping transgender women of color feel a sense of integration into society; they will then feel less inclined to engage in sexually risky behaviors, therefore mitigating or even eliminating their chances of HIV infection. Until we learn to accept and embrace people's differences, strengths, and weaknesses, we cannot move toward building a stronger and more unified society.

Conclusion

For the past 2 decades, transgender women (male to female) of color have experienced a systematic increase in HIV incidence and prevalence (Hirshfield et al., 2019). In 2022, the CDC updated the statistics on new HIV diagnoses among transgender women. The significant changes in diagnoses happened among Black/African American and Hispanic/Latinas; the first group saw a 3% decrease from 49% the previous year to

46%. In comparison, Hispanic/Latinas experienced a 2% increase in HIV infection rate from 33% to 35%. The HIV infection rates of other racial and ethnic groups remained the same: AA 2%, AI/AN 1%, NH/PI 1%, and Multiracial 2% (CDC, 2022c). The prevalence of smoking among transgender women of color has been associated with increased mental health issues and substance abuse (Ryan, 2020).

This research study aimed to establish an association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status in adult transgender women of color compared to adult cisgender women of color. Secondary data was used to analyzed the 2020 BRFSS survey (CDC, 2021j). However, the complex sample logistic regression analysis results showed no association between smoking and the likelihood of HIV testing after controlling for sociodemographic factors (age, education, language, and race/ethnicity), healthcare coverage, and mental health status for transgender women of color. These results are partly due to the small sample size (n=171) used in the study. The research study results also showed the need to expand data collection on transgender people. In 2020, only 32 states, and D.C. reported information on transgender people, whereas data on cisgender people was collected from all 50 states, D.C. and all U.S. territories.

This research study's findings have helped to fill in some of the gaps in the literature; however, this population continues to be understudied, underrepresented, and stigmatized by society; living in the intersectionality of inequities and inequalities. The study results also underscored the need for further research, looking at the variables

discussed here while also adding others, such as acculturation, access to healthcare, alcohol consumption, illicit drug use, social support, and healthcare providers' behaviors and attitutedes to help build a complete narrative of the disparities and inequities suffered by transgender women of color. Further, this information would be helpful in informing public health professionals on how best to address these issues and build targeted programs that are culturally appropriate for this population. One way could be by integrating a holistic and gender specific approach to HIV prevention and testing, and implementing tobacco cessation programs that use psychosocial drivers to explain the complex nature of transgender women of color, rather than treating them as a one-size-fits-all group or using preventative methods that were developed for MSMs or cisgender women.

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Appendix: CDC Behavioral Risk Factor Surveillance System 2020 Codebook

Description of Variables

Table 6: Provides a summary of the CDC 2020 BRFSS variable tables.

Centers for Disease Control and Prevention. (2021j, August 27). *LLCP 2020 codebook report overall version data weighted with LLCPWT behavioral risk factor surveillance system* https://www.cdc.gov/brfss/annual_data/2020/pdf/codebook20_llcp-v2-508.pdf

Label: Do you consider yourself to be transgender?
Section Name: Sexual Orientation and Gender Identity (SOGI)
Module Number: 20
Question Number: 2
Column: 553
Type of Variable: Num
SAS Variable Name: TRNSGNDR
Question Prologue:
Question: Do you consider yourself to be transgender?   (If yes, ask "Do you consider yourself to be male-to-female, female-to-male, or gender non-conforming?)

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Yes, Transgender, male-to-female	372	0.15	0.17
2	Yes, Transgender, female to male	367	0.15	0.21
3	Yes, Transgender, gender nonconforming	278	0.12	0.16
4	No	235,887	98.28	98.12
7	Don't know/Not Sure	862	0.36	0.40
9	Refused	2,256	0.94	0.94
BLANK	Not asked or Missing	161,936	.	.

Label: Calculated sex variable
Section Name: Calculated Variables
Module Number: 8
Question Number: 11
Column: 1979
Type of Variable: Num
SAS Variable Name: _SEX
Question Prologue:
Question: Calculated sex variable

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Male Notes: BIRTHSEX=1 or BIRTHSEX not equal to (1,2) and SEXVAR=1	183,931	45.76	48.71
2	Female Notes: BIRTHSEX=2 or BIRTHSEX not equal to (1,2) and SEXVAR=2	218,027	54.24	51.29

Label: Current Smoking Calculated Variable
Section Name: Calculated Variables
Module Number: 10
Question Number: 2
Column: 2007
Type of Variable: Num
SAS Variable Name: _RFSMOK3
Question Prologue:
Question: Adults who are current smokers

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	No Notes: _SMOKER3 = 3 or 4	328,370	81.69	80.38
2	Yes Notes: _SMOKER3 = 1 or 2	52,488	13.06	13.33
9	Don't know/Refused/Missing Notes: _SMOKER3 = 9	21,100	5.25	6.30

Label: Ever been tested for HIV calculated variable
Section Name: Calculated Variables
Module Number: 18
Question Number: 1
Column: 2036
Type of Variable: Num
SAS Variable Name: _AIDTST4
Question Prologue:
Question: Adults who have ever been tested for HIV

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Yes Notes: HIVTST7 = 1	116,990	31.80	37.19
2	No Notes: HIVTST7 = 2	232,101	63.08	58.42
9	Don't know/Not Sure/Refused Notes: HIVTST7 = 7 or 9	18,830	5.12	4.40
BLANK	Not asked or missing Notes: HIVTST7 = Missing	34,037	.	.

Label: Imputed age in six groups
Section Name: Calculated Variables
Module Number: 8
Question Number: 15
Column: 1985
Type of Variable: Num
SAS Variable Name: _AGE_G
Question Prologue:
Question: Six-level imputed age category

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Age 18 to 24 Notes: 18 <= _IMPAGE <= 24	25,652	6.38	12.06
2	Age 25 to 34 Notes: 25 <= _IMPAGE <= 34	44,382	11.04	17.37
3	Age 35 to 44 Notes: 35 <= _IMPAGE <= 44	51,971	12.93	16.37
4	Age 45 to 54 Notes: 45 <= _IMPAGE <= 54	62,033	15.43	15.87
5	Age 55 to 64 Notes: 55 <= _IMPAGE <= 64	78,089	19.43	16.42
6	Age 65 or older Notes: _IMPAGE => 65	139,831	34.79	21.92

Label: Computed level of education completed categories
Section Name: Calculated Variables
Module Number: 8
Question Number: 23
Column: 2004
Type of Variable: Num
SAS Variable Name: _EDUCAG
Question Prologue:
Question: Level of education completed

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Did not graduate High School Notes: EDUCA = 1 or 2 or 3	26,248	6.53	12.45
2	Graduated High School Notes: EDUCA = 4	107,096	26.64	27.61
3	Attended College or Technical School Notes: EDUCA = 5	111,387	27.71	30.39
4	Graduated from College or Technical School Notes: EDUCA = 6	155,340	38.65	29.02
9	Don't know/Not sure/Missing Notes: EDUCA = 9 or Missing	1,887	0.47	0.52

Label: Language identifier
Section Name: Questionnaire Language
Module Number: 1
Question Number: 1
Column: 615-616
Type of Variable: Num
SAS Variable Name: QSTLANG
Question Prologue:
Question: Language identifier

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	English	387,478	96.40	93.38
2	Spanish	14,479	3.60	6.62
3 - 99	Other	1	0.00	0.00

Label: Computed Race-Ethnicity grouping
Section Name: Calculated Race Variables
Module Number: 8
Question Number: 7
Column: 1975
Type of Variable: Num
SAS Variable Name: _RACE
Question Prologue:
Question: Race/ethnicity categories

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	White only, non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 10	295,900	73.61	59.95
2	Black only, non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 20	30,130	7.50	11.64
3	American Indian or Alaskan Native only, Non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 33	6,813	1.69	0.97
4	Asian only, non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 40,41,42,43,44,45,46,47	10,138	2.52	5.59
5	Native Hawaiian or other Pacific Islander only, Non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 50,51,52,53,54	2,009	0.50	0.18
6	Other race only, non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 60	3,344	0.83	0.58
7	Multiracial, non-Hispanic Notes: _HISPANC = 2 and _MRACE1 = 77	8,314	2.07	1.28
8	Hispanic Notes: _HISPANC = 1	36,322	9.04	17.64
9	Don't know/Not sure/Refused Notes: _HISPANC = 7 or 9 or _MRACE1 = 77 or 99 and _HISPANC = 2	8,987	2.24	2.17
BLANK	Missing Notes: _HISPANC = Missing or _MRACE1 = Missing	1	.	.

Label: Respondents aged 18-64 with health care coverage
Section Name: Calculated Variables
Module Number: 3
Question Number: 1
Column: 1902
Type of Variable: Num
SAS Variable Name: _HCVU651
Question Prologue:
Question: Respondents aged 18-64 who have any form of health care coverage

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Have health care coverage Notes: 18 <= AGE <=64 and HLTHPLN1 = 1	223,524	55.61	64.21
2	Do not have health care coverage Notes: 18 <= AGE <=64 and HLTHPLN1 = 2	31,204	7.76	11.68
9	Don't know/Not Sure, Refused or Missing Notes: AGE > 64 or AGE = Missing or HLTHPLN1 = 7 or 9 or Missing	147,230	36.63	24.11

Label: Computed Mental Health Status
Section Name: Calculated Variables
Module Number: 2
Question Number: 2
Column: 1901
Type of Variable: Num
SAS Variable Name: _MENT14D
Question Prologue:
Question: 3 level not good mental health status: 0 days, 1-13 days, 14-30 days

Value	Value Label	Frequency	Percentage	Weighted Percentage
1	Zero days when mental health not good	255,707	63.62	61.15
2	1-13 days when mental health not good	89,979	22.39	23.66
3	14+ days when mental health not good	48,343	12.03	13.21
9	Don't know/Refused/Missing	7,929	1.97	1.99