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**Syndemic Pandemic:
COVID-19, HIV, and Antiretroviral Therapy Adherence Among Black/African Americans
in Atlanta**

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An abstract of a thesis
submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral, Social, and Health Education Sciences
2022

ABSTRACT

Syndemic Pandemic: COVID-19, HIV, and Antiretroviral Therapy Adherence Among Black/African Americans in Atlanta

By Lauren Nisotel

Introduction: The COVID-19 pandemic and its consequences pose a threat to optimal antiretroviral therapy (ART) adherence in underserved communities with HIV. The present sequential explanatory mixed methods study explored the impact of the pandemic on ART adherence among Black/African Americans (Black/AA) people with HIV (PWH) in Atlanta.

Methods: A total of 200 Black/AA PWH were recruited across three HIV clinics in Atlanta to complete a cross-sectional survey. Thirty-eight of these participants took part in either a focus group discussion or individual in-depth interview. Multivariable regression analysis was conducted on survey data prior to thematic analysis of the qualitative interview transcripts and triangulation of mixed methods data.

Results: Eighty percent of participants reported optimal (>95%) ART adherence across both Spring and Winter 2020. Multivariable logistic regression analysis revealed that optimal adherence to ART was significantly associated with housing stability, greater education attainment, and having a job that was not impacted by the COVID-19 pandemic. Qualitative findings complemented and enriched the quantitative results, providing insight into individual, social, and structural syndemic factors experienced among this sample. Participants cited overlap in discrimination and intersectional stigma experienced by people with COVID-19 and HIV.

Discussion: The impact of the COVID-19 pandemic on structural factors, such as housing stability, employment status, and access to transportation, pose a significant threat to optimal ART adherence among Black/AA PWH. These results have implications for researchers and policy makers. Future research that seeks to understand differential access to social and structural determinants of health in the Black/AA community should be prioritized. To this end, policy makers should advocate for social, structural, and economic justice for historically underserved communities.

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ACKNOWLEDGEMENTS

First and foremost, I would like to thank the participants who volunteered their time and effort to take part in this study. I would also like to extend gratitude to the clinic staff at Site-H, Site-L, and Site-E for their support with patient identification and study support. I especially would also like to thank my family and friends, near and far, who have supported and encouraged me through my academic and professional journey. Additionally, I want to acknowledge my incredible mentors who have offered guidance and advised me over the years. I am especially grateful to Dr. Robert Bednarczyk, Dr. Lisa Flowers, Prof. Claudia Ordóñez, and Dr. Kimbi Hagen for empowering and supporting me at every phase of this project. I would also like to extend immense gratitude to Krysta Medearis and Kelsy McIntosh for their support with data collection and analysis. An extra special thanks goes to Leisha McKinley-Beach for her expert HIV community consultancy and for supporting my education as a health equity researcher. Last but not least, I want to acknowledge Dr. Eric Nehl for his unwavering support throughout this project and my time at Rollins – I am grateful for the wisdom and guidance he has offered. This research was supported by a Synergy Research Award (PIs: Bednarczyk & Flowers) from the Woodruff Health Sciences Center and a Community-Engaged/Social Determinants of Health Research Thesis Award (PI: Nisotel) from the Emory Prevention Research Center.

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CHAPTER I: Introduction

Introduction

In March of 2020, the Centers for Disease Control and Prevention (CDC) signaled that people with HIV (PWH) may be at an increased risk for COVID-19 acquisition and severe disease, compared to the general population (CDC, 2020). The risk of this population is predicated on potential interactions between COVID-19, HIV, and other risk factors for COVID-19 complications, such as diabetes, hypertension, and cardiovascular disease, which are common among PWH, in addition to potential interference with HIV care and treatment, socio-structural barriers, such as stigma, structural violence, and discrimination often experienced by PWH (Shiau et al, 2020; CDC, 2019; Earnshaw et al, 2013). To understand the manifestation of COVID-19 in the lives of PWH, it must be viewed alongside HIV and other health conditions that already exist within this population.

The HIV epidemic in the United States has been characterized by ongoing health disparities. HIV disproportionately impacts people who are Black or Hispanic and live in the US South, as well as men who have sex with men (MSM), compared to the general population (Fields et al, 2021; CDC, 2020; Sullivan et al, 2021). In 2019, Black and/or African Americans (Black/AA) accounted for 42% (15,305) of new HIV diagnoses, while only accounting for 13% of the U.S. population (CDC, 2021). Black/AA account for more of the overall population of southern states than they do in any other parts of the U.S., with 31% of Georgia residents self-identifying as Black/AA (Sullivan et al, 2021).

Data from MSM also illustrate a geographic variation in HIV incidence, with rate ratios comparing Black/AA MSM to white MSM ranging from 2.4 to 10.1 by state, with the three

highest state-specific rates occurring in the South (Sullivan et al, 2021). This disproportionate burden among Black/AA affects both men and women in the U.S. South: in 2018, 38% of all new U.S. HIV diagnoses among MSM were among Black/AA, 63% of which occurred in the U.S. South. Similarly, 58% of all new HIV diagnoses among women were among Black/AA, 65% of which occurred in the U.S. South (Sullivan et al, 2021).

Black/AA have consistently shouldered the burden of HIV health disparities in the U.S., a result of unequal access to HIV prevention and treatment services (CDC, 2020). Despite decades of advancements in HIV care, race-related differences in HIV incidence, prevalence, morbidity, and mortality remain persistent among Black/AA (Fields et al, 2020). In 2018, the death rate for Black/AA with HIV was higher (16.3 per 100,000) compared to their non-Black/AA counterparts (2.5 per 100,000) (CDC, 2020). These health disparities are driven by gaps in health coverage, provider shortages, low levels of health literacy, high rates of sexually transmitted infections, and stigma associated with seeking HIV care and prevention services (Sullivan et al, 2021). Black/AA with HIV are less likely to be diagnosed, engaged in care, receive and adhere to antiretroviral treatment (ART), and be virally suppressed than their non-Black/AA counterparts (Storholm et al, 2019). It is well documented that use of ART prevents transmission of HIV and prolongs survival. To this end, access and adherence to ART are vital to HIV prevention and treatment for Black/AA with HIV.

Studies have found that Black/AA and Native American and Alaskan Native people are hospitalized for COVID-19 more than five times that of non-Hispanic white persons, suggesting that persons from minority groups are experiencing some of the greatest disparities related to COVID-19 (CDC, 2020). These higher rates are directly connected to systemic and structural racism and oppression, which are expressed through inequalities in living conditions, work

circumstances, insurance status, limited access to care, and higher rates of comorbidities that are known risk factors to severe COVID-19 illness. To this end, Black/AA with HIV are particularly vulnerable when considering the risk and impact of COVID-19.

Given their high vulnerability, there is a critical need to understand how COVID-19 has impacted Black/AA with HIV and their access to ART. Informed by Syndemic theory (Singer, 1994), the present study considers the impact of the COVID-19 pandemic on accessing and adhering to antiretroviral therapy among Black/AA with HIV living in Atlanta, Georgia.

Theoretical Framework

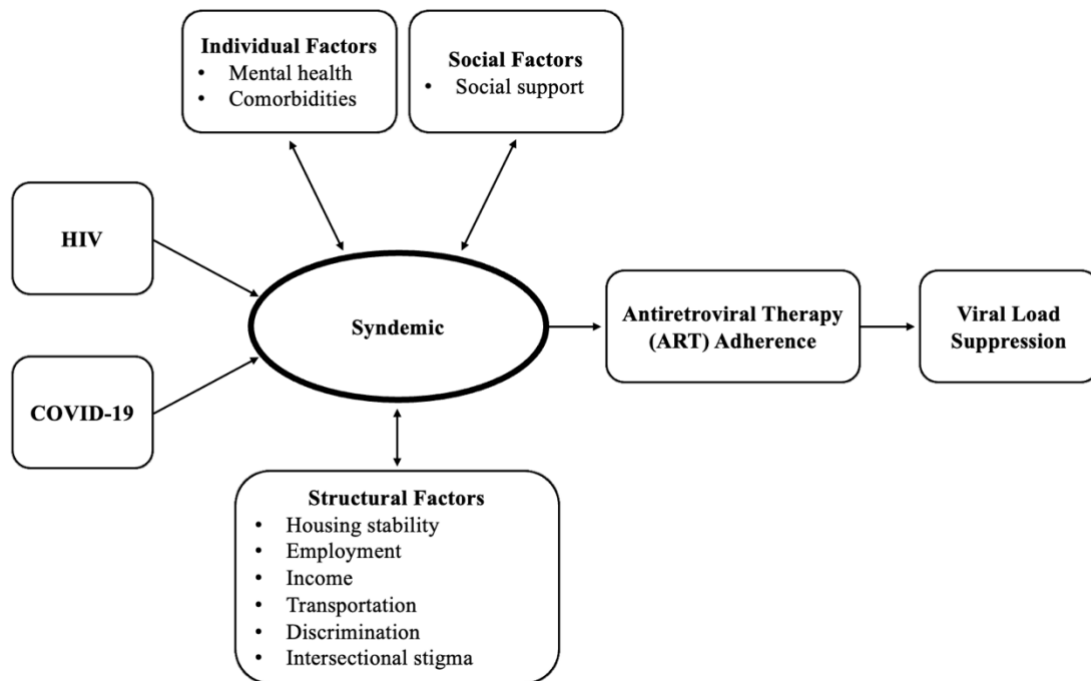
A syndemic is defined as two or more epidemics or diseases, interacting synergistically to contribute to an excess burden of disease in a population (Singer, 1994). Syndemic theory describes how individual epidemics are sustained in a population as a result of harmful social conditions (Singer, 1994; Singer & Clair, 2003; Singer et al, 2006; Singer, 2006). To this end, syndemic theory accounts for epidemics of both physiological (i.e., HIV/AIDS) and psychosociological (i.e., behavioral, social, and structural) conditions that contribute to the spread of disease (Wilson et al, 2014). Syndemic theory was first postulated in public health literature by anthropologist Merrill Singer. Singer highlighted the role of substance abuse, gang violence, and AIDS (SAVA) syndemic resulting in an intensified vulnerability to diminished health outcomes among the poor across the northeast United States (Singer, 1994). Singer found that components of the SAVA syndemic both reinforced one another and were intimately bound, suggesting that the successful reduction of one epidemic (i.e., HIV/AIDS), is dependent on the mitigation of other epidemics (i.e., substance abuse and gang violence) (Singer, 1994; Wilson et al, 2014).

Since its conception, syndemic theory has been widely applied to studies of the HIV epidemic to understand how psycho-societal and structural factors impact HIV treatment and health outcomes. While Singer's original SAVA syndemic model focused on substance abuse, violence, and AIDS, it has also been adapted and applied to study HIV health outcomes among racial and ethnic minority groups (Wilson et al, 2014; Quinn et al, 2018; Godley et al, 2020). Figure 1 describes the theoretical framework for this analysis, an adaptation of syndemic theory that incorporates relevant individual, social, and structural conditions in order to consider the various barriers and facilitators to ART adherence.

For the purposes of this study, COVID-19 is defined as (1) infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for COVID-19, and (2) the impact of a global pandemic on psychosocial and structural drivers of inequalities.

Singer's theory considers how diseases co-occur in particular geographical contexts due to harmful social conditions (disease concentration) and interact at the population and individual levels to mutually enhance injurious consequences for HIV (disease interaction) (Singer, 1994; Tsai & Venkataramani, 2016). Syndemic factors that have the potential to impact health outcomes can take the form of individual factors, such as age, genetics, mental health, and co-infections/morbidities, social factors, such as social support and networks, and structural factors, such as homelessness, stable employment, poverty, racism, and intersectional stigma. These individual, social, and structural factors interact with co-occurring epidemics and contribute to excess burden of disease, as well as negative health behaviors and subsequent suboptimal health outcomes (Singer, 2006).

Figure 1. Syndemic of COVID-19 and HIV on ART adherence: A Theoretical Framework
(adapted from: Singer, 2006)



The analytical framework in Figure 1 describes the specific individual, social, and structural factors that may take shape for PWH throughout the COVID-19 pandemic, including compromised mental health, social support, housing, employment, poverty, racism, and intersectional stigma. As displayed in the figure, co-occurring COVID-19 and HIV result in a syndemic, which influences the aforementioned individual, social, and structural factors. The resulting syndemic has an impact on ART adherence and viral load, or the amount of HIV detected in an individual's blood.

Syndemic theory has been widely applied to studies which investigate how a variety of factors influence ART adherence among HIV-positive men across various geographical contexts. Among studies with MSM, one 2019 study found that substance use dependence, and mental

health problems, particularly anxiety, were primary drivers of suboptimal ART adherence among HIV-positive heterosexual men. This study found that socio-structural factors, such as HIV-related stigma and social support are potential moderators of these drivers. Above all, this particular study found that Black/AA men reported lower ART adherence compared to other racial/ethnic groups, suggesting that socio-structural syndemic factors have the potential to significantly influence ART adherence (McMahon et al, 2019).

The association between syndemic conditions and ART adherence has been further explored across the HIV community to ascertain the discrete factors that influence adherence. One study observed that depression, post-traumatic stress disorder (PTSD), and stimulant use all significantly decreased ART adherence in a population of older HIV-positive MSM (Zepf et al, 2020). The presence of PTSD as a syndemic factor that significantly decreases ART adherence is particularly relevant, as researchers have sought to understand the role of racism, structural violence, and HIV among Black/AA in the United States during a time of racial reckoning (Godley et al, 2020).

Evidence shows that experiences of racism, discrimination, and minority stress play a significant role in mental and physical health and well-being, affecting Black/AA most critically (Godley et al, 2020). A qualitative study conducted in the Midwest U.S. explored syndemic factors that influence engagement in HIV care among Black men. This study found overlapping stigmas associated with race, gender, sexual orientation, HIV status, and other marginalized identities (Quinn et al, 2018). The intersection of race and HIV status were particularly evident among participant narratives, and often accompanied by depressive symptoms and avoidance behaviors (Quinn et al, 2018). Intersectional stigma is a concept used to characterize the convergence of multiple stigmatized identifies within a person or group, and to address their

joint effects on health and well-being (Bowleg, 2012). Findings from this study provide insight into how future opportunities should prioritize social and structural-level interventions to address syndemic conditions and the influence of stigma and poverty on engagement in HIV care.

Research is emerging on the potential syndemic conditions and perspectives of COVID-19 and HIV. Several commentaries have proposed systematic agendas for how multidisciplinary specialists should explore the syndemic factors that result from co-occurring COVID-19 and HIV (Shiau et al, 2020; Gesesew et al, 2021). At this time, research has only sought to characterize communities and populations that are most at-risk for syndemic conditions resulting from COVID-19 and HIV. Early insights support the case for more rigorous analyses that seek to ascertain the impact of COVID-19 and HIV syndemic conditions on health outcomes among racial and ethnic minority groups.

An explanatory sequential mixed-methods research design was selected to understand the impact of COVID-19 on ART adherence among Black/AA. A mixed-methods approach to this study allowed for considerations of both quantitative and qualitative perspectives, which are key to contextualizing patient experience in a meaningful way. While there are benefits and challenges to a mixed-methods research approach, a strength of this framework is that it allows for one approach to compliment the restrictions of another (Regnault, Willgoss & Barbic, 2018). This approach was most conducive to the proposed study, as it allowed for the research question to be studied from multiple perspectives, supporting meaningful interpretation of study outcomes from the patients' perspective. Particularly in research studies that seek to understand the experience of historically marginalized or underserved communities, it is paramount to incorporate the patient voices into the study findings.

There exists a gap in the mixed-methods literature which considers the degree to which the COVID-19 pandemic has impacted ART adherence among Black/AA with HIV. This study employed an explanatory sequential mixed-methods research design to capture multiple data sources in order to understand the full scope of impact. The first phase of this study collected survey data on COVID-19 knowledge, attitudes, and beliefs from 200 Black/AA with HIV in metro Atlanta. The second phase of this study included 5 focus group discussions and 15 individual in-depth interviews among 35 participants to further explore themes around COVID-19, HIV, and being part of the Black/AA community. Additionally, demographic and clinical outcomes data were extracted from medical records via chart review. Existing literature supports the use of a mixed-methods study design to understand ART adherence in this population, as there is a need to ascertain the various social and structural conditions that have an impact on medication taking behaviors. Thus, the aim of this study was to investigate how individual, social, and structural factors, such as poverty, racism, and intersectional stigma influence adherence to ART and viral load suppression.

Research Question

This research aims to answer the following research question: In what ways has the COVID-19 pandemic impacted adherence to ART among Black/AA with HIV?

The study addressed the following aims:

1. To assess the degree to which the COVID-19 pandemic interrupted adherence to antiretroviral therapy (ART).

2. To examine how individual, social, and structural syndemic conditions affect ART adherence.

Significance Statement

This project takes an innovative approach to mixed-methods analysis by using the syndemic framework to understand how individual, social, and structural syndemic factors interact and influence adherence to ART among Black/AA with HIV while experiencing the COVID-19 pandemic. By employing an explanatory sequential mixed-methods design, which included survey administration, followed by focus groups and individual in-depth interviews among patients seeking care across three HIV clinics in Atlanta, the study team was able to ascertain unique insights into the complex intersectionality of how both COVID-19 infection and the global pandemic have impacted the ability to access HIV care and treatment in this population. Furthermore, this study contributes to the growing body of public health research which recognizes the components of syndemic theory as drivers of health, social, and economic inequities, as well as providing evidence for research seeking to understand the impact of COVID-19 on ART adherence among Black/AA with HIV.

Numerous studies in public health and medical studies have sounded the alarm on how COVID-19 has disproportionately affected vulnerable populations across the United States (Shiau et al, 2020; Gesesew et al, 2021). However, akin to early studies exploring syndemic theory, most studies have focused on populations particularly at-risk for HIV and/or COVID-19, rather than people living with HIV (Rogers et al, 2021; Leddy et al, 2021). While these studies have been meaningful in understanding effective HIV risk mitigation practices for vulnerable

populations, there is a critical need to understand and adapt these practices to people living with HIV to prevent a sequelae of illness.

To date, the vast majority of studies seeking to understand COVID-19 focus on surveillance or the impact of COVID-19 on health outcomes within the general population. Relevant literature that seeks to understand the impact of COVID-19 on the Black community is currently limited to qualitative analyses, which focus on medical mistrust and vaccine hesitancy (Rhodes et al, 2021; Bogart et al, 2021). The recent emergence and rapidly evolving nature of COVID-19 is consistent with the current body of literature, which is developing. While likely ongoing, investigational research focusing discretely on how COVID-19 impacts people with HIV does not currently exist in the literature.

To this end, the present study is intentional about understanding how the individual, social, and structural syndemic factors, resulting from the co-occurrence of COVID-19 and HIV, intimately impact adherence to ART, as a health behavior. Furthermore, this framework assesses how syndemic factors influence health behaviors, such as ART adherence, and accounts for subsequent viral load, a biological indicator of controlled or uncontrolled HIV.

Definition Of Key Terms

ART: Antiretroviral Therapy - The daily use of a combination of HIV medicines (called an HIV regimen) to treat HIV infection. A person's initial HIV regimen generally includes three antiretroviral (ARV) drugs from at least two different HIV drug classes (National Institute of Health).

Black/AA: Descriptive term for a person who self-identifies as Black and/or African American.

COVID-19: An abbreviation for coronavirus disease-19, a highly contagious multi-system respiratory disease caused by the SARS-CoV-2 virus (CDC, 2020).

Intersectional Stigma: A concept that has emerged to characterize the convergence of multiple stigmatized identities within a person or group, and to address their joint effects on health and wellbeing (Bowleg et al, 2012).

PWH: Descriptive term for persons living with HIV disease (UNAIDS, 2018).

SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2, the virus that causes coronavirus disease 19 (COVID-19) (CDC, 2020).

Syndemic: Adversely interacting diseases and other health conditions that increase the illness burden of a population, commonly as a consequence of harmful social conditions that produce multiple disease clusters (Singer, 1994).

Viral Load: The amount of HIV in a sample of blood. Viral load is reported as the number of HIV RNA copies per milliliter of blood. An important goal of antiretroviral therapy (ART) is to suppress a person's viral load to an undetectable level—a level too low for the virus to be detected by a viral load test (National Institute of Health).

CHAPTER II: Review of the Literature

Introduction

The following chapter provides an overview of current research on adherence to ART among Black/AA with HIV, situated within the theoretical context of syndemic theory. A brief review of the theoretical framework upon which this study is grounded, followed by an overview of the scope of the problem of adherence to ART among Black/AA with HIV, as well as the impact of COVID-19 on adherence. Furthermore, the individual, social, and structural correlates of ART adherence are explored within the context of COVID-19. While evidence is limited on how the COVID-19 pandemic impacts ART adherence, this review of the literature will consult evidence that seeks to understand the impact of syndemics on adherence to ART. Evidence is presented for the relevance of applying syndemic theory at the intersection of COVID-19, HIV, and Black/AA race, and a gap in the literature is identified.

Syndemic Theory

The theoretical framework which guides this study, described in detail in the first chapter (see Figure 1), is adapted from syndemic theory and intersectionality theory (Bowleg, 2012; Singer, 1994, 2006). Syndemic theory has been applied to a growing body of public health research which indicates that interacting diseases that increase the illness burden of a population, pose a significant threat to individual, social, and structural conditions, specifically among vulnerable populations (Singer 1994, 2006).

To date, Singer's syndemic theory has been widely applied across the HIV population, it has also been employed to study mental health outcomes, substance use, violence, and food insecurity among individuals experiencing homelessness and racial and ethnic minority groups

(Godley, 2020; Leddy, 2021). In considering the experiences of Black/AA with HIV on race and health status, the theoretical grounding of the present study also incorporates ideas from intersectionality theory. Intersectionality has been applied to public health research in an effort to consider the ways that social identities do not exist independently, but compound to produce unique experiences which contribute to a person's health (Bowleg, 2012; Crenshaw, 1991). This theory has been used to describe the interlocking systems of oppression that work together to produce disparate health outcomes for individuals with multiple marginalized identities (Bowleg, 2012; Crenshaw, 1991).

When it comes to addressing the needs of Black/AA with HIV in particular, the 2021 *Lancet* Series on HIV in the USA, which describes the current state of the nation's HIV epidemic, cited overlapping racial disparities related to COVID-19 and HIV which has resulted in disproportionate burden of both COVID-19 and HIV in Black communities across the United States (Fields et al, 2021). The authors called upon policy makers, public health practitioners, providers, and communities to leverage their strategies through structural and policy level interventions to quell the disproportionate burden of HIV and COVID-19 among Black communities (Millett, 2020; Fields et al, 2021).

Why Adherence to Antiretroviral Therapy (ART)?

Suboptimal adherence to antiretroviral therapy (ART) has increasingly been recognized as a pressing public health challenge (Spreckelson et al., 2021). It is recommended that people with HIV initiate ART as soon as possible following diagnosis and take ART with high levels of adherence consistently over time in order to achieve and sustain HIV viral suppression (Gwadz et al, 2021). Viral load suppression is clinically defined as having less than 200 copies of HIV

per milliliter of blood (CDC, 2019). While the majority of people with HIV in the United States engage in HIV care and initiate ART immediately following diagnosis, there are clear challenges to continuously sustained adherence (Gwadz et al, 2021). Use of ART prevents transmission of HIV between serodiscordant sexual partners and prolongs survival, therefore, access and adherence to ART are vital aspects of HIV prevention and care (Storholm et al, 2019).

In 2020, the World Health Organization fell short of reaching the 90-90-90 goals, in which 90% of those with HIV will be diagnosed, 90% of those diagnosed will receive ART, and 90% of people receiving ART will achieve HIV viral suppression across high-resource settings (Gwadz et al, 2021; UNAIDS, 2020). Gains in treatment efficacy, as well as an increase in people who are aware of their HIV status and engaged in treatment, are reflected through an 18% increase in viral load suppression among all people with HIV globally (UNAIDS, 2020). Despite this achievement, there are still nearly 40% of people with HIV globally with detectable viral loads (UNAIDS, 2020). ART has led to marked reductions in mortality and morbidity among people with HIV, yet from the outset optimal adherence to prescribed regimens has remained essential to its success (Simoni et al, 2012). Given persistent challenges to accessing and receiving HIV care across high- and low-resource settings, ART adherence has long been thought of as an unaddressed aspect of the HIV care continuum (Bae et al, 2011).

HIV Prevalence Among Black and/or African Americans

Black/AA with HIV in the United States are less likely to be diagnosed, engaged in care, receive and adhere to ART, and be virally suppressed than their non-Black/AA counterparts (Storholm et al, 2019). According to a 2014 CDC Morbidity and Mortality Weekly Report (MMWR), in a nationally representative sample of people with HIV, researchers found that

while non-Hispanic Black/AA represent 12% of the population, they make up 43% of all HIV cases, and 44% of new cases in the United States (Crepaz et al, 2018). Although ART prescriptions among people with HIV increased overall from 89% in 2009 to 94% in 2013, fewer Black/AA were on ART and had a suppressed viral load, compared to their Hispanic/Latinx and non-Hispanic white counterparts (Crepaz et al, 2018).

As of 2018, there are 36,060 people living with HIV in Atlanta, GA (Sullivan et al, 2020). The U.S. South continues to experience disproportionate rates of HIV compared to other regions of the country (Rhodes et al, 2020). Southern states comprise over 51% of new HIV diagnoses each year, despite accounting for only 38% of the country's overall population (Rhodes et al, 2020). As of 2019, Black/AA account for over 70% of HIV cases across Georgia, despite only making up roughly 31% of the population (GDPH, 2019). While Black/AA MSM are most disproportionately impacted by HIV, Black/AA heterosexual women and men have a higher incidence of new HIV infections compared to their non-AA counterparts (Crepaz et al, 2018). This evidence alone supports the need for targeted efforts that address HIV prevention and treatment for Black/AA communities.

Factors Influencing Adherence to ART

Factors associated with suboptimal ART adherence are consistent with the literature on known barriers to other HIV-related outcomes, such as engagement in HIV care and ART adherence. For example, people with HIV who are younger, Black/AA, women, and those with a higher viral load, lack of medical coverage, and fewer years living with HIV and/or less time on ART, are more likely to discontinue ART compared to their counterparts who do not face these barriers (Gwadz et al, 2021; Geter et al, 2019, 2018). Furthermore, substance use, mental health

distress (specifically depression), and incarceration contribute to suboptimal ART adherence. Given that depression affects upwards of 20% of people with HIV, compared to 12-13% of the general population, mental health may have important implications for health outcomes (O'Donnell et al, 2017). Most strongly associated with suboptimal adherence is low socioeconomic status and chronic poverty, however researchers are still seeking to understand the specific mechanisms by which these types of factors contribute to suboptimal adherence, particularly 1-2 years following diagnosis (Gwadz et al, 2021; Geter et al, 2019, 2018).

People with HIV face a number of challenges related to their HIV infection, including life-long use of ART, HIV-related stigma, and an increased susceptibility to opportunistic infections. Stressful and traumatic life events are common among this population and may affect health behaviors such as adherence to ART, which has important implications for treatment outcomes (O'Donnell et al, 2017). Some examples of stressful and traumatic life events include romantic relationship changes, estrangement from family, death or serious injury of family member or close friend, major illness, injury, or hospitalization, employment challenges, financial difficulties, legal difficulties, life transitions, and safety concerns. In a study examining the longitudinal associations between stressful and traumatic life events and ART adherence, captured by monthly pill counts, they found that stressful and traumatic life events were associated with poorer ART adherence, including decreased likelihood of adhering to $\geq 95\%$ of ART doses (O'Donnell et al, 2017).

Studies of people with HIV reveal racial and ethnic disparities in HIV care and treatment (Gwadz et al, 2021; Bradley et al, 2019; Geter et al, 2019, 2018; Simoni et al, 2012). However, few studies have sought to understand the social and structural determinants of HIV care among Black/AA. One systematic review, which included five individual studies and one study with

multiple outcomes addressing social and structural determinants of ART adherence to HIV therapy, found that integration of spirituality with HIV care, diagnosing and managing depressive symptoms associated with HIV diagnosis and stigma, and self-efficacy were all noted as facilitators to improving ART adherence (Geter et al, 2018). Other barriers and facilitators of ART adherence included HIV-related stigma, relationship turbulence, prioritizing caring for others over personal care, and social support from family members, among Black women with HIV (Geter et al, 2018). To date, the limited body of research seeking to ascertain the discrete social and structural determinants of health has been largely focused on Black women in the United States and sub-Saharan Africa, suggesting a need to understand the role of these factors among all sexes/genders (Bradley et al, 2019; Geter et al, 2019, 2018).

Mental Health Comorbidities

The mental health of people with HIV is important for both quality of life, ART adherence, and biological disease progression. Mental health problems are prevalent among people with HIV, with some estimates that over 50% of this population likely meet the criteria for one or more psychiatric disorder (Blashill et al, 2011). One systematic review of the literature found that depression, post-traumatic stress disorder, interpersonal violence, stigma, shame, and body concerns all have the potential to moderate HIV care behaviors, such as ART adherence, quality of life, treatment retention, health care utilization, and disease progression among people with HIV (Blashill et al., 2011). Furthermore, in a sample of 46 HIV+ individuals with severe mental illness receiving care through a day program in Northern California, non-white persons and those living alone were more apt to rely on the use of reminders and cues for their ART, while persons with bipolar disorder reported significantly more incidents of the impact of their

mental illness symptoms on ART adherence, than persons with other psychiatric diagnoses (Kemppainen et al, 2004). In a study seeking to ascertain impact of an ART adherence intervention for people with serious mental illness, when stratifying into two diagnostic groups (depressive disorders without psychosis vs. psychotic or bipolar disorder), HIV+ persons with non-psychotic depressive disorders demonstrated a larger decrease in HIV viral load and more improvements in mental health quality of life, compared to HIV+ persons with psychotic or bipolar disorders (Dalseth et al, 2017). Despite advances in documenting the deleterious effects of mental health and its importance to HIV care over the last two decades, there is a continued need for evidence-based psychosocial interventions that integrate mental health treatment with improving self-care behaviors for those living with HIV.

Social Support

Social support is associated with HIV-related health outcomes, including medical care adherence, improved quality of life, and increased knowledge about HIV care and treatment. Social support can be a protective factor in coping with challenges imposed by living with HIV (Enriquez et al, 2019). In an effort to understand the longitudinal effects of social support on ART adherence among HIV+ women and health care utilization among HIV+/- women, one study found that over 3 years, perceived emotional support was associated with optimal ART adherence (OR: 1.19, 95% CI: 1.10-1.28) and health care utilization (OR: 1.16, 95% CI: 1.05-1.27), and tangible social support with adherence only (OR: 1.18, 95% CI: 1.08-1.27) when controlling for sociodemographic characteristics and depressive symptoms (Chandran et al, 2019). A secondary analysis was conducted from two mixed-methods ART adherence intervention studies that took place in the Midwest U.S. found that adults living with HIV who

struggled to adhere to ART also lacked social support in many areas of their lives (Enriquez et al, 2019). While overall social support scores were low, as measured by the Medical Outcomes Study Social Support Survey (MOS-SSS), convergent qualitative data citing extreme isolation and constant turmoil correspond with low scores on each dimension of the MOS-SSS (Enriquez et al, 2019). Underscoring the universal relevance of social support on ART adherence, a cross-sectional out of Brazil found that 64.9% participants reported insufficient adherence to ART, as well as a significant association between emotional social support with antecedents of non-adherence behaviors and doctor-patient communication (Oliveria et al, 2020). As the body of evidence surrounding the impact of social support on ART adherence continues to develop, future studies should prioritize mixed-methods study designs to facilitate the collection of comprehensive data on how and when social support is a protective factor to ART adherence among different sub-groups of people living with HIV.

Housing, Employment, and Transportation

Lack of basic resources, such as housing, employment, and transportation have been consistently associated with suboptimal ART adherence. Evidence has indicated that stable housing is a very important factor to maintaining adherence to ART in people with HIV, particularly for those with a comorbid mental health or substance use disorder (Smith & Cook, 2019; Harris et al, 2017; Surratt et al, 2015). In a secondary analysis of a study seeking to ascertain factors affecting ART adherence in people with HIV who have comorbid mental health disorders, people with stable housing and employed, even part time, were more likely to be adherent to ART (Smith & Cook, 2019). A systematic review on associations between adherence and employment found that people with HIV who are employed were 27% more likely to adhere

to ART, compared to their unemployed counterparts (Nachega et al, 2015). Furthermore, in a meta-analysis examining the prevalence of housing insecurity and its association with psychological, behavioral, and environmental factors influencing ART adherence among substance using people with HIV in South Florida, housing insecurity demonstrated significant effects on adherence, including lower past week adherence (Surratt et al, 2015). These findings suggest that housing insecurity operates as a key driver of ART adherence in this population. One study seeking to understand which basic resources negatively impact ART adherence, effects for unstable housing were fully mediated through social support, access to services, and self-efficacy, highlighting key targets for intervention. However, inability to access transportation had a direct negative effect on adherence, suggesting that free or reduced cost transportation could positively impact ART adherence among underserved populations (Cornelius et al, 2017). Future studies should seek to understand the role of stable housing, employment, and transportation as stressors that negatively impacts ART adherence and treatment access.

Discrimination and Stigma

The deleterious effects of discrimination on physical and mental health are well documented. Studies have found racial and ethnic discrimination, as well as discrimination based on sexual orientation to be associated with a myriad of poor HIV health outcomes. In a study conducted among HIV+ Latino MSM, ART adherence was found to be associated with ethnicity discrimination (OR=0.85, CI=0.74, 0.97, $p<0.05$), perceived gay sexual orientation discrimination (OR=0.84, CI= 0.74, 0.97, $p<0.05$), and HIV serostatus discrimination (OR=0.83, CI=0.72, 0.95, $p<0.01$) (Galvan et al, 2017). In a multi-group structural equation model to

analyze baseline data of women enrolled in the Interagency HIV Study in North Carolina, depressive symptoms were a significant moderator between medical mistrust, everyday discrimination, and internalized stigma, reducing ART medication adherence, engagement in care, and quality of life (Relf et al, 2019). In an effort to ascertain the psychosocial mechanisms that may mediate perceived discrimination on adherence to ART, a cross-sectional analysis of the Interagency HIV study found that perceived discrimination in health care settings was negatively associated with optimal adherence ($\geq 95\%$) (Turan et al, 2017). Furthermore, internalized stigma and depressive symptoms mediated the perceived discrimination-adherence association (Turan et al, 2017). To this end, perceiving discrimination in healthcare settings may contribute to internalized HIV-related stigma, which may lead to subsequent depressive symptoms, with downstream adverse effects on ART adherence (Turan et al, 2017). Future studies should utilize study designs that allow for capturing both discrete aspects of discrimination and stigma and their impact on ART adherence, as well as how mental health and depressive symptoms moderate this association.

COVID-19 as a Health Disruptor

The COVID-19 pandemic has disrupted HIV prevention and treatment services around the world, influenced sexual behavior, which has consequences for HIV transmission and mortality (Mitchell et al, 2021). Early modelling shows severe disruptions in HIV treatment could result in additional AIDS-related deaths, specifically in developing nations (UNAIDS, 2020). Some communities have reported reductions in medication collection of up to 20%, as well as multiple reports of people with HIV not having an adequate supply of ART for a lockdown of more than 60 days (UNAIDS, 2020). Additionally, reports have emerged

suggesting that some people with HIV have abandoned their HIV treatment during the pandemic due to a lack of food, a necessary component for some ART regimens (UNAIDS, 2020).

Although research is still being conducted to understand the full scope of impact that COVID-19 is having on people with HIV, a calibrated, deterministic, compartmental HIV transmission model for MSM in Baltimore, MD seeking to ascertain the potential effect of COVID-19 related disruptions on HIV incidence and mortality, found that disruptions to ART initiation and viral suppression are estimated to substantially increase HIV-related deaths (ART initiations by median 1.7% [95% CI: 0.8-3.2], viral suppression by median 9.5% [95% CI: 5.2-15.9] over the course of one year, with smaller proportional increases over 5 years (Mitchell et al, 2021). To this end, maintaining access to ART and adherence support is of critical importance to maintain viral suppression and minimize excess HIV-related mortality due to COVID-19 restrictions in the United States.

Summary of the Current Problem

Rigorous studies documenting the potential negative health consequences of COVID-19 have up to this point focused on the general population, though preliminary studies have signaled a critical need to understand the impact on people living with serious or chronic illnesses. Furthermore, given the complex manifestation of biological and social conditions as a result of the pandemic, there is a need to understand the syndemic conditions that result from co-occurring HIV and COVID-19. The present review of the literature is consistent with these findings, in that the results of existing studies on the impact of COVID-19 on ART adherence among Black/AA with HIV are limited and require further study.

With regard to the individual, social, and structural factors that influence ART adherence, research on the syndemic of COVID-19 and HIV and how these conditions impact health behaviors are both limited and inconsistent. There is a gap in the literature which considers the effects of both HIV and COVID-19 on the Black/AA community, while understanding how mental health, social support, basic resources, discrimination and stigma moderate ART adherence. The present study seeks to fill this gap in the literature by applying a syndemic framework to understand the downstream effects of how COVID-19 has impacted ART adherence among Black/AA with HIV in a mixed-methods research study conducted in Atlanta, GA.

CHAPTER III: Methods

Introduction

Study Purpose

The purpose of this study is to investigate ART adherence outcomes among Black/AA with HIV in the Atlanta metro region. This study aims to employ a novel approach to fill a gap in the literature by explicitly addressing syndemic conditions that influence health behavior, to understand to what degree the pandemic had an impact on ART adherence. This study also considers the effects of individual, social, and structural correlates that influence access and adherence to ART, including mental health, co-morbidities/infections, social support, homelessness, poverty, transportation, employment, racism, and intersectional stigma related to being Black/African American, HIV-positive, and being at a heightened risk for contracting COVID-19. This study is a primary analysis conducted from January-July 2021 at three HIV clinics across Atlanta under a Woodruff Health Sciences Center Synergy Grant, co-led by principal investigators from the Emory University School of Medicine and Rollins School of Public Health at Emory University, for which the investigator served as a primary data collector. A mixed-methods research study design was selected to allow for comparisons across quantitative and qualitative data, give voice to the participant experience, and foster a community-engaged approach to academic research. Additionally, this study will utilize qualitative findings to validate and explain findings from the quantitative phase of this study. Furthermore, a sequential explanatory mixed methods design was selected to allow for the first, quantitative, component to inform the aims for the following, qualitative, component. The original study which sought to understand the impact of the COVID-19 pandemic on Black/AA with HIV, employed a community-based participatory research approach to support collaborative

efforts with community consultants in the HIV and Black communities. This research is of particular importance as it will be one of the first that seeks to investigate the impact of COVID-19 on ART adherence, in addition to identifying syndemic conditions that have the potential to influence adherence behavior. This study was theoretically grounded in syndemic theory, as described in-depth in Chapter 1 (see Figure 1).

This research seeks to answer the following research question: In what ways has the COVID-19 pandemic impacted adherence to ART among Black/AA with HIV?

Research Aims

The study will address the following aim:

1. To evaluate the degree to which the COVID-19 pandemic interrupted adherence to antiretroviral therapy (ART).
2. To examine how individual, social, and structural syndemic conditions effect ART adherence.

Human Subjects Approval

This thesis project was a secondary analysis of a mixed methods study (N=200) conducted through the Emory University School of Medicine and Rollins School of Public Health at Emory University from January to July 2021. The original study was funded by a grant from the Woodruff Health Sciences Center through the Synergy pilot grant mechanism (PIs: Robert A. Bednarczyk, PhD, Lisa Flowers, MD). Data were collected by four Graduate Research Assistants who underwent CITI, human subjects research, and project-specific trainings prior to conducting the research. Participants were recruited from three HIV outpatient clinics across

Atlanta: a safety net hospital, a Ryan White-funded HIV clinic, and an academic medical center. Clinic staff (i.e., physicians, nurses, medical assistants) supported this study through identifying eligible participants for recruitment. Prior to data collection, eligible participants were informed that participation is voluntary and that they could drop out of the study at any time without penalty. After obtaining informed consent, participants completed a 15–20-minute Qualtrics survey on an electronic tablet or paper copy, depending on their preference. Participants who expressed interest in participating in a subsequent focus group discussion or individual in-depth interview at the time of the survey were later contacted for participation in qualitative activities.

The study protocol was approved by the Emory University Institutional Review Board (IRB ID: STUDY00000591) on 12/10/2020. Additional confirmation was received by the Emory IRB confirming the analyses related to this thesis project are included in the approved IRB protocol. This project was deemed “human subjects research” based upon the Human Subjects Research Determination (Appendix A). These data have been scrubbed of identifying information and is currently only available to the internal research team members.

Population and Sample

Synergy Quantitative Survey

The Synergy Quantitative Survey was developed by a multidisciplinary research team at Emory University’s Rollins School of Public Health and Emory University School of Medicine, led by Co-Principal Investigators Lisa Flowers, MD and Robert A. Bednarczyk, PhD. The quantitative data collection tool was designed to monitor the impact of COVID-19 on Black/African Americans with HIV. Quantitative data was collected via a Qualtrics cross-sectional survey (Appendix B) which collected information on the following six core topics: (1)

demographics, (2) HIV and treatment specific questions, (3) health status questions, (4) vaccine(s) and healthcare seeking questions, (5) impact of COVID-19 on health seeking, and (6) health behaviors in the last 30 days.

Synergy Sampling Methodology

This study employed a sequential explanatory mixed-methods design, which included (1) a cross-sectional quantitative survey and (2) a qualitative study that used semi-structured interviews. The target population for the Synergy study is made up of Black or African Americans with HIV, 18 years of age or older, and receiving care at three designated HIV clinics across Atlanta. We purposively sampled 200 patients with HIV across three outpatient HIV centers, with the help of clinic nurses and medical assistants to approach and confirm participant eligibility criteria. The final question of the quantitative survey asks participants to self-report their interest in participating in an individual in-depth interview, a focus group discussion, both, or neither. This information was extracted to purposively sample 38 of the 200 enrolled participants to partake in a qualitative interview. Participants who expressed interest in contributing to a qualitative interview were approached via telephone and stratified by age, clinic site, and gender to ensure a representative sample for this phase.

Phase I: Quantitative

Data Collection

The Synergy survey was developed in Qualtrics and administered on a Web-enabled electronic tablet by a trained graduate research assistant (data collector) from January to July 2021. The survey administration took place in three outpatient HIV clinics at S-H, S-L, or S-E. These three clinics were selected by co-PI Dr. Lisa Flowers and co-investigator Dr. Minh Nguyen, two attending physicians who work across these institutions. Additional reasons for selecting these clinics include the high volume of HIV care being delivered, as well as variation in patient demographics and quality of care. Given the co-investigators' role as staff physicians across these clinics, the study team was able to obtain permission to recruit in a timely manner.

Trained data collectors traveled to clinic multiple times per week to administer the Synergy survey to patients receiving care or treatment at S-H, S-L, and S-E. The data collectors worked with clinic nurses and medical assistants to identify and approach potentially eligible participants given sensitivity around the HIV-positive eligibility criteria. Upon determination of eligibility and interest in participation, the participant was invited into a private clinic room to complete study procedures. Prior to beginning study activities, the data collector re-confirmed eligibility and completed the informed consent discussion. Survey procedures were designed to protect participant privacy and ensure anonymity. The Synergy survey was self-administered, with participants self-reporting their responses on a Web-based Qualtrics survey or, if requested, a paper copy. Skip patterns, which ask respondents to skip groups of questions that do not apply to them, are used to minimize redundancy and survey fatigue. The data collector remained in the clinic room for the duration of the survey to be available for questions and clarifications. Upon

completion of the survey, participants received \$20 via ClinCard, a reloadable debit card used to remunerate research participants.

Validity and Reliability

The validity and reliability of the survey instrument is integral to decreasing errors that might arise from measurement problems. A test-retest reliability of the Synergy survey was not conducted given that selected measures were designed around the impact of a novel coronavirus pandemic. No formal test of validity for all Synergy survey measures has been conducted, however, the research team believes the measures are successful in ascertaining the impact of the pandemic among this specific population. Additionally, research has suggested that there is no way to consistently measure validity across all questions on a survey instrument, as some items can be validated with objective measures and others cannot (Price, Jhangiani, & Chiang, 2015). Given the sensitivity around reporting health information in this specific study population, it is up to researchers, scientists, and policy makers to determine if self-reported data is appropriate for clinical research among this community.

Data Quality

The Synergy research team maintained a high level of data security and quality at each phase of the study. The previously described strategies to ensure adequate response rate, test of reliability of the survey, and ensure standardization questionnaire administration procedures are used to ensure adequate data quality. To minimize response error, the majority of surveys were completed by the participant on a Web-based electronic tablet to support direct data entry. Several surveys were completed on a paper copy based on participant preference; data entry for

these surveys was completed by a trained graduate research assistant following a QI/QA protocol to minimize entry errors. The investigator of this study was tasked with developing a protocol and tracking system for maintaining data quality and integrity. These systems included tracking data cleaning, storage, transcription, inter-coder alignment, and analyses.

Sample

The sample for this study consists of persons self-identifying as Black or African American, HIV-positive, over the age of 18 years old. Within the combined dataset, four records were removed due to ineligibility, dropout, or duplicate enrollment. The survey record counts across all three sites totaled a combined sample of 200 participants.

Of these 200 participants, 38 participated in the qualitative phase of this study. Twenty-three (23) participants took part in one of the five (5) focus group discussions conducted, ranging from 3-6 participants per group, and stratified by age, gender, and clinic site. An additional fifteen (15) participants took part in an individual in-depth interview.

Measures

Adherence to Antiretroviral Therapy (ART)

The outcome variables addressed by this study includes adherence to antiretroviral therapy (ART) during the spring and winter (last 3 months) of 2020.

Adherence to ART was measured with two questions: “In Spring 2020, how often did you take your antiretrovirals as prescribed?”, “In the last 3 months, how often have you taken your antiretrovirals as prescribed?”, with responses options “all (100%) of the time”, “almost all (95-99%) of the time”, “a lot (75-94%) of the time”, “some (50-74%) of the time”, “almost never

(1-49%)”, “none (0%) of the time”, and “decline to answer”. These variables were recoded to be dichotomous, with participants who responded with options equal to or greater than “almost all (95-99%) of the time” coded 1 for greater than 95% adherence, and those who responded with options less than “almost all (95-99%) of the time” coded 0 for less than 95% adherence.

Personal Demographic Characteristics

In this study, the primary demographic variables of interest were age, gender identity, HIV viral load, history of a COVID-19 diagnosis, comorbidities, housing, employment, and educational attainment.

Age was captured by date of birth and was computed to a numerical value in years. This variable was recoded categorically by age group stratifications from the qualitative phase of this study, with participants 18-30 years old=1, 31-49 years old=2, and 50+ years old=3.

Gender identity was measured categorically with a single question: “What is your gender identity?”, with response options, “female”, “male”, “genderqueer or non-binary”, “trans female/woman”, or “trans male/man”. This variable was recoded to consolidate response options to include, 1=female, 2=male, 3=genderqueer, non-binary, trans female/woman, and trans male/man.

HIV viral load was measured with the following questions: “Was your viral load detectable or undetectable in Spring 2020?” and “Is your viral load currently detectable or undetectable?”, with response options “I had/have an undetectable viral load”, “I had/have a detectable viral load, but it was low”. This variable was recoded to be dichotomous, such that all participants who reported an undetectable viral load were coded as 0, and those who reported a detectable, but low viral load were coded as 1.

Ever having a diagnosis of COVID-19 was measured with the following questions: “Have you ever been diagnosed with COVID-19 by a health care professional or public health worker?” with response options “no”, “yes”, “I don’t know”, and “decline to answer”. The variable was recoded to be dichotomous, such that participants who responded with “no” were coded as 0, and participants who responded with “yes” were coded as 1.

Co-morbidities were measured categorically with the following question: “do you have any other health conditions besides HIV?”, with response options 0=no, 1=yes, and at least one of my other health conditions is not well controlled, and 2=yes, but all of my other health conditions are well controlled.

Housing type or living situation was measured with the following question: “Where are you currently living?”, with response options “a house or apartment that I own or rent”, “a house or apartment that belongs to a family member”, “a house or apartment that a friend rents”, “a house or apartment that a friend owns”, “on the street”, “residential drug/alcohol treatment facility”, “rooming, boarding, or halfway house”, “shelter/welfare hotel”, “other (free text)”, and “decline to answer”. This variable was recoded categorically to consolidate response options and included 0=rent or owns an apartment or house, 1=residential drug/alcohol facility, rooming, boarding, halfway house, welfare hotel, or on the streets.

Employment status was measured with the following question: “Which statement(s) best describe your employment status?”, with response options “able to work but unemployed – due to COVID-19”, “able to work but unemployed – look for work right now”, “able to work but unemployed – not looking for work right now”, “day laborer”, “employed – full time”, “employed – part time”, “homemaker”, “military”, “self-employed”, “student – full time”, “student – part time”, “unable to work”, and “other (free text)”. This variable was recoded

categorically to consolidate response options and included 1=employed (full or part-time), 2=unemployed, and 3=unable to work, disabled, retired, student, military, homemaker, or day laborer.

Educational attainment was measured with the following question: “What is the highest level of education you have completed?”, with response options “K-8th grade”, “9-11th grade”, “high school graduate/GED”, “some college credit”, “technical/vocational/associates degree”, “bachelor’s degree”, “master’s degree”, and “doctorate”. This variable was recoded categorically to consolidate response options and included 0=less than a high school degree, 1=high school graduate, GED, or equivalent, and 2=greater than a high school degree.

Additional Variables of Interest: Syndemic Factors

Depression, social support, and the impact of the COVID-19 pandemic on mental health care, employment, and housing were analyzed as other variables of interest in this study.

Syndemic Factors: Individual

Depression was assessed using an adapted CES-D-10, a 10-item Likert scale assessing depressive symptoms in the past week. This scale includes three items on depressed affect, five items on somatic symptoms, and two on positive affect. Responses range from 0=rarely or none of the time, 1=some of the time, 2=most of the time, and 3=all of the time. Scoring is reversed for items 5 and 8, which include positive affect statements. The total depression score was computed by summing the responses to all ten items. Scores can range from 0 to 30, with higher scores suggesting a greater severity of depression symptoms. Cronbach’s alpha reliability for this scale was 0.82 suggesting high internal consistency of scale items. The CES-D-10 variable was

recoded to indicate the clinical cutoff for depression, which was measured dichotomously, such that all participants who scored greater than 10 on the CES-D-10 were coded 1=greater than 10 (positive for depression) and 0=less than 10 (negative for depression) (Resseguier et al, 2013).

Interruptions to mental health care as a result of the COVID-19 pandemic was measured with a single question: “How much has the coronavirus crisis interrupted the care you receive for mental health (i.e., counselors, therapist, support groups)?”, with categorical response options 0=not at all, 1=somewhat, and 2=a lot.

Syndemic Factors: Social

Social support was measured with a single question: “In the past month, did you talk to anyone in your social support network about things that are important to you?”, and was coded dichotomously, with 0=no and 1=yes.

Syndemic Factors: Structural

Changes in employment status as a result of the COVID-19 pandemic was measured with three questions: “Has the coronavirus crisis led to you or a household member losing employment, having to stop working, or having to work fewer hours”, “Has the coronavirus pandemic led to you or a household member having to work outside home during the pandemic because of the essential work duties or financial restraints”, and “Has the coronavirus pandemic led to you or a household member requesting or receiving unemployment benefits”, and were coded dichotomously, with 0=no and 1=yes.

Changes in housing as a result of the COVID-19 pandemic were measured with a single question: “Has the coronavirus crisis led to any of the following...loss of your housing, or becoming homeless?”, and was coded dichotomously, with 0=no and 1=yes.

Data Analysis Methodology

Preliminary Analyses

Data analyses were conducted using Statistical Package for Social Science (SPSS) version 27.0. Data cleaning and preparation was completed by a graduate research assistant using Statistical Analysis Software (SAS) version 9.4. Once the data was prepared for analysis, all further analyses were conducted using SPSS.

The first step of the preliminary analysis of the data was to produce frequency tables including weighted counts for all study variables, which were assessed for missing data quantities. Non-response data varied from survey measures, below 16.5% for all variables and below 5% for the majority of variables. However, nearly a third (30.5%) of participants answered less than 10 items on the CES-D-10 depression scale. Low or incomplete responses are common for depression scales that request sensitive or potentially stigmatized information (Resseguier et al, 2013). Given the significant number of low or incomplete responses, it was decided that only participants who answered six or more items on the CES-D-10 would be included in the analysis. In lieu of imputation, mean CES-D-10 depression scale scores were computed for all valid cases.

The second step was to analyze the distribution of all study variables in the overall sample using basic univariate analysis. Frequency tables were produced to examine the weighted percentage and unweighted frequency of demographic variables, outcome variables, and

additional variables of interest, including individual, social, and structural syndemic factors. Univariate statistics were analyzed to assess the accuracy of the data output and ensure that values produced were reasonable (Tabachnick & Fidell, 2013). Demographic variables included age, gender identity, HIV viral load, history of a COVID-19 diagnosis, comorbidities, housing, employment, and educational attainment; outcome variables included adherence to ART during the spring of 2020 and the last 3; and additional variables of interest for individual, social, and syndemic factors included depression, social support, and the impact of the COVID-19 pandemic on mental health care, employment, and housing.

Third, the outcome variables of adherence to ART were cross tabulated with each of the demographic variables and additional variables of interest for syndemic factors. This analysis step was completed in order to determine whether any crude associations existed between the primary variables of interest before other study variables were added to the analysis. Statistical differences by adherence to ART were examined using a Pearson Chi-Square test. Significant differences were assessed at a value of $\alpha=0.05$.

Fourth, bivariate logistic regression analyses were run to assess the crude association of each study variable with each outcome variable. This step was to ensure that all variables included in the multivariate models were significantly associated with the outcome variable at the bivariate level. In developing the final multivariate models for this study, only variables which were theoretically relevant to the study aims and statistically significantly associated with the outcome variable were included in the final model (Aneshensel, 2013). For each outcome variable, adherence to ART during the spring of 2020 and the last 3 months, only those variables that were significantly associated with that outcome on the bivariate level were included in the final multivariate model (Aneshensel, 2013). For each bivariate association, odds ratios (ORs),

along with their 95% confidence intervals and associated p-values were reported. Significance was assessed at a value of $\alpha=0.05$.

Lastly, a correlation matrix was produced to check for multicollinearity among study variables. A cutoff correlation value of 0.70 or above was used to assess whether any of the study variables were too highly correlated with each other to both be included in a multivariable model, as this would lead to redundancy in the analysis (Tabachnick & Fidell, 2013). If any of the study variables were too highly correlated with each other, one variable would have been included in the multivariable model to prevent multicollinearity in the final data analysis models.

Primary Analyses

After the initial data analysis steps were carried out, the primary study analyses of multivariable logistic models were carried out. Logistic regression models were produced for each of the primary outcome variables, adherence to ART in the spring of 2020 and over the last 30 days. In the first step of the multivariable models, age groups, HIV viral load during the spring of 2020 and currently, housing, employment, and educational attainment were included to test the associations of demographic variables with the outcomes in the multivariable logistic regression. In the second step of the models, the same main effects for these demographic variables were included in order to assess effects of the interacting relationships between these demographic variables on each of the adherence to ART outcome. The third step of the models included the additional variables of interest for syndemic factors which were significantly associated with the outcome at the bivariate level were added to the model along with the main effects of the demographic variables. The fourth and final step of the models included all demographic variables and additional variables of interest for syndemic factors were entered into the model.

The sequential logistic regression models were fitted for each of the adherence to ART outcome variables. This process for building sequential logistic regression model is consistent with similar studies which have considered the demographics and additional variables of interest for syndemic factors which are associated with adherence to ART (Gwadz et al, 2021). The Nagelkerke R^2 was reported for each model in order to determine the percentage of variance in the outcome variables that could be explained by the variables in the model (Tabachnick & Fidell, 2013). Finally, for each variable in the final models, the adjusted odds ratios (AOR) with their 95% confidence intervals and accompanying p-value are reported (Tabachnick & Fidell, 2013). Significance was assessed at a value of $\alpha=0.05$.

Phase II: Qualitative

In the qualitative phase of this study, data collection occurred subsequent to quantitative survey data collection. Emerging themes and preliminary findings from the quantitative component of this study were used to inform the focus and structure of the qualitative interviews. The final question of the quantitative survey asks participants to self-report their interest in participating in an individual in-depth interview, a focus group discussion, both, or neither. This information was extracted to purposively sample 38 of the 200 enrolled participants to partake in a qualitative interview. Participants who expressed interest in contributing to a qualitative interview were approached via telephone and stratified by age, clinic site, and gender to ensure a representative sample for this phase.

Qualitative Interview Guides

Two semi-structured qualitative interview guides were developed by the Synergy research team to assist in interpreting the findings from the quantitative phase survey by providing insight into key themes being assessed. While these interview guides were based on the same questions and themes, one was framed for focus group discussions, whereas the other for individual in-depth interviews. Prioritization of discussion topics were informed by preliminary survey analyses and consisted of the following: (1) knowledge and attitudes, (2) perceptions of the syndemic, and (3) behaviors and perceptions related to COVID-19 prevention and treatment measures, including vaccination. Additionally, all qualitative interview participants were asked directly about COVID-19 pandemic-related barriers and facilitators they personally experienced in obtaining HIV medication(s), housing, employment, and transportation.

Data Collection

In the second, qualitative, phase, 40 participants were purposively selected across clinic sites and age groups, from those who completed the survey. To provide richness and depth to the quantitative findings, the team used both individual in-depth interviews and focus group discussions to collect additional information on the emerging themes. Five (5) focus group discussion and fifteen (15) individual in-depth interviews were conducted from April to June 2021. Participants who self-reported interest in partaking in a qualitative interview were contacted via telephone by a trained graduate research assistant and invited to participate. Due to the COVID-19 pandemic, all qualitative interviews took place using the Zoom videoconferencing platform, as to adhere to CDC guidelines and maintain safety precautions.

Scheduling for both focus group discussions and individual interviews was based on the availability of both fellow participants and interviewers, as well as convenience of accessing technology required for participation. Interested participants were stratified by clinic site (i.e., S-L/H, S-E) and age groups (i.e., 18-30 years, 31-49 years, 50+ years) to facilitate cohesion in the focus group discussions. Upon completion of the qualitative interview, participants received \$40 for focus group discussions and \$30 for individual interviews via ClinCard.

Data Analysis

Data collection for the qualitative phase of this study was obtained through focus group discussions and individual in-depth interviews. A codebook based in grounded theory was developed using inductive and deductive codes to ascertain the study aims. Audio files underwent transcription by GMR Transcription services prior to data cleaning and deidentification. Transcripts were coded and analyzed for themes with the help of the MAXQDA 2020 software for qualitative data analysis.

The steps for the qualitative phase of this study were as follows: (1) preliminary exploration of data by reading through transcripts, (2) coding data by segmentation, (3) utilize codes and subcodes to develop themes by aggregating codes together, (4) connecting interrelated themes, and (5) constructing a narrative (Creswell, 2002). To support further interpretation and discussion, data visualization was produced to show the evolving conceptual framework for factors that influence adherence to ART, which were illuminated in the qualitative interviews. A list of themes, subcodes, example questions from the qualitative interview guide are presented in Table 1.

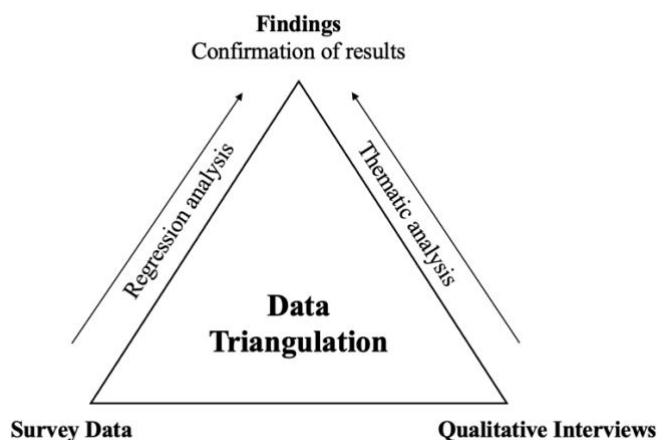
Table 1. *Qualitative Interview Guide Questions*

Impact on health and wellness	
Mental health	Have you felt unusually sad or blue since COVID-19 started?
Social support and isolation	What is different about your social life compared to what it was before COVID-19? Have you ever felt socially isolated over the last year because of COVID-19?
Impact on financial and physical environment	
Employment and income	Did you experience any changes to your job or employment because of COVID-19? Has COVID-19 impacted your income in any way?
Housing stability	What effect has COVID-19 had on where you live?
Impact on healthcare access & quality	
Telehealth	Did you use telehealth or telemedicine during the COVID-19 lockdown last spring?
Medication	Has there been any change to the way you get your medications filled? Has the time in between refills for your prescriptions changed since COVID-19 started? Does it feel harder, the same, or easier to get your prescriptions filled since spring 2020?
Patient-clinician relationships	Have you felt that the COVID-19 information your provider has given you is appropriate information you can trust? What makes you trust your provider?
Transportation	If you use public transportation, how has your experience of using MARTA changed since the start of COVID-19? Do you feel safe from COVID-19 when you are using public transportation? Have you experienced any MARTA schedule changes or service disruptions because of COVID-19?
Perceptions of syndemic dynamics	
Discrimination and intersectional stigma	How do you think having HIV could affect a person's experience of having COVID-19? Have you ever felt that you were treated differently because of your HIV status? Do you think people who develop COVID-19 are treated differently when others know they have it? How do the stigmas from having COVID-19, HIV, and being Black overlap?

Data Triangulation

A mixed methods research design was employed to combine quantitative and qualitative methods to answer the research questions at hand. The rationale for this methodological design was to allow for key qualitative themes to inform and validate findings from the quantitative component. In order to understand how quantitative and qualitative data complement, compare, and contrast with each other, triangulation, or the integration of different approaches to gain a more complete picture, is a necessary component of mixed methods data analysis (Tonkin-Crine et al., 2016). The process by which data triangulation was conducted was based off of the Triangulation Protocol for Qualitative Research (Farmer et al., 2006). The current study collected quantitative and qualitative data from multiple sources, therefore, both methodological and data triangulation was conducted. The first step of data triangulation included independent analyses of the (1) quantitative survey data and (2) qualitative interview data, as outlined in the above data analysis sections. Key themes and findings were identified from both qualitative and quantitative components to observe alignment or discord across methods. Once identified, key findings and themes were triangulated, and for each key finding, paired comparisons were made to compare the data coming from each methodological component. The relationship between data was marked by one of the four categories: silence, dissonance, partial agreement, and agreement. Silence reflected when only one set of data represented a finding; dissonance reflected conflicting findings; partial agreement reflected complementarity between data; and agreement reflected convergence in data. Outcomes of the data triangulation were then discussed amongst the research team, prior to finalizing the key findings.

Figure 2. *Data Triangulation process map*



Assessment of Research Aims

This study was designed to assess two specific research aims, and specific mixed methods analyses (statistical and qualitative) associated with each of these aims are described:

1. To evaluate the degree to which the COVID-19 pandemic interrupted adherence to antiretroviral therapy (ART).

The first study aim was assessed through the first and second steps in the multivariable logistic regression models. In the first and second steps of the models, demographics were included only as main effects, so the independent effects of all variables on each outcome could be assessed for ART adherence in both Spring and Winter 2020. These models were designed to assess whether the combined effect of a unique combination of demographic variables that had a different impact on adherence to ART outcomes that differed from the impact of demographic variables independently. In assessing this research aim, the multivariable models indicated whether specific combinations of demographic variables were more likely to be adherent to ART in the spring and winter (last 3 months) of 2020. Upon completion of statistical analyses, key

findings were extracted from the quantitative and qualitative components to compare, complement, and validate these findings. Data points that were complementary or convergent in the triangulation process were noted as key findings in the results. Furthermore, the holistic nature of these mixed methods findings was integral in understanding if the predictors being evaluated influenced adherence to ART.

2. To examine how individual, social, and structural syndemic conditions effect ART adherence.

The secondary aim of this study was to consider the role of additional individual, social, and structural syndemic conditions on adherence to ART, including depression, social support, and the impact of the COVID-19 pandemic on mental health care, employment, and housing. Additionally, this research aim sought to determine whether the inclusion of these additional variables in the multivariable models would influence adherence to ART. This research aim was assessed with the third and fourth steps of the multivariable models. The third step of the models were designed to consider whether the inclusion of additional variables would alter the main effects of adherence to ART in Spring 2020. The fourth step of the model was to assess whether the inclusion of additional variables of interest would alter the main effects of adherence to ART in Winter 2020. Upon completion of statistical analyses, key findings were extracted from the quantitative and qualitative components to compare, complement, and validate these findings. Data points that were complementary or convergent in the triangulation process were noted as key findings in the results. Similar to the primary research question, the holistic nature of these mixed methods findings was integral in understanding if the predictors being evaluated influenced adherence to ART.

CHAPTER IV: RESULTS

Introduction

Study Purpose

The purpose of this study is to investigate ART adherence outcomes experienced by Black/AA with HIV in the Atlanta metro region during the COVID-19 pandemic. This study is an analysis of a sequential explanatory mixed-methods research study conducted from January-July 2021 at S-H, S-L, and S-E to understand the impact of the COVID-19 pandemic on Black/AA with HIV. This study considers the effects of individual, social, and structural correlates that influence access and adherence to ART, including mental health, social support, isolation, employment, income, housing stability, discrimination and intersectional stigma related to being Black/AA, HIV-positive, and at a heightened risk for contracting COVID-19. This study utilized qualitative findings to validate and explain findings from the quantitative phase of the study.

This research project sought to answer the following research question: In what ways has the COVID-19 pandemic impacted adherence to ART among Black/AA with HIV?

Research Aims

The study addressed the following aims:

1. To evaluate the degree to which the COVID-19 pandemic interrupted adherence to antiretroviral therapy (ART).
2. To examine how individual, social, and structural syndemic conditions effect ART adherence.

Quantitative Findings

Preliminary Analyses

Univariate Analyses

The demographic characteristics of the study sample are presented in Table 2. The total sample consisted of 200 participants who identify as Black or African American. The sample was 46.5% female, 50.5% male, and 3% queer, non-binary, or transgender. More than half (58%) of the sample consisted of people over the age of 50 years old, with 30.5% age 31-49 years old, and 11.5% age 18-30 years old. The sample consisted of 58% of participants reporting at least one comorbidity that is not well controlled and 37.5% reporting at least one comorbidity that is well controlled. The majority (87.9% vs. 88%) of participants reported an undetectable (<50 copies/mL) HIV viral load during Spring 2020 and Winter 2020. A small portion of participants (12.7%) reported a history of COVID-19. About half (51.5%) of participants had an educational attainment greater than a high school degree, 32.3% were a high school graduate or equivalent, and 16.2% did not have a high school degree. Of the participants, 38.5% were employed, 37.5% were unable to work, on disability, or retired, and 24% were unemployed. The majority (91.3%) of participants rent or own an apartment or house and 8.7% live in a residential drug or alcohol facility, halfway house, shelter, welfare hotel, or on the streets.

Table 2. *Personal Demographic Characteristics of Study Sample*

Variable	N/mean (%/sd)
Total	200
Age	49.7 (sd=13.5)
18-30 years old	23 (11.5)
31-49 years old	61 (30.5)
50+ years old	116 (58)
Gender Identity	
Male	101 (50.5)
Female	93 (46.5)
Queer, Non-Binary, Trans Female, Trans Male	6 (3.0)
Comorbidities	
Yes, and at least one other health condition is not well controlled	108 (58.7)
Yes, but all other health conditions are well controlled	69 (37.5)
No	7 (3.8)
HIV Viral Load	
<i>Spring 2020</i>	
Undetectable (<50 copies/mL)	167 (87.9)
Detectable (>50 copies/mL)	23 (12.1)
<i>Winter 2020</i>	
Undetectable (<50 copies/mL)	162 (88.0)
Detectable (>50 copies/mL)	22 (12.0)
History of COVID-19 diagnosis	
Yes	25 (12.7)
No	167 (87.3)
Education	
< High school	32 (16.2)
High school graduate or equivalent	64 (32.3)
> High school	102 (51.5)
Employment	
Employed	74 (38.5)
Unemployed	46 (24.0)
Unable to work, on disability, or retired	72 (37.5)
Housing	
Rents or owns an apartment or house	178 (91.3)
Residential drug or alcohol facility, halfway house, shelter, welfare hotel, or on the streets	17 (8.7)

Univariate analyses of the remaining study variables are presented in Table 3. Across the study sample, the majority (95.8%) reported depressive symptomology, by scoring greater than or equal to a 10 on the CES-D-10. In the past 30 days, 67.7% reported having someone to talk with about things that are important. As a result of the COVID-19 pandemic, 41.4% reported loss

of employment or decreased hours, 34.2% reported having to do essential work outside of the home, 38.4% reported requesting or receiving unemployment benefits, and 13.2% reported loss of housing or becoming homeless. Of the participants who reported interruptions to mental health care as a result of the COVID-19 pandemic, 25.4% experienced somewhat of a disruption, and 7.2% experienced a lot of disruption.

Table 3. *Univariate Analysis of ART Adherence Outcomes and Syndemic Variables*

Variable	N/mean (%/sd)
Depression (CES-D-10)	
≥10 (depressive symptomology)	160 (95.8)
<10 (no depressive symptomology)	7 (4.2)
Social Support	
Had someone to talk with about things that are important	
Yes	128 (67.7)
No	61 (32.3)
Impact of COVID-19 Pandemic	
Led to loss of employment or decreased hours	77 (41.4)
Led to essential work outside of the home	63 (34.2)
Led to requesting or receiving unemployment benefits	71 (38.4)
Led to loss of housing or becoming homeless	24 (13.2)
Interrupted care received for mental health	
Not at all	122 (67.4)
Somewhat	46 (25.4)
A lot	13 (7.2)
ART Adherence	
<i>Spring 2020</i>	
Yes (>95%)	162 (85.3)
No (<95%)	28 (14.7)
<i>Winter 2020 (last 3 months)</i>	
Yes (>95%)	163 (85.3)
No (<95%)	28 (14.7)

Bivariate Analyses

As the purpose of this study was to understand how ART adherence was impacted by the COVID-19 pandemic, the Spring 2020 and Winter 2020 ART adherence variables were selected to determine if there were statistically significant differences in ART adherence across time points. Given that ART adherence for two time periods was collected at the same timepoint, a McNemar test was used to test the differences between these two related groups. Results of the McNemar test revealed that there were no statistically significant differences in counts across ART adherence for Spring 2020 to Winter 2020 ($p=1.00$). As shown in Table 4, of the participants who reported good ART adherence ($>95\%$) in Spring 2020, the majority also reported good ART adherence in Winter 2020. Of the participants who reported poor ART adherence ($<95\%$) in Spring 2020, the majority also reported ART poor adherence in Winter 2020.

Table 4. *McNemar's Test of ART Adherence Variables*

	ART Adherence (Winter 2020) <i>n=191; $\bar{x}=.85$ ($sd=.355$)</i>	
	No ($<95\%$) N	Yes ($>95\%$) N
ART Adherence (Spring 2020) <i>n=190; $\bar{x}=.85$ ($sd=.355$)</i>	No ($<95\%$) 19	Yes ($>95\%$) 9
	Yes ($>95\%$) 9	152

$N=189$; $p=1.00$

Note. Due to missing data, this analysis was done only on complete data for both timepoints.

Additionally, the frequencies of each ART adherence variable were cross tabulated with the demographic and additional variables of interest, as shown in Table 5. Chi-Square tests indicated statistically significant differences by HIV viral load (Spring and Winter 2020) and housing for ART adherence in Spring 2020. Participants who reported good ART adherence were more likely to have an undetectable HIV viral load in both Spring ($\chi^2=4.047$, $p=.044$) and Winter 2020 ($\chi^2=5.841$, $p=.016$), and own or rent an apartment or house ($\chi^2=3.898$, $p=.048$). Statistically significant differences by age groups, HIV viral load in Winter 2020, educational attainment, employment status, and housing were present for ART adherence in Winter 2020. The highest percentages of participants who reported good ART adherence in Winter 2020 were over the age of 50 years old ($\chi^2=14.230$, $p<.001$), had an undetectable HIV viral load in Winter 2020 ($\chi^2=3.828$, $p=.050$), had greater than a high school degree ($\chi^2=10.290$, $p=.006$), employed ($\chi^2=8.467$, $p=.015$), and own or rent an apartment or house ($\chi^2=10.717$, $p=.001$).

Table 5. Frequency of ART Adherence Outcomes by Demographic Variables

Variable	ART Adherence			
	Spring 2020 (>95%)		Winter 2020 (>95%)	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Age				
18-30 years old	17 (22.7)	5 (22.7)	13 (59.1)	9 (40.9)
31-49 years old	46 (80.7)	11 (19.3)	49 (86)	8 (14)
50+ years old	99 (89.2)	12 (10.8)	101 (90.2)	11 (9.8)
<i>Pearson Chi Square</i>	3.423 (<i>p</i> =.181)		14.230 (<i>p</i> <.001)	
Gender Identity				
Male	80 (81.6)	18 (18.4)	81 (83.5)	16 (16.5)
Female	77 (89.5)	9 (10.5)	77 (87.5)	11 (12.5)
Queer, Non-Binary, Trans Female, Trans Male	5 (83.3)	1 (16.7)	3 (83.3)	1 (16.7)
<i>Pearson Chi Square</i>	2.295 (<i>p</i> =.317)		.609 (<i>p</i> =.738)	
Comorbidities				
Yes, and at least one other health condition is not well controlled	88 (85.4)	15 (14.6)	57 (37)	10 (42)
Yes, but all other health conditions are well controlled	60 (88.2)	8 (11.8)	91 (60)	13 (54)
No	5 (83.3)	1 (16.7)	5 (3)	1 (4)
<i>Pearson Chi Square</i>	.325 (<i>p</i> =.850)		.256 (<i>p</i> =.880)	
HIV Viral Load				
Spring 2020				
Undetectable (<50 copies/mL)	143 (87.7)	20 (12.3)	140 (86.4)	22 (13.6)
Detectable (>50 copies/mL)	15 (71.4)	6 (28.6)	18 (81.8)	4 (18.2)
<i>Pearson Chi Square</i>	4.047 (<i>p</i> =.044)		.338 (<i>p</i> =.561)	
Winter 2020				
Undetectable (<50 copies/mL)	141 (89.2)	17 (10.8)	143 (89.9)	16 (10.1)
Detectable (≥50 copies/mL)	14 (70)	6 (30)	15 (75)	5 (25)
<i>Pearson Chi Square</i>	5.841 (<i>p</i> =.016)		3.828 (<i>p</i> =.050)	
History of COVID-19 diagnosis				
Yes	22 (88)	3 (12)	21 (84)	4 (16)
No	139 (85.3)	24 (14.7)	142 (86.6)	22 (13.4)
<i>Pearson Chi Square</i>	.131 (<i>p</i> =.718)		.122 (<i>p</i> =.727)	
Education				
< High school	28 (87.5)	4 (12.5)	29 (90.6)	3 (9.4)
High school graduate or equivalent	43 (75.4)	14 (24.6)	43 (72.9)	16 (27.1)
> High school	89 (89.9)	10 (10.1)	89 (90.8)	9 (9.2)
<i>Pearson Chi Square</i>	.858 (<i>p</i> =.354)		10.290 (<i>p</i> =.006)	
Employment				
Employed	62 (88.6)	8 (11.4)	64 (91.4)	6 (8.6)
Unemployed	34 (77.3)	10 (22.7)	32 (72.7)	12 (27.3)
Unable to work, on disability, or retired	61 (88.4)	8 (11.6)	62 (88.6)	8 (11.4)
<i>Pearson Chi Square</i>	3.450 (<i>p</i> =.178)		8.467 (<i>p</i> =.015)	
Housing				
Rents or owns an apartment or house	147 (87)	22 (13)	149 (88.2)	20 (11.8)
Residential drug or alcohol facility, halfway house, shelter, welfare hotel, or on the streets	11 (68.8)	5 (31.3)	10 (58.8)	7 (41.2)
<i>Pearson Chi Square</i>	3.898 (<i>p</i> =.048)		10.717 (<i>p</i> =.001)	

Additionally, ART adherence outcomes were cross tabulated with the additional variables of interest, as shown in Table 6. Of the participants who reported good ART adherence in Winter 2020, statistically significant differences were observed by participants who lost employment or decreased hours due to the COVID-19 pandemic ($\chi^2=6.486$, $p=.011$), as well as those who experienced interruptions to mental health care as a result of the pandemic ($\chi^2=7.526$, $p=.023$).

Table 6. Frequency of ART Adherence Outcomes by Syndemic Variables

Variable	ART Adherence			
	Spring 2020 (>95%)		Winter 2020 (>95%)	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Depression (CES-D-10)				
≥ 10 (depressive symptomology)	130 (83.3)	26 (16.7)	130 (83.3)	26 (16.7)
< 10 (no depressive symptomology)	6 (100)	0 (0)	7 (100)	0 (0)
<i>Pearson Chi Square</i>	<i>1.191 (p=.275)</i>		<i>1.388 (p=.239)</i>	
Social Support				
In the last 30 days, talked with someone about things that are important	109 (88.6)	14 (11.4)	108 (87.1)	16 (12.9)
<i>Pearson Chi Square</i>	<i>1.079 (p=.299)</i>		<i>.015 (p=.902)</i>	
Impact of COVID-19 Pandemic				
Led to loss of employment or decreased hours	61 (83.6)	12 (16.4)	57 (78.1)	16 (21.9)
<i>Pearson Chi Square</i>	<i>.587 (p=.443)</i>		<i>6.486 (p=.011)</i>	
Led to essential work outside of the home	48 (81.4)	11 (18.6)	49 (81.7)	11 (18.3)
<i>Pearson Chi Square</i>	<i>1.890 (p=.169)</i>		<i>1.765 (p=.184)</i>	
Led to requesting or receiving unemployment benefits	55 (82.1)	12 (17.9)	54 (80.6)	13 (19.4)
<i>Pearson Chi Square</i>	<i>.893 (p=.345)</i>		<i>3.228 (p=.072)</i>	
Led to loss of housing or becoming homeless	18 (81.8)	4 (18.2)	17 (81)	4 (19)
<i>Pearson Chi Square</i>	<i>.312 (p=.576)</i>		<i>.729 (p=.393)</i>	
Interrupted care received for mental health				
Not at all	102 (87.2)	15 (12.8)	101 (86.3)	16 (13.7)
Somewhat	39 (86.7)	6 (13.3)	41 (89.1)	5 (10.9)
A lot	9 (75)	3 (25)	7 (58.3)	5 (41.7)
<i>Pearson Chi Square</i>	<i>1.369 (p=.504)</i>		<i>7.526 (p=.023)</i>	

The associations between each study variable and each outcome variable were then assessed using bivariate logistic regression models, which are presented in Table 7. A separate bivariate logistic regression model was conducted for each variable with each of the outcome variables. Age (years), HIV viral load (Spring and Winter 2020), and educational attainment were statistically significant with Spring 2020 ART adherence outcomes at the bivariate level. Older participants were significantly more likely to report good adherence compared to their younger counterparts (OR=1.034; $p<.05$). Participants who had a detectable HIV viral load in Spring 2020 (OR=.350; $p<.05$) and Winter 2020 (OR=.281; $p<.05$) were less likely to report good ART adherence in Spring 2020. Participants who had a high school degree or equivalent (OR=.345; $p<.05$) were less likely to report good adherence than participants who attained greater than a high school degree).

Furthermore, age, age groups, educational attainment, employment status, housing, loss of employment or decreased hours due to the COVID-19 pandemic, and interruptions to mental health care due to the COVID-19 pandemic were statistically significant with Winter 2020 ART adherence outcomes at the bivariate level. Older participants were significantly more likely to report good adherence compared to their younger counterparts (OR=1.060; $p<.001$). Additionally, participants aged 31-49 years old (OR=4.240; $p<.05$) and over 50 years old (OR=6.357; $p<.001$) were more likely to report good ART adherence in Winter 2020, compared to their younger (18-30 years old) counterparts. Participants who had a high school degree or equivalent (OR=.272; $p<.01$) were less likely to report good adherence than participants who attained greater than a high school degree). Participants who were unemployed (OR=.250; $p<.05$) were less likely to report good ART adherence compared to participants who were

employed. Participants living in a residential drug or alcohol facility, halfway house, shelter, welfare hotel, or on the streets (OR=.192; $p<.01$) were less likely to report good ART adherence compared to participants who rent or own an apartment or house. Participants who lost employment or decreased hours due to the COVID-19 pandemic (OR=.331; $p<.05$) were less likely to report good ART adherence, as well as participants who experienced a lot of interruptions to mental health care due to the COVID-19 pandemic (OR=.222; $p<.05$)

Bivariate logistic regression results showed the odds of having poor ART adherence in Winter 2020 was statistically significant for participants who faced barriers to social and structural determinants of health, such as less education, unemployment, unstable housing, age, depression, employment changes due to COVID-19, and mental health care interruptions due to COVID-19. The odds of having poor ART adherence in Spring 2020 were significantly less than Winter 2020, suggesting that the ongoing COVID-19 pandemic has the potential to disrupt ART adherence.

Table 7. Bivariate Associations Between ART Adherence Outcomes and All Study Variables

Variable (Ref)	ART Adherence	
	Spring 2020 (>95%) OR (95% CI)	Winter 2020 (>95%) OR (95% CI)
Age Groups (18-30 years old)		
31-49 years old	1.230 (.372-4.061)	4.240 (1.367-13.150)*
50+ years old	2.426 (.758-7.766)	6.357 (2.217-18.226)***
Gender Identity (Female)		
Male	.519 (.220-1.227)	.723 (.316-1.656)
Queer, Non-Binary, Trans Female, Trans Male	.584 (.061-5.574)	.714 (.076-6.696)
Comorbidities (No)		
Yes, and at least one other health condition is not well controlled	1.173 (.128-10.757)	1.40 (.151-12.946)
Yes, but all other health conditions are well controlled	1.50 (.155-14.522)	1.140 (.120-10.813)
HIV Viral Load (Undetectable)		
<i>Spring 2020</i>		
Detectable (>50 copies/mL)	.350 (.122-1.005)*	.707 (.219-2.285)
<i>Winter 2020</i>		
Detectable (≥50 copies/mL)	.281 (.095-.829)*	.336 (.108-1.046)
History of COVID-19 diagnosis (No)		
Yes	1.266 (.351-4.562)	.813 (.255-2.594)
Education (Greater than high school)		
Less than high school	.787 (.229-2.704)	.978 (.248-3.855)
High school graduate or equivalent	.345 (.142-.840)*	.272 (.111-.665)**
Employment (Employed)		
Unemployed	.439 (.158-1.216)	.250 (.086-.272)*
Unable to work, on disability, or retired	.984 (.347-2.789)	.574 (.238-2.215)
Housing (Rent or own an apartment or house)		
Residential drug or alcohol facility, halfway house, shelter, welfare hotel, on the streets)	.329 (.104-1.038)	.192 (.066-.561)**
Depression (No)		
≥10 (depressive symptomology)	.313 (.070-1.386)	.303 (.068-1.342)
Social Support (No)		
In the last 30 days, talked with someone about things that are important	1.589 (.660-3.826)	1.059 (.425-2.635)
Impact of COVID-19 Pandemic (No)		
Led to loss of employment or decreased hours	.718 (.307-1.678)	.331 (.137-.797)*
Led to essential work outside of the home	.545 (.228-1.306)	.557 (.233-1.331)
Led to requesting or receiving unemployment benefits	.668 (.289-1.547)	.457 (.192-1.089)
Led to loss of housing or becoming homeless	.716 (.221-2.323)	.589 (.182-1.967)
Interrupted care received for mental health	.889 (.375-2.104)	.751 (.323-1.746)
Some	.956 (.346-2.641)	1.299 (.447-3.779)
A lot	.441 (.107-1.815)	.222 (.063-.784)*

Ref=Reference group; OR= Odds Ratio; 95% CI=95% Confidence Interval

*p<.05, **p<.01, ***p<.001

The final preliminary analysis step was to assess a correlation matrix of all study variables, to evaluate multicollinearity among predictors that were to be entered into the multivariable models. Correlations between two dichotomous variables were assessed using the Phi coefficient, while correlations between categorical variables and dichotomous variables or categorical variables were assessed with Cramer's V. Additional details on how multicollinearity was assessed was described in Chapter 3. As shown in Table 8, a number of variables of interest were statistically significantly correlated with the outcome variables, but no correlations exceed the multicollinearity cut-off of 0.70. Based on these results and the results of all other bivariate analyses, the following variables were statistically significant at the bivariate level and therefore included in each of the multivariable models described in the next section: age groups, HIV viral load (Spring and Winter 2020), educational attainment, employment status, housing stability, loss of employment or decreased hours due to COVID-19 pandemic, and interruptions to mental health care due to the COVID-19 pandemic.

Table 8. Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age groups	--																	
2. Gender	.195***	--																
3. Viral load (SP20)	.100 ^a	.174 ^a	--															
4. Viral load (WT20)	.193 ^a	.114 ^a	.643***	--														
5. COVID-19 Dx	.113 ^a	.030 ^a	-.003	.105	--													
6. Comorbidities	.191***	.110 ^a	.220 ^{a*}	.125 ^a	.109 ^a	--												
7. Education	.138 ^a	.118 ^a	.226***	.205 ^{a*}	.097 ^a	.094 ^a	--											
8. Employment	.226***	.130 ^a	.107	.137	.030	.146 ^a	.185**	--										
9. Housing	.128 ^a	.162 ^a	-.046	.081	.003	.086 ^a	.130 ^a	.225***	--									
10. Social support	.065 ^a	.004 ^a	-.090	-.029	.071	.175	.193**	.053	-.064	--								
11. Depression	.178 ^a	.044 ^a	.076	.083	.082	.082 ^a	.086 ^a	.083 ^a	-.162**	-.072	--							
12. COVID-19 led to loss of employment	.176 ^a	.041 ^a	-.044	.003	.056	.204**	.064 ^a	.177 ^a	.131	.049	-.005	--						
13. COVID-19 led to essential work	.118 ^a	.192**	-.030	-.109	.013	.146 ^a	.100 ^a	.265***	.075	.070	.095	.378***	--					
14. COVID-19 led to unemployment benefits	.111 ^a	.060 ^a	-.010	-.030	-.017	.254 ^a	.114 ^a	.138 ^a	.090	.056	.043	.581***	.307***	--				
15. COVID-19 led to loss of housing	.151 ^a	.090	.064 ^a	.076 ^a	-.062	.248 ^a	.197**	.094 ^a	.178*	.012	.082	.301***	.154*	.210**	--			
16. COVID-19 mental health	.077 ^a	.104 ^a	.035 ^a	.062 ^a	.125 ^a	.116 ^a	.093 ^a	.111 ^a	.071 ^a	.045 ^a	.092 ^a	.154 ^a	.179 ^a	.045 ^a	.127 ^a	--		
17. ART adherence (SP20)	.134 ^a	.110 ^a	-.149*	-.181*	.026	.043 ^a	.181**	.137 ^a	-.145*	.077	-.086	-.057	-.104	-.071	-.042	.089 ^a	--	
18. ART adherence (WT20)	.273***	.056 ^a	-.043	-.146*	-.025	.038 ^a	.233***	.215**	-.240***	.009	-.092	-.190*	-.100	-.135	-.065	.207**	.623***	--

Note. Phi Coefficients are reported unless otherwise denoted.

^aCramer's V

*p<.05; **p<.01; ***p<.001

Primary Analyses by Study Aim

Research Aim 1

The first aim of the study was to evaluate the degree to which the COVID-19 pandemic interrupted adherence to ART. This aim was assessed using the first and second steps of the multivariable logistic regression models. The first step of the models included the main effects for demographic variables including HIV viral load (Spring 2020 and Winter 2020), and educational attainment by ART adherence for Spring 2020. The second step of the model included the main effects for demographic variables including age groups, educational attainment, employment status, and housing by ART adherence for Winter 2020. The third and final step of the model included the main effects for the syndemic variables, including loss of employment or decrease in hours due to the COVID-19 pandemic, and interruptions to mental health care due to the COVID-19 pandemic by ART adherence for Winter 2020. It should be noted that syndemic variables were only included in the multivariable models for ART adherence in Winter 2020, as there was no statistical significance between the syndemic variables and ART adherence for Spring 2020.

Table 9. *Multivariable Model: Logistic Regression with Demographic Variables and ART Adherence Outcomes (Spring 2020)*

Variable (Ref)	ART Adherence Spring 2020 (>95%) AOR (95% CI)
HIV Viral Load (Undetectable)	
<i>Spring 2020</i>	
Detectable (>50 copies/mL)	.838 (.153-4.592)
<i>Winter 2020</i>	
Detectable (\geq 50 copies/mL)	.372 (.074-1.865)
Education (Greater than high school)	
Less than high school	.589 (.158-2.189)
High school graduate or equivalent	.406 (.145-1.136)
<i>Nagelkerke R²</i>	.100

Ref=Reference group; AOR= Adjusted Odds Ratio; 95% CI=95% Confidence Interval

The results of the first step of the final models are presented in Table 9. The first step of the model did not reveal statistically significant associations between demographic variables and Spring 2020 ART adherence. The results of the second step of the model are presented in Table 10. The second step of the model for ART adherence in Winter 2020 reveals that educational attainment and housing remained statistically significantly associated with good ART adherence after all other demographic variables were included in the model. Participants who had a high school degree or equivalent were less likely to report good ART adherence compared to participants who attained greater than a high school degree (AOR=.208; $p<.01$). Additionally, participants who lived in a residential drug or alcohol facility, halfway house, shelter, welfare hotel, or on the streets were less likely to report good ART adherence compared to participants who own or rent an apartment or house.

Table 10. Multivariable Model: Logistic Regression with Demographic Variables and ART Adherence Outcomes (Winter 2020)

Variable (Ref)	ART Adherence Winter 2020 (>95%) AOR (95% CI)
Age (18-30 years old)	
31-49 years old	1.042 (.162-6.697)
50+ years old	.224 (.009-5.833)
Education (Greater than high school)	
Less than high school	.883 (.180-4.331)
High school graduate or equivalent	.208 (.068-.634)**
Employment (Employed)	
Unemployed	.412 (.114-1.483)
Unable to work, on disability, or retired	.747 (.206-2.702)
Housing (Rent or own an apartment or house)	
Residential drug or alcohol facility, halfway house, shelter, welfare hotel, on the streets)	.201 (.055-.735)*
<i>Nagelkerke R²</i>	.320

Ref=Reference group; AOR=Adjusted Odds Ratio; 95% CI=95% Confidence Interval

* $p<.05$, ** $p<.01$, *** $p<.001$

Research Aim 2

The second research aim of the study was to examine how individual, social, and structural syndemic conditions effect ART adherence. The aim was assessed with the third step of the final sequential multivariable logistic regression model of the study. The third step of the multivariable model included loss of employment or decreased hours due to the COVID-19 pandemic and interruptions in mental health care due to the COVID-19 pandemic. The results of the third and final step of the model are presented in Table 11. The third step of the model for ART adherence in Winter 2020 reveals that participants who lost employment or decreased hours due to the COVID-19 pandemic were less likely to report good ART adherence compared to participants who did not experience loss of employment or hours (AOR=.301; $p<.05$).

Table 11. *Multivariable Model: Logistic Regression with Syndemic Variables and ART Adherence Outcomes (Winter 2020)*

Variable (Ref)	ART Adherence Winter 2020 (>95%) AOR (95% CI)
COVID-19 pandemic led to loss of employment or decreased hours (No)	.301 (.114-.791)*
COVID-19 pandemic interrupted care received for mental health (No)	
Some	1.847 (.568-6.010)
A lot	.594 (.130-2.712)
<i>Nagelkerke R²</i>	.145

Ref=Reference group; AOR=Adjusted Odds Ratio; 95% CI=95% Confidence Interval

* $p<.05$, ** $p<.01$, *** $p<.001$

Qualitative Findings

Research Aim 1

The first aim of the study was to evaluate the degree to which the COVID-19 pandemic interrupted adherence to ART. Among the topics and themes assessed in the five focus group discussions and fifteen individual in-depth interviews, three major themes arose that pose a threat to optimal ART adherence: (1) transportation, (2) insurance restrictions around mail order prescriptions, and (3) emotional and mental health. Additionally, three complementary themes were identified as facilitators to ART adherence: (1) mail order prescriptions and telehealth, (2) increased supply of medication through mail order prescriptions, and (3) strong relationships between patients and infection disease (ID) clinicians. The findings from these interviews will be presented as barriers and facilitators to optimal (>95%) ART adherence. Focus group discussion and in-depth individual participants demographics are presented in Table 12.

Table 12. *Demographic Characteristics of Qualitative Interview Participants*

Interview	Clinic	N	Gender	Age
FGD 1	S-H/L	4	Male=3; Female=1	50+
FGD 2	S-H/L	6	Male=3; Female=2	31-49
FGD 3	S-E	4	Male=3; Female=1	50+
FGD 4	S-H/L	6	Male=1; Female=5	50+
FGD 5	S-E	3	Male=2; Female=1	31-49
IDI 1	S-H/L	1	Male	63
IDI 2	S-H/L	1	Female	46
IDI 3	S-H/L	1	Female	30
IDI 4	S-H/L	1	Male	44
IDI 5	S-H/L	1	Female	46
IDI 6	S-E	1	Male	55
IDI 7	S-H/L	1	Male	31
IDI 8	S-H/L	1	Male	61
IDI 9	S-H/L	1	Male	47
IDI 10	S-H/L	1	Female	70
IDI 11	S-H/L	1	Female	54
IDI 12	S-E	1	Female	55
IDI 13	S-E	1	Male	54
IDI 14	S-E	1	Transgender Female	33
IDI 15	S-H/L	1	Female	55

Note. Focus Group Discussion = FGD; Individual In-Depth Interview = IDI; S-H/L = Site H/L; S-E = Site E

Barriers to Optimal ART Adherence

This section discusses the barriers to optimal ART adherence among Black/AA with HIV, which include (1) transportation, (2) insurance restrictions around mail order prescriptions, and (3) emotional and mental health. For the purposes of this study, transportation, a subcode under impact of health care access, mode, and quality of health care delivery as a result of the COVID-19 pandemic (HCA&Q), was defined as changes to public and personal transportation as a result of the COVID-19 pandemic. Insurance restrictions around mail order prescriptions was identified under the medications subcode of the HCA&Q code and was defined as the ability

to access and adhere to HIV medication as prescribed, as well as utilization of mail order prescriptions to have HIV or other medications delivered to home during the COVID-19 pandemic. Finally, emotional and mental health, a subcode of the impact on health and well-being code, was defined as emotional and psychological symptoms as a direct result of the COVID-19 pandemic.

Transportation. Participants discussed how transportation, either personal or public (i.e., MARTA) served as a barrier for accessing and adhering to ART regimens. Multiple participants emphasized how transportation during the COVID-19 pandemic prevented them from accessing their medication as they regularly do – one participant explained, “Oh, definitely transportation, because my car went out. So, I was on the bus and having to walk two miles to get to the closest bus stop, which made it difficult for me to get to my doctors’ appointments and stuff like that, medication, and all that.” (*Male, S-L/H, IDI #9*). This participant shed light on how even with public transportation options, distance from stops and stations can serve as a barrier to accessibility and use of public transit.

With regard to public transportation, several participants noted MARTA shutdowns or reduced routes as a barrier to obtaining their ART and traveling to their ID clinic. One participant noted, “Say I had to go to clinic and get my meds and MARTA wasn’t running, what am I going to do?” (*Female, S-L/H, FGD #4*). The importance of public transportation for many of these participants was echoed by another participant, when saying, “I didn’t have a car at the time, and there was no bus on [my] road, so it was hard to get to the clinic or drug store.” (*Female, S-E, FGD #3*). For participants that did not have access to personal transportation, reliance on public transportation during the COVID-19 pandemic was not feasible given the

reduced routes and shutdowns. This sentiment was heard across all focus groups, regardless of clinic site, underscoring the pervasiveness of this issue.

Furthermore, participants cited distance from clinic or pharmacy as a barrier to accessing ART and HIV care. One participant noted, “They are setup for people oftentimes who don’t work, who are on SSI, and that kind of thing. So, I have to come home, take a shower, and then get it together enough to get downtown. And that’s another thing – location...I mean, it’s a two-and-a-half-hour trek to the clinic...so that’s a real barrier.” (*Male, S-L/H, IDI #7*). This participant noted both the location and travel time of their pharmacy and clinic as a barrier to receiving HIV care and treatment, suggesting that the hours of operation are not feasible for the schedules of those working a full-time job.

Insurance restrictions around mail order prescriptions. While transportation served as a barrier for several participants in accessing ART, mail order prescriptions had the potential to alleviate this barrier. However, multiple participants experienced insurance restrictions which prevented them from requesting mail order prescriptions during the COVID-19 pandemic. One participant cited this barrier when saying, “I can get them through S-L/H, but because of my insurance, I won’t be able to get my meds through CVS Caremark, through the mail.” (*Male, S-L/H, FGD #4*). Another participant added, “I have requested the mail-in stuff for my meds, but my insurance won’t allow it.” (*Female, S-L/H, FGD #2*). Given that the majority of participants across sites were able to request mail-order prescriptions for their ART as a result of the COVID-19 pandemic, insurance restrictions around requesting mail-order prescriptions created an additional barrier to accessing and adhering to ART for a number of participants. While this restriction was only experienced by a handful of participants, the presence of mail-order

prescriptions as a facilitator for the majority of participants (to be discussed in the next section), highlights inequities around accessing ART through mail-order services.

Emotional and mental health. Many participants cited emotional and mental health as a barrier to accessing and adhering to their ART regimens. One participant discussed how their emotional and mental health has impacted the ability to take their medication as prescribed, “I may have missed my medication for maybe a week. And I finally I come out of it and start feeling better, I come out from under a rock, and I get my medications...but it’s not easy, it’s really not. Emotionally. It’s not easy to – it’s not even being HIV-positive as it is just having to deal with that along with other stuff” (*Male, S-L/H, IDI #9*). This participant highlighted how depending on their emotional and mental state, there is variability in how well they are following their ART regimen as prescribed. Another participant described how their emotional and mental health sometimes prevents them from picking up their medication, compounded by COVID-19 risk mitigation strategies, “My mental health...not too good, because it’s hard to get the medication in certain areas, certain times, especially when [COVID-19] was very bad. It was so hard to get the medications, to go places that I needed to go to get the medication...it’s hard to get up and go out” (*Female, S-L/H, IDI #15*). To this end, the emotional and mental impact of the COVID-19 pandemic, compounded by the realities of being HIV-positive for some, served as a barrier to accessing and adhering to ART regimens as prescribed in this sample.

Facilitators to Optimal ART Adherence

This section discusses the facilitators to optimal ART adherence among Black/AA with HIV, which include (1) telehealth, (2) mail-order prescriptions and increased medication supply, and (3) strong relationships between patients and infection disease (ID) clinicians. For the

purposes of this study, telehealth, a subcode under impact of health care access, mode, and quality of health care delivery as a result of the COVID-19 pandemic, was defined as utilization of telehealth or telemedicine to attend medical appointments during the COVID-19 pandemic. Mail-order prescriptions and increased medication supply was identified under the medications subcode of the HCA&Q code and was defined as the ability to access and adhere to HIV medication as prescribed, as well as utilization of mail order prescriptions to have HIV or other medications delivered to home during the COVID-19 pandemic. Finally, strong relationships between patients and ID clinicians theme were captured under the patient and health care worker relations subcode of the HCA&Q code and was defined as the impact of COVID-19 on the relationships between patient and health care workers that provide them care.

Telehealth. In light of the COVID-19 pandemic, many ID clinics pivoted to offering telehealth or telemedicine services to help reduce the transmission of COVID-19. This sample of participants benefitted from this change in delivery of care, as all participants were offered a telehealth option to temporarily engage with their ID clinician for HIV care and treatment. While not all participants preferred telehealth to in-person clinic visits, the vast majority reported a positive experience with telehealth. One participant discussed how the telehealth option relieved their stress of potential COVID-19 exposure, saying, “I was afraid to go to the hospitals. And they told us to stay away from the hospitals. So, I was happy that it was an option that we got on Zoom and talked. So, I saw my doctor on Zoom. I love S-E. I really do. They’ve helped me out so much” (*Male, S-E, FGD #3*). For this participant, the option for a safe, virtual visit underscored their overall positive view of the clinic. Another participant discussed how telehealth has been particularly convenient for them, especially when there are no critical health issues to discuss, “I like it a lot. That way I don’t have to drive to the doctor. If it [isn’t] nothing

real serious going on with me, it works for me” (*Female, S-L/H, FGD #4*). Participants who benefitted most from telehealth appointments noted that their HIV was well-managed and under control, which they believed was part of the reason they had access to telehealth options: “I did a Zoom call. I take my medicines. I do everything I need to do so if I need to come in for labs or something like that, if it was something serious, she’d have me come do it. But I didn’t need to” (*Female, S-L/H, IDI #2*).

Mail-order prescriptions and increased medication supply. Participants described several different scenarios that have been experienced in accessing medication, mail-order prescriptions, and an increased supply of medication due to the COVID-19 pandemic. Participants fell into the following groups: (1) participants who had already been receiving medication by mail, (2) participants who started receiving medication by mail due to COVID-19, (3) participants who received an increased supply of medication via mail due to the COVID-19 pandemic, and (4) participants who were unable to access mail order prescriptions or preferred to pick up medications in-person. Many participants described how they had already been receiving their medications by mail prior to the COVID-19 pandemic: “I get mine delivered – my doctor put in multiple refills, and they deliver it to my front door” (*Male, S-L/H, FGD #1*). Many participants, across both clinic sites, began receiving their medication via mail as a result of the COVID-19 pandemic: “The only change for me is not going to the hospitals, getting my meds mailed to me instead of going there” (*Male, S-E, FGD #3*). Another participant highlighted the benefit of increased medication refills by mail during the COVID-19 pandemic, “As far as my medicine, during COVID, instead of sending a month, they’ve been sending three months. So, that’s been absolutely wonderful for me.” (*Female, S-L/H, FGD #1*). Another participant in this focus group discussion echoed this sentiment by saying, “What they did at S-L, they shipped out

a 90-day supply of our medication.” (*Male, S-L/H, FGD #1*). Lastly, some participants preferred to continuing picking up their medications in-person or did not have access to mail-order prescriptions, “I pick it up from [drug store]. I have always picked them up from [drug store]” (*Female, S-L/H, IDI #2*). A small number of participants reported not having access to mail-order prescriptions, when saying “I’ve never had the option for mail. I always go and get mine. I take my car, and I go right up and get it from the pharmacy” (*Female, S-E, FGD #3*).

Strong relationships between patients and infection disease (ID) clinicians. Participants across both clinic sites emphasized strong relationships with their ID clinicians, which served as a facilitator to requesting, accessing, and adhering to ART regimens. One participant spoke to the positive nature of the relationship with their ID clinician, when saying “I like to talk to my doctor. Yes, I do. Some people don’t like to talk to their doctor. Me personally, I talk to my doctor a lot.” (*Male, S-E, IDI #14*). Another participant described the trust and positive relationship between her and her ID clinician, “I trust her greatly. She is very kind. She shows a lot of empathy and compassion. She never rushes through my appointments. She actually spends a great deal of time with me.” (*Female, S-E, IDI #12*). One participant from S-L/H described how they have continued to receive care at this clinic because of their relationship with staff and clinicians: “Since 2012, I’ve had the same medical team...I have a great team. I have insurance now, and I haven’t left [S-L/H] still. I could go anywhere now, but they have been the most encouraging. They have been supportive of my growth, of me going back to school. So, when you have that kind of support around you, you kind of want to keep it.” (*Female, S-L/H, IDI #11*).

Research Aim 2

Syndemic Factors

The second research aim of the study was to examine how individual, social, and structural syndemic conditions affect ART adherence. Among the topics and themes assessed in the five focus group discussions and fifteen individual in-depth interviews, five major themes arose that had the potential to impact ART adherence: (1) mental health, (2) social support and relationships, (3) employment and income, (4) housing, and (5) discrimination and stigma across syndemic dynamics. For the purposes of this study, mental health, a subcode under impact on health and wellness as a result of the COVID-19 pandemic, was defined as emotional or psychological symptoms as a direct result of the COVID-19 pandemic. Social support and relationships were captured by the subcodes ‘relationships’ and ‘isolation’, respectively, under impact and health and wellness as a result of the COVID-19 pandemic. Relationships was defined as changes to personal relationships, including intimate (romantic or platonic), familial, and friendships because of COVID-19. Isolation was defined as feelings of loneliness because of physical isolation during lockdown. Employment and income were captured as subcodes under impact on financial and physical environment as a result of the COVID-19 pandemic. Employment was defined as changes to employment status as a result of the COVID-19 pandemic, and income was defined as changes to financial status as a result of the COVID-19 pandemic. Housing was also captured as a subcode under impact on financial and physical environment and was defined as changes to housing or living situation as a result of the COVID-19 pandemic. Finally, discrimination and stigma were captured under the syndemic dynamic code, defined as health consequences of identifiable disease interactions and the social, environmental, or economic factors that promote such interaction or worsen disease.

Discrimination and stigma were assessed by participant's perception of mutual influence at the intersection of four different factors: (1) Black/AA and COVID-19, (2) Black/AA and HIV, (3) COVID-19 and HIV, and (4) HIV, Black/AA, COVID-19.

Mental health. Among this population, many participants reported feelings of depression and anxiety as a result of the COVID-19 pandemic and social distancing measures. One participant cited how risk mitigation and precautions have contributed to their feelings of depression: "It's depressing. It really is depressing. Wearing a mask is depressing because I can't breathe. Not being able to go everywhere I want to go. I don't go where I want to go because of the pandemic. I'm home more and that's depressing." (*Male, S-E, IDI #6*). In addition to individual feelings of depression, participants reported a collective sense of depression that the pandemic has resulted in: "And you can tell a lot of people are depressed because they don't have nothing to do. There's no energy. There're no activities in order for them to do." (*Male, S-L/H, FGD #1*). Within the context of depression, participants who reported grieving often experienced compounded symptoms of depression and isolation given the magnitude of their situation. One participant shared, "I'm more depressed trying to keep in contact with people. And trying to see people...like I said, when you had someone that died, like my mother, it's depressing to think people don't want to come [to a funeral]. So, it's been really a depression with me for the past year." (*Male, S-L/H, FGD #2*).

Social support and relationships. While the overwhelming majority of participants were able to take advantage of virtual spaces to connect with family and friends during the pandemic, a facilitator of social support, many participants reported feelings of loneliness and changes to relationships. One participant noted how virtual spaces, such as Zoom, have helped him to stay connected with friends and continue engaging with their Narcotics Anonymous community:

“Fortunately, there is Zoom. I do NA meetings on Zoom. And that’s where my socialization comes from. I have friends in California now, friends in DC, and friends in the local areas. We all Zoom now. It’s good.” (*Male, S-E, FGD #3*). While participants noted that they preferred in-person interactions to virtual, Zoom was integral in maintaining connection with family and loved ones: “I greatly appreciate Zoom because that’s the only way I can see my family members face-to-face and stay connected with them and stuff.” (*Male, S-E, IDI #13*). While relationships helped to offset feelings of loneliness and isolation, these feelings were persistent for many participants: “I definitely feel isolated. Yeah, I do. I feel so isolated...and hurt inside. With this pandemic, I’m in the house – like claustrophobia, you know? And sometimes I feel like I’m alone, but I have my family.” (*Male, S-E, IDI #6*).

Employment and income. Participants reported changes to employment and income as a result of the pandemic, having both positive and negative impacts. Several participants reported obtaining employment that resulted in greater stability: “That’s the only positive thing I’d say to come out of this...I got a job that I feel more secure at.” (*Female, S-L/H, FGD #4*). One participant reported how unemployment benefits helped him to invest in his own business, when saying, “I lost my job, and I was put on unemployment. And I gained money. And I used that money to invest in my brand that I’ve been working on for four years” (*Male, S-E, FGD #3*). Multiple participants reported not feeling comfortable returning to work as a form of COVID-19 risk mitigation:

“I got monthly income from the government. Right when the pandemic hit, I was ready to go back to work because I just had my daughter, she is two. I was ready to go back to work and put her in daycare – but that income is not enough to take care of me and my daughter. So yeah, I think it impacted me negatively. And it

still is because I don't feel like I can go to work. And I don't feel safe enough to send her to daycare or to school right now.” (Female, S-L/H, FGD #2).

While many participants experienced loss of employment or decreased hours, the stimulus package helped many participants to maintain or increase their financial stability: “I lost my job. Getting unemployment, I was making half the money I was making on the job. But still, positive things, more money was coming my way. Like the stimulus checks. I was able to bank some money and pay my bills. I was able to do those things.” (*Male, S-L/H, FGD #4*).

Housing. Some participants reported that their living situation or housing was impacted by the COVID-19 pandemic. One participant reported how relocating was a positive aspect of the pandemic, when saying, “Something positive that came out of the pandemic for me was that I moved, and I have a new place. Some people are just so fearful they didn't want to do anything. But in this day and time, you have to live life because you don't know what tomorrow brings. I got moved and everything has been okay.” (*Female, S-L/H, IDI #15*). Conversely, several participants reported the pandemic as a barrier to relocating or moving, when saying “When the COVID hit, it was harder for me to find housing because of the – I guess the eviction thing they had going. No one can get evicted. So, I've been doing my best looking, but every time I call a place, they keep saying COVID, so it's quite hard.” (*Transgender, S-E, IDI #14*). One participant reported that the shift to remote work heightened the need to relocate given complex family and relationship dynamics, in the context of mental health:

“When they told us [that we were going remote], I actually went to the bathroom and started to cry. Because although some of my colleagues were excited to be able to work from home, I wasn't because my husband was having a very severe mental health crisis and had stopped talking – he hadn't spoken a word to

anybody probably about five months before COVID happened. So, the thought of being at home...was very hard, and I did eventually end up having to move out of my home May 2020. I had to move out. And I lived in hotels, then I lived in a couple of Airbnb's, and then finally I got an apartment in August. So yeah, my housing was definitely affected by COVID, but I don't know if COVID hadn't happened that my husband wouldn't have experienced a mental health break that would have caused me to move out." (Female, S-E, IDI #12)

While participants experienced variations in the impact of the COVID-19 pandemic on housing, there were no documented instances across the interviews that resulted in loss of housing or homelessness.

Discrimination and stigma. Overlapping identities have the potential to result in varying access to health care resources and treatment by medical staff and practitioners. Given the unique intersectional identifies that exist within this population, understanding how discrimination and stigma manifest among these groups is important in promoting health equity. Of the four syndemic dynamics assessed, (1) Black/AA and COVID-19, (2) Black/AA and HIV, (3) COVID-19 and HIV, and (4) HIV, Black/AA, COVID-19, participants reported overlapping between HIV and COVID-19 stigma. One participant talked about the fear surrounding how new coronavirus is, compared to HIV, an infection we have more information on at this time: "I'm worried about [COVID-19] and [its] deadly approach on my health [compared to] HIV or any other disease. Because the virus is totally new to me, as well as new to society. So, we have not grasped that, as we have with HIV or any other virus." (Female, S-L/H, FGD #4). Speaking more directly to the stigma of COVID-19 and HIV, one participant said, "Because they contracted COVID-19, you stigmatize them? That's wrong. I would never do that to a person because I

don't want it done to me.... I didn't ask to have HIV, so when people start to make certain assumptions about folks, no matter who they are, you don't have the right to that because you don't know their story – with COVID, as well.” (*Male, S-E, FGD #3*). Another participant noted, “People are still so uneducated about HIV and how it's transmitted and what happens. I don't disclose that to everybody. I disclose it when I feel that I need to. So, it's the same thing with COVID-19. Everybody looks at you if you cough – they want to duck under a table or something because you're going to give them COVID. So that overlapping across the color of our skin, being melanated people.” (*Female, S-E, FGD #3*). Other participants noted marked differences between COVID-19 and HIV stigma, when saying, “People are leery about being around someone. I think with HIV, it's different than with COVID...you have to have some type of sexual exchange of blood in order to contract it. With COVID, you could just be in a room with someone and exchange the same air. So, I think that if someone were around someone with COVID or knew someone had COVID, they would be a little more uneasy about being around them.” (*Male, S-L/H, IDI #4*). Although there were varying responses to if and how these two health conditions overlap, all participants noted persistent discrimination and stigma among people with COVID-19, HIV, or both.

Data Triangulation

Triangulation of quantitative and qualitative data was completed in a stepwise process: (1) quantitative data analysis, (2) qualitative data analysis, (3) alignment of key themes across data sources, and (4) refinement and finalization of key themes ascertained through mixed-methods data collection. Four themes emerged to include factors that had the potential to influence ART adherence throughout the COVID-19 pandemic: health and wellness, financial

and physical environment, healthcare access and quality, and perceptions of syndemic dynamics. These themes, including both positive and negative factors influence ART adherence, that emerged from the quantitative and qualitative components, are presented in Table 13.

Health and wellness emerged as a key theme, encompassing age and HIV viral load, both statistically significant at the bivariate level, in addition to mental health and social support. Age had the potential to influence ART adherence bidirectionally, with older age as a predictor of optimal ART adherence. Additionally, having an undetectable HIV viral load and social support were predictors of optimal ART adherence. Finally, mental health or depressive symptoms had the potential to negatively influence ART adherence, as reported by several participants throughout the qualitative interviews.

Financial and physical environment emerged as a key theme and included educational attainment, income, housing stability, employment, loss of employment or decreased hours due to the COVID-19 pandemic, and transportation. These resources proved to have varying effects on ART adherence, with statistically significant associations between educational attainment, housing stability, and loss of employment or decreased hours due to the COVID-19 pandemic at the multivariate level, and employment at the bivariate level. All served as a facilitators to optimal ART adherence, with the exception of employment changes as a result of the COVID-19 pandemic, which served as a barrier. In addition to transportation, these same factors emerged as barriers and facilitators to optimal ART adherence across almost all qualitative interviews. Having stable housing, income, employment, and greater educational attainment were all facilitators to optimal ART adherence, while transportation posed a threat to optimal ART adherence by creating a barrier to accessing prescription refills.

Table 13. *Triangulation of Quantitative and Qualitative Findings that Impact ART Adherence*

Theme	Quantitative	Qualitative
Health and wellness	+ Older age (50+ years old) + Undetectable HIV viral load	- Depressive symptoms + Social support
Financial and physical environment	+ Educational attainment + Housing stability + Employment - Loss of employment or decreased hours due to pandemic	+ Employment + Higher income + Housing stability + Access to transportation
Healthcare access and quality	- Interruptions to mental health care due to pandemic	+ Telehealth + Mail-order prescriptions
Perceptions of syndemic dynamics	N/A	- Discrimination - Intersectional stigma

Note. + = positively influences ART adherence; - = negatively influences ART adherence

Healthcare access and quality emerged as a key theme, encompassing telehealth, mail-order prescriptions, and interruptions to mental health care due to the COVID-19 pandemic.

While interruptions to mental health care due to the pandemic was statistically significant with suboptimal ART adherence at the bivariate level, telehealth and mail-order prescriptions emerged from the qualitative interviews as powerful facilitators of optimal ART adherence by serving to alleviate structural barriers to accessing HIV care and treatment.

Finally, perceptions of syndemic dynamics surfaced as a key theme, encompassing discrimination and intersectional stigma as barriers to optimal ART adherence. This theme was not accessed through the lens of ART adherence in the quantitative survey; however, participants highlighted the striking parallels between HIV and COVID-19 stigma and the potential for subsequent discrimination. Findings also highlighted how the intersectionality of HIV, COVID-19, and being Black/AA further compounds the stigma and discrimination associated with each unique identity.

Summary of Findings

Overall, this study found statistically significant differences between educational attainment, housing, and changes to employment due to the COVID-19 pandemic for optimal (>95%) ART adherence in Winter 2020. The quantitative results of this study indicate that participants who reported attaining a high school degree or equivalent were less likely to report optimal ART adherence in Winter 2020, compared to their counterparts who attained greater than a high school degree. Participants who reported living in a residential drug or alcohol facility, halfway house, shelter, welfare hotel, on the streets were less likely to report optimal ART adherence in Winter 2020 compared to participants who rent or own a house or apartment. These results revealed statistically significant differences in the odds of optimal ART adherence depending on educational attainment and housing stability. The qualitative findings are aligned and complementary of these results, as they support the notion that educational attainment is often linked to employment, which can influence healthcare benefits, insurance, and medication access. Furthermore, qualitative findings around housing stability and relocation due to COVID-19 emerged as a key theme among the discussions and interviews.

The secondary aim of this study was to consider the individual, social, and structural syndemic factors that have the potential to influence ART adherence. The quantitative results of this study indicate that participants who reported that the COVID-19 pandemic led to loss of employment or decreased hours were less likely to report optimal ART adherence in Winter 2020, compared to participants who did not experience this change in employment. Qualitative findings indicated that the COVID-19 pandemic had a widespread, yet varying impact on both employment, and subsequently, income. These overall findings support the research question

which seeks to understand how the COVID-19 pandemic and resulting individual, social, and structural syndemic conditions influence ART adherence.

Furthermore, these results confirm that the adapted syndemic theoretical framework (Figure 1) successfully explains how these two co-occurring conditions, HIV and COVID-19, work together to create a syndemic, creating individual, social, and structural factors that have the potential to influence ART adherence. This study found a statistically significant association between ART adherence and multiple syndemic factors. However, all syndemic factors emerged as potential influencers of ART adherence throughout the qualitative interviews. Individual factors included depressive symptomology and interruptions to mental health care due to the COVID-19 pandemic. Social support factors included social support and isolation. Finally, structural factors included housing stability, employment status, transportation, discrimination, and intersectional stigma. The model suggests that while these factors all have the potential to impact ART adherence, HIV viral load suppression is subsequently influenced by ART adherence. HIV viral load suppression was found to be statistically significant with ART adherence at the bivariate level, however this relationship did not remain at the multivariate level. This model highlights the importance of accounting for a variety of structural factors and social determinants of health, in addition to individual and social drivers of ART adherence. The findings from this mixed-methods study validated the theoretical model by indicating that structural factors are the most prevalent predictors of ART adherence in this population of Black/AA with HIV.

CHAPTER 5: DISCUSSION

Introduction

This study was informed by a conceptual model, syndemic theory through an intersectional lens, to consider the impact of the COVID-19 pandemic on adherence to ART among Black/AA with HIV in Atlanta. This study specifically addressed how individual, social, and structural syndemic factors influence adherence to ART in this population (see Figure 1). The conceptual model was adapted from syndemic theory and intersectionality theory and addresses the critical need for public health to examine the impact of social determinants of health and intersectional identities on health behavior (Bowleg, 2012; Singer & Clair, 2003; Crenshaw, 1991). The present study applied an intersectional lens to syndemic theory by considering how two co-occurring epidemics, COVID-19 and HIV, result in a syndemic and create undesirable individual (mental health), social (social support), and structural conditions (employment, income, housing, transportation, discrimination, stigma) with the potential to influence adherence to ART. Furthermore, these structural conditions can be compounded by the presence of intersecting identities, in this case, being Black/AA and HIV-positive in the context of COVID-19. This study was intentional about considering how these individual, social, and structural syndemic conditions influence how each individual's experience will vary given their unique intersectional identity.

Summary of Study

The purpose of this study was to investigate the impact of the COVID-19 pandemic on adherence to ART among Black/AA with HIV in Atlanta. To the knowledge of the authors, this study was the first of its kind to apply an intersectional lens to syndemic theory to understand

how the COVID-19 pandemic has influenced adherence to ART among PWH. This study was a primary analysis nested in a sequential explanatory mixed methods study seeking to understand the impact of the COVID-19 pandemic on Black/AA with HIV. The sub-study for this thesis was designed to answer the following research question: In what ways has the COVID-19 pandemic impacted adherence to ART among Black/AA with HIV?

Discussion of Key Results

Research Aim 1

The first aim of this study was:

1. To evaluate the degree to which the COVID-19 pandemic interrupted adherence to antiretroviral therapy (ART).

To date, there are no prior studies that have considered the impact of the COVID-19 pandemic on adherence to ART among Black/AA with HIV. Extensive research has been conducted to understand factors associated with optimal or suboptimal ART adherence, as well as disparities that exist among Black and Brown communities (Gwadz et al, 2021; Bradley et al, 2019; Geter et al, 2019; Storholm et al, 2019; Simoni et al, 2012). One study among Black/AA PWH found that older age was associated with greater ART adherence, whereas lower perceived treatment effectiveness and lower quality healthcare ratings were associated with poorer ART adherence (Storholm et al, 2019). Another study among Black/AA and Latino long-term survivors of HIV found that higher rates of non-adherence occurred among people who identified as male, transgender, moderate-to-high users of cannabis, and ART- and care-related stigma, while older age, more years since diagnosis, and motivation for care were associated with lower rates of non-adherence (Gwadz et al, 2021). In assessing racial disparities across HIV care and treatment, one

study which sought to explain disparities in viral suppression and medication adherence among women in the U.S. found that race was associated with ART non-adherence, with Black women more likely to miss a dose of ART, compared to white and Hispanic/Latina women (Geter et al, 2019).

While the majority of literature to date has focused on documenting early inequities in COVID-19 outcomes across HIV serostatus and racial identity, original research is limited to modelling and qualitative studies (Fields, Copeland & Hopkins, 2021; Waterfield et al, 2021; Barbera et al, 2020; Millett, 2020). Using a calibrated, deterministic, compartmental HIV transmission model for MSM in Baltimore and available data on COVID-19 related disruptions to HIV care services, one study found that disruptions to ART initiations and viral suppression are estimated to substantially increase HIV-related deaths and viral suppression over 1 year, with smaller proportional increases over 5 years (Mitchell et al, 2021). Furthermore, a rapid qualitative assessment on the impact of the COVID-19 pandemic on a racially/ethnically diverse sample of gay, bisexual, and other MSM with HIV in the U.S. South found mixed results with regard to knowledge and perceptions around COVID-19 information, sources of trustworthiness, impact on health behaviors, and general concerns (Rhodes et al, 2020). Both preliminary studies have underscored an urgent need to develop interventions that support ART adherence among Black/AA with HIV in the time of COVID-19.

Very few studies have sought to understand how the COVID-19 pandemic has impacted Black/AA with PWH, broadly. One mixed methods study found that while HIV care visits were commonly canceled due to the COVID-19 pandemic, this did not negatively impact engagement in HIV care and ART use (Gwadz et al, 2021). Another study seeking to understand COVID-19 related medical mistrust and health impacts among Black Americans with HIV found that

participants experiencing more negative COVID-19 impacts showed lower ART adherence, compared to their counterparts (Bogart et al, 2020). These studies have uncovered important insights into how COVID-19 has the potential to impact social and economic determinants, and their downstream effects on ART adherence. Given the scarcity in original research seeking to uncover the explicit factors of how the COVID-19 pandemic has impacted adherence to ART among Black/AA with HIV, this study will contribute to closing a gap in the literature and provide a foundation for future research within the field.

Research Aim 2

The secondary aim of this study was:

2. To examine how individual, social, and structural syndemic conditions affect ART adherence.

Syndemic theory has been widely applied to HIV research across Black/AA populations (Godley & Adimora, 2020). Many studies have found evidence that psychosocial, economic, and structural syndemic conditions create pervasive barriers to HIV care and treatment among racial and ethnic minority groups (Leddy et al, 2021; Zepf et al, 2020; McMahon et al, 2019). One qualitative assessment found that food insecurity and intimate partner violence co-occur with poor mental health and substance use which have a negative influence on HIV risk behaviors and treatment adherence (Leddy et al, 2021). Another study seeking to understand syndemic conditions and medication adherence in older MSM with HIV found that depressive symptoms and stimulant use significantly decreased medication adherence (Zepf et al, 2020). Furthermore, a structural equation modeling analysis indicated that men who reported higher levels of HIV-

related stigma experienced higher levels of anxiety, which was associated with reduced probability of optimal ART adherence (McMahon et al, 2019).

Given the novel and emerging nature of COVID-19, the literature surrounding how syndemic conditions and social determinants of health have been influenced for PWH in the context of the COVID-19 pandemic is limited to commentaries and mini-reviews (Gesese et al, 2021; Waterfield et al, 2021). A commentary seeking to understand the consequences of the COVID-19 pandemic for PWH and its impact of social determinants of health cited that people who test positive for COVID-19 and HIV are at risk for increased psychosocial burdens stemming from stress and isolation, as well as additional barriers that inhibit access to care, may cause them to become more disenfranchised (Waterfield et al, 2021). Because overlapping identities and conditions can result in an increased burden of disease or stigma, an intersectionality framework has been applied to understand the impact of discrimination and stigma among racially and ethnically diverse PWH. One study that investigated intersectionality on internalized HIV stigma and internalized substance use stigma, and their implications for depressive symptoms, found that those who internalized HIV stigma experience greater depressive symptoms, but only if they had also internalized substance use stigma (Earnshaw et al, 2015). These findings underscore how multiple, or intersecting identities can create an excess burden of negative mental and physical health consequences. Given the dearth of information surrounding how syndemic conditions influence HIV care and ART adherence among Black/AA with HIV, there is a dire need for interventions that support adherence to care and treatment in this community.

Overall Findings

This study was the first of its kind to consider the impact of the COVID-19 pandemic on adherence to ART in Black/AA with HIV, in addition to investigating the individual, social, and structural syndemic factors that pose a threat to optimal ART adherence, using a mixed methods study design. This study sought to respond to calls for rigorous public health research to understand how the ongoing COVID-19 pandemic is impacting the health and well-being of historically marginalized populations (Fields et al, 2021). The conceptual model for this study was informed by syndemic theory and intersectionality theory, and the study findings are consistent with the proposed model. While viral load suppression, age, education level, employment status, housing stability, COVID-19 resulting in loss of job or decreased hours, and interruptions to mental health care due to COVID-19 were significantly associated with ART adherence at the bivariate level, only housing stability, education level, and loss of job or decreased hours due to the COVID-19 pandemic remained statistically significant with Winter 2020 (last 3 months) ART adherence at the multivariate level. Given that viral load suppression was not significantly associated with ART adherence, contrary to what we might expect, further research is needed to explore the validity of self-report adherence and viral load suppression measures in predicting ART use behaviors.

Overall, this study revealed that structural resources, such as housing stability, employment status, and education level play an important role in predicting ART adherence in this sample, which is consistent with prior research which suggests that social determinants of health influence health behaviors, such as ART adherence (Bradley et al, 2019; Geter et al, 2018). In particular, this study found strong associations between optimal ART adherence and owning/renting an apartment or house, attaining education greater than a high school degree, and

employment that was not impacted by the COVID-19 pandemic. To an extent, these findings are consistent with the idea that structural conditions can serve as barriers or facilitators to HIV care and treatment, given that education level is often linked to employment and greater access to health insurance benefits (Zajacova & Lawrence, 2018). In light of structural racism and oppressive tactics, Black/AA with HIV may be more likely to experience disenfranchisement, housing insecurity, as well as barriers to accessing education and lawful employment, all of which have the potential to compromise positive health behaviors (Fields et al, 2021; Millett, 2020). Furthermore, housing stability has been widely cited as a facilitator to ART adherence, as housing insecurity is more likely to be associated with gaps in HIV treatment and lower access to HIV care (Surratt et al, 2015). Further research is needed to explore how the effects of working and living conditions among PWH differentially impact HIV health outcomes and adherence to ART.

Across the study's findings, mental health emerged as a key theme from both the quantitative and qualitative results. While only statistically significant at the bivariate level, interruptions to mental health care due to the COVID-19 pandemic was widely experienced across this sample. While the vast majority of participants reported experiencing depressive symptomology, this was not significantly associated with ART adherence. Findings from the qualitative interviews highlight that depressive symptoms, isolation, and loneliness in light of the COVID-19 pandemic were extremely common among this sample. Persistent depressive symptomology and barriers to engaging with one's social network shed light on the extent to which the COVID-19 pandemic has impacted individual and social syndemic factors. As evidence of the ongoing toll COVID-19 is having on mental and emotional health continues to surface, future research should identify measures and designs that comprehensively evaluate the

pandemic's impact on mental health and well-being among communities of heightened risk of severe mental illness.

Strengths and Limitations

Strengths

A key strength of this study was its use of a mixed methods approach, which may improve the study validity and interpretation of results. By considering both quantitative and qualitative findings, this study may do a better job of contextualizing patient experiences in a clinically meaningful way, compared to an assessment which uses a single methodology (Regnault et al, 2018). Furthermore, mixed methods research designs support in-depth analysis of a research question from multiple perspectives, allowing researchers to identify complementary themes across data sources. A sequential explanatory mixed methods design was selected to allow for preliminary analysis of the quantitative data, which subsequently supported the refinement of qualitative interview topics. This design allowed for the research team to achieve data saturation across all three clinic sites prior to beginning qualitative research activities, as to best capture a representative and meaningful sample.

An additional strength of this study is that it focuses on Black/AA with HIV in Atlanta, a historically underserved population that has been greatly impacted by HIV, as documented in the review of the literature. There is increasing recognition that populations included in trials should adequately represent the population treated in clinical practice (Shephard, 2020). The majority of research citing race-based differences in health outcomes across the general population often lack a representative sample of participants from underserved communities, undermining the generalizability of study findings (Konkel, 2015). Furthermore, researchers often interpret these

findings in a way that places blame on communities with poor health outcomes, rather than understanding how systemic racism plays a role in differential access to services and goods. In addition to focusing on a historically underserved community, these study findings will support quality improvement of health care delivery, as well as prioritizing health policy that addresses the unique individual, social, and structural needs of the Black/AA population.

Limitations

Despite its strengths, this study was constrained by several limitations. The primary limitation was the predominant use of novel survey measures to assess the impact of COVID-19 on health and well-being. Given the unprecedented nature of COVID-19, the research team developed new survey metrics that would effectively assess the unique impact of the pandemic on this particular population. The limited use of validated scales presented challenges in quantifying the impact of the pandemic on health and well-being, in relation studies with similar aims. Furthermore, mental health was assessed using the Center for Epidemiologic Studies Depression (CES-D-10) scale, a validated scale commonly used to screen for depressive symptoms. As with any self-report questionnaire, many participants forwent or only partially completed the CES-D-10, which presented potential issues of bias (Resseguier et al, 2013). Missing CES-D-10 data was handled based on best practices, which involved exclusion of participants who completed less than 6 items on the scale and computing an average depression score for all valid cases. While this likely resulted in some level of bias, the approach was selected as to not falsely overestimate the prevalence of depressive symptoms among this sample.

In addition, this study used a cross-sectional survey to capture quantitative data, which limited its ability to make causal claims about the predictors and outcomes under study. Given the cross-sectional nature of the data, associations and links between ART adherence outcomes, demographic, and syndemic variables cannot be assumed to be causal or directional. Because both ART adherence outcomes and the predictors being studied were examined at the same time, results were limited to ascertaining differences within the group, rather than changes over time. This limitation was particularly relevant for both ART adherence outcome measures, which asked respondents to self-report their percent adherence in Spring of 2020 and Winter 2020 in the same assessment. Because the outcome measures ask respondent to report percent adherence across two different, previous time points, the potential for recall bias is high. Given that there were no statistically significant differences within Spring and Winter 2020 adherence outcomes, it is likely that at least some participants reported consistent adherence across both time points.

As mentioned previously, data from the cross-sectional survey was self-reported to promote privacy and confidentiality around reporting personal health information in this population. While self-report data facilitates quick and easy data collection, it also presents a myriad of limitations that have the potential to compromise data quality. It is possible that social desirability bias played a role in how participants responded to certain items. Given that survey questions focused on knowledge, attitudes, beliefs, and health behaviors in the context of COVID-19 and HIV, two highly stigmatized conditions, some participants may have felt inclined to report more socially acceptable answers. To this end, the study team took extra steps to ensure that participants were informed, comfortable, and in a private space while taking the survey to reduce the potential for respondent and social desirability biases.

Implications and Recommendations

Implications for Health Equity Research

The findings of this study have numerous implications for health equity research across public health and the broader scientific community. First, the public health community must prioritize the investigation and development of interventions that seek to improve health among Black/AA everywhere, with a particular focus on the U.S. South. A justified history of medical mistrust and complex historical relationships has resulted in a dearth of research that focuses on addressing the unique health needs of Black/AA. Furthermore, when race-based differences do emerge, researchers will often times place blame on individuals or communities with suboptimal health outcomes. Prior studies that have identified race-based differences in health outcomes often stop short of understanding how structural oppression and systemic racism play a role in shaping access and quality of care in underserved communities. In a time of racial reckoning and increased attention towards Black Lives Matter and grassroots movements aimed at reducing state-backed racial violence and discrimination, it is essential that public health and scientific researchers reflect on how and why we conduct research with underserved communities. In order to conduct research that is both equitable and anti-oppressive, researchers should employ a community-engaged approach and work alongside community consultants to understand best practices for meaningfully and respectfully engaging with the community of interest. Furthermore, findings on race-based health outcomes should be used to bolster health policy measures that address social and structural determinants of health at the population level.

Secondly, given its robustness, mixed methods research should be continually revered as a gold standard when conducting outcomes research. The scientific community has historically lauded quantitative methods as superior, whereas the contrary remains true for single method

qualitative analyses. Quantitative methods are important in ascertaining causal relationships that are generalizable, however, these standalone methods fail to account for the patient experience or narrative, arguably of equal or greater value. When investigating new or unprecedented conditions, as done in this study, a lack of validated scales can make it difficult to capture meaningful data. The use of qualitative methods is especially helpful in bolstering datasets to include a diverse range of experiences that tell a story. These stories are particularly useful in understanding barriers and facilitators, as well as the experiences of those who may fall into the margins of the health care system. These findings should support the addition of qualitative methods, as well as their importance as a standalone method in conducting health equity research across populations. To this end, health equity researchers should prioritize the selection of mixed methods research designs that support robust analysis and comprehensive findings.

Future Directions

Future studies of syndemic theory through an intersectional lens and ART adherence outcomes among Black/AA with HIV should be conducted using mixed methods research designs to allow for quantitative and qualitative findings to complement each other and understand the unique experiences of this population. In-depth studies should be conducted among PWH, or with specific subgroups of Black/AA PWH, in order to better understand their lived experiences and the ways intersectional stigma affects health. Studies that deeply explore the experiences of Black/AA are necessary to elevate the voices of historically marginalized groups that may not be represented in larger studies due to small sample size. People who identify as Black/AA need to be intentionally recruited for larger studies, in a culturally appropriate fashion, so that they can be represented. While this cross-sectional study found

associations between optimal ART adherence and housing stability, higher education level, and employment that was unimpacted by the COVID-19 pandemic, longitudinal research is required to understand the causal pathways of these relationships.

The addition of a community consultant or expert on traditional academic research teams is essential for understanding best practices for thoughtfully engaging with underserved populations. When conducting research among historically underrepresented communities, specifically Black/AA, it is necessary to understand how historical relationships between with scientific community have led to justified medical mistrust, racism, and discrimination. In research conducted with marginalized populations, community consultants should be a core member of the research team, from proposal to publication. While these professionals are often members of the population of interest, they are also experts in best practices for engaging with communities that have historically been harmed by research efforts. These best practices for community engagement will allow for research teams to better understand the communities they are serving, facilitating a richer, more meaningful investigation and experience.

Future studies should work to develop measurement tools that assess the impact of the COVID-19 pandemic on mental and physical health. Due to the unprecedented and emerging nature of the COVID-19 pandemic, silos exist among researchers seeking to develop and validate measures that accurately ascertain how the pandemic has affected health. Future research is required to develop validated measurement tools that assess the impact of COVID-19 on health, systematically. These metrics should focus on broad scope pandemic preparedness, as to not reinvent the wheel when a subsequent pandemic emerges. Survey methodologists and psychometricians should work collaboratively to develop these tools, anticipating necessary adaptations by community and health status.

Conclusion

Through the application of syndemic and intersectional approaches to a sequential explanatory mixed methods research study among Black/AA with HIV in Atlanta, this study found that those with greater housing stability, higher education attained, and not having a job that was impacted by the COVID-19 pandemic had higher odds of optimal ART adherence compared to their counterparts. Qualitative results supported these findings, in addition to the presence of mental health, social support, access to public transportation, use of telehealth, mail-order prescriptions, discrimination, and intersectional stigma, which all had the potential to influence adherence to ART. These significant associations revealed important differences in ART adherence outcomes depending on individual, social, and structural determinants of health. Social and structural determinants of health and syndemic conditions through an intersectional lens must be considered in future research addressing ART adherence among Black/AA with HIV.

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APPENDICES**APPENDIX A: Synergy Quantitative Survey****Synergy Quantitative Survey**

Start of Block: UID

Q90 What is the participant's study identification number?

End of Block: UID

Start of Block: Introduction

Q92 Thank you for taking the time to complete our survey. Your responses to these questions will provide our research with the data needed to develop a better understanding of the impact of COVID-19 on people like you. Your participation is completely voluntary, and you can choose not to answer any question you choose not to. If you have any issues or questions, please do not hesitate to ask the study recruiter who provided you with the tablet to complete this survey.

End of Block: Introduction

Start of Block: Demographics

D2 What is your gender identity?

- Female (1)
 - Genderqueer or Non-Binary (2)
 - Male (3)
 - Trans Female / Trans Woman (4)
 - Trans Male / Trans Man (5)
 - Not Listed (please specify) (6)
-

Decline to answer (7)

D3 What sex were you assigned at birth (on your original birth certificate)?

- Female (1)
 - Male (2)
 - Other (3) _____
 - Decline to answer (4)
-

D4 Do you consider yourself to be of Hispanic/Latino-a or Portuguese origin or descent (for example from, or coming from people who were from, Central America, Cuba, Puerto Rico, South America, or the Spanish Caribbean)?

- No (1)
- Yes (2)
- Decline to answer (3)

D5 What is your current marital status?

- Divorced (1)
 - Married (2)
 - Single (3)
 - Partnered/Cohabiting (4)
 - Separated (5)
 - Widowed (6)
 - Other (7) _____
 - Decline to answer (8)
-

D6 What is the highest level of education that you have completed?

- K-8th Grade (1)
- 9th-11th Grade (2)
- High School Graduate / GED (3)
- Some college credit but no degree (4)
- Technical / Vocational or Associate's Degree (5)
- Bachelor's Degree (6)
- Master's Degree (7)
- Doctorate (e.g., MD, JD, PhD) (8)
- Other (9) _____
- Decline to answer (10)

D7 Which statement(s) best describes your **current** employment status? (Check all that apply)

- Able to work but unemployed - Due to COVID-19 (1)
- Able to work but unemployed - Looking for work right now (2)
- Able to work but unemployed - Not looking for work right now (3)
- Day Laborer (4)
- Employed - Full Time (5)
- Employed - Part Time (6)
- Homemaker (7)
- Military (8)

- Self-Employed (9)
- Student - Full Time (10)
- Student - Part Time (11)
- Unable to work (12)
- Other (13) _____
- Decline to answer (14)
-

D8 How many people under the age of 18 live in your household?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 or more (6)
- Decline to answer (7)
-

D9 How many people between the ages of 18 and 39 live in your household (Please include yourself if you are between 18-39 years old)?

- 0 (7)
 - 1 (1)
 - 2 (2)
 - 3 (3)
 - 4 (4)
 - 5 or more (5)
 - Decline to answer (6)
-

D10 How many people between the ages of 40 and 64 live in your household (Please include yourself if you are between 40-64 years old)?

- 0 (7)
 - 1 (1)
 - 2 (2)
 - 3 (3)
 - 4 (4)
 - 5 or more (5)
 - Decline to answer (6)
-

D11 How many people 65 years or older live in your household (Please include yourself if you are 65 years or older)?

- 0 (7)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 or more (5)
- Decline to answer (6)
-



D12 In what Zip code do you currently live?

D13 What type of healthcare coverage (insurance) do you currently have? (Select all that apply)

- Medicaid or Medicare (1)
- Military / VA (Tricare, VA, CHAMP-VA) (2)
- No Health Insurance (3)
- Private Insurance (Aetna, BlueCross, etc.) (4)
- Other (5) _____
- Decline to answer (6)
-

D14 Where are you currently living? (Select all that apply)

- A house or apartment that I own or rent (1)
- A house or apartment that belongs to a family member (2)
- A house or apartment that a friend rents (3)
- A house or apartment that a friend owns (4)
- On the street (5)
- Other (6) _____
- Residential drug/alcohol treatment facility (7)
- Rooming, boarding, or halfway house (8)
- Shelter / Welfare hotel (9)
- Decline to answer (10)

Display This Question:

If Where are you currently living? (Select all that apply) = A house or apartment that I own or rent

D15 Do you currently own or rent your house/apartment?

- Own (1)
- Rent (2)
- Decline to answer (3)

End of Block: Demographics

Start of Block: HIV and Treatment Specific Questions

1 When were you first diagnosed with HIV?

- Less than 6 months ago (1)
 - Between 6 months and 1 year ago (2)
 - Between 1 year and 2 years ago (3)
 - Between 2 years and 5 years ago (4)
 - More than 5 years ago (5)
 - Decline to answer (6)
-

2 Are you currently taking any HIV Medication (antiretroviral medication) for your HIV diagnosis?

- No (1)
- Yes (2)
- I don't know (3)
- Decline to answer (4)

Skip To: End of Block If Are you currently taking any HIV Medication (antiretroviral medication) for your HIV diagnosis? = No

3 For how long have you been consistently taking HIV Medication (antiretroviral medication) for your HIV diagnosis?

- Less than 1 month (1)
- 1-3 months (2)
- 4-6 months (3)
- 7-11 months (4)
- 1-2 years (5)
- 3-5 years (6)
- More than 5 years (7)
- Decline to answer (8)

End of Block: HIV and Treatment Specific Questions

Start of Block: Health Status Questions

5 Was your viral load detectable or undetectable in Spring 2020?

- I had an undetectable viral load (1)
 - I had a detectable viral load (2)
 - Decline to answer (4)
-

6 What is your viral load now?

- I currently have an undetectable viral load (1)
 - I currently have a detectable viral load, but it is low (2)
 - Decline to answer (4)
-

7 Do you have any other health conditions besides HIV?

- No (1)
- Yes - and at least one of my other health conditions is not well controlled (2)
- Yes - but all of my other health conditions are well controlled (3)
- Decline to answer (4)

End of Block: Health Status Questions

Start of Block: Vaccine(s) and Healthcare Seeking Questions

1 Thinking about the "Flu Shot" (influenza vaccination), which of the following do you most agree with?

- I get a flu shot every year (1)
 - I get a flu shot most years, but not all (2)
 - I sometimes get a flu shot, but usually do not (3)
 - I never get a flu shot (4)
 - Decline to answer (5)
-

2 Did you receive a flu shot between October 2019 and May 2020?

- No (1)
 - Yes (2)
 - Don't know (3)
 - Decline to answer (4)
-

Display This Question:

If Did you receive a flu shot between October 2019 and May 2020? = No

3 Why didn't you get a Flu Shot last year? (Select all that apply)

- I never get a Flu Shot (1)
- I don't think that the Flu Shot will keep me from getting the Flu (2)
- Last time I received a Flu Shot I got sick from it (3)
- I could not afford to get a Flu Shot (4)
- I don't need one because I don't think I would get very sick if I were to get the Flu (5)
- I have heard the Flu Shot can make you sick (6)
- Decline to answer (7)

Display This Question:

If Did you receive a flu shot between October 2019 and May 2020? = Yes

4 What made you decide to get a Flu Shot last year? (Select all that apply)

- I get the Flu Shot every year (1)
- I think that the Flu Shot protects me against the Flu (2)
- I think that the Flu Shot protects my family and community from the Flu (3)
- My insurance coverage paid for the Flu Shot (4)
- My employer required me to receive a Flu Shot (5)
- Decline to answer (6)

5 Has at least one of your healthcare providers recommended that you receive a Flu Shot for the 2020-2021 influenza season?

- No (1)
- Not Sure (2)
- Yes (3)
- Decline to answer (4)
-

6 Have you received a flu shot for the 2020-2021 influenza season?

- No (1)
- Not yet, I plan to (4)
- Yes (2)
- Decline to answer (3)
-

Currently, there are a number of vaccines being tested in clinical trials that are intended to prevent the virus (SARS Coronavirus 2; or SARS-CoV-2 for short) that causes Coronavirus Disease 2019 (or COVID-19 for short). We'd like to ask you a few questions about Coronavirus Disease 2019 or COVID-19, your actions, and potential vaccines to prevent this disease.

In this survey: **"Coronavirus"** means the virus (SARS Coronavirus 2; SARS-CoV-2) that was identified in December 2019. **"COVID-19"** means all of the social, financial, emotional, physical, political, and logistical issues caused or made worse by the coronavirus / COVID-19 pandemic.

7 What do you think about the coronavirus crisis?

- It is not as severe as is it being reported (1)
 - It is as severe as being reported (2)
 - It is more severe than is being reported (3)
 - Decline to answer (4)
-

8 Have you been tested for Coronavirus?

- No (1)
- Yes (2)
- Don't know (3)
- Decline to answer (4)

Skip To: 11 If Have you been tested for Coronavirus? = No

9 How long ago was your most recent test for coronavirus?

- Less than 1 week ago (1)
 - Between 1 week and 1 month ago (2)
 - Between 1 and 3 months ago (3)
 - More than 3 months ago (4)
 - Don't know (5)
 - Decline to answer (6)
-

10 What was the result of your most recent coronavirus test?

- Negative (1)
 - Positive (2)
 - Pending / Indeterminate (3)
 - Don't know (4)
 - Decline to answer (5)
-

Display This Question:

If Have you been tested for Coronavirus? = No

11 What has kept you from being tested for coronavirus? (select all that apply)

- I haven't felt sick (1)
 - Testing was not available in my are (2)
 - I didn't know where to go for testing (3)
 - I haven't had transportation to or from a testing location (4)
 - I was worried about not being able to pay (5)
 - I didn't have someone to watch my children or other people in my care while I went for testing (6)
 - I haven't been able to take time off from work (7)
 - I was afraid to know if I had the coronavirus (8)
 - I was told by a healthcare provider to self-quarantine instead of getting tested (9)
 - Other (10) _____
 - Decline to answer (11)
-

12 Have you ever been diagnosed with COVID-19 by a health care professional or public health worker?

- No (1)
 - Yes (2)
 - I don't know (3)
 - Decline to answer (4)
-

13 Have any other members of your household been diagnosed with COVID-19 by a healthcare professional or public health worker?

- No (1)
 - Yes (2)
 - I don't know (3)
 - Not applicable, I live alone (5)
 - Decline to answer (4)
-

14 Are you an essential worker (healthcare worker, sanitation services, grocery store worker, cleaning services, restaurant worker)?

- No (1)
 - Yes - and I was employed during the stay at home / shelter in place order (2)
 - Yes - but I was not employed during the stay at home / shelter in place order (3)
 - Decline to answer (4)
-

15 Think about what you were doing when the coronavirus crisis first started (Spring 2020) and Georgia had a stay at home / shelter in place order. How often did you leave home for

ESSENTIAL purpose (for example going to work, buying groceries, seeking medical care, taking care of someone)?

- Never (1)
 - Rarely (less than once a week) (2)
 - Frequently (one or more times a week) (3)
 - Every day or almost every day (4)
 - Decline to answer (5)
-

16 How often did you leave home for OTHER reasons?

- Never (1)
 - Rarely (less than once a week) (2)
 - Frequently (one or more times a week) (3)
 - Every day or almost every day (4)
 - Decline to answer (5)
-

17 Think about what you are doing now (Winter 2021). How often do you leave home for ESSENTIAL purposes (for example going to work, buying groceries, seeking medical care, taking care of someone.)

- Never (1)
- Rarely (less than once a week) (2)
- Frequently (one or more times a week) (3)
- Every day or almost every day (4)
- Decline to answer (5)

18 These days (Winter 2021), how often do you leave home for OTHER reasons?

- Never (1)
 - Rarely (less than once a week) (2)
 - Frequently (one or more times a week) (3)
 - Every day or almost every day (4)
 - Decline to answer (5)
-

19 Think about the start of the Coronavirus crisis in Georgia (Spring 2020). In those days how often did you do each of the following?

Used
sanitizer
wipes on
high-touch
surfaces
(e.g.,
grocery
cart, door
handles)
when not at
home (6)

Wore
disposable
gloves
when not at
home (7)

Wore a
mask when
not at home
(8)

Washed
your hands
when
returning
home (9)



20 Think about the last few weeks (December 2020 - present), how often are you doing each of the following?

Wearing
disposable
gloves
when not at
home (6)

Wearing a
mask when
not at home
(7)

Washing
your hands
when
returning
home (8)

21 **Think about Spring 2020**, when Georgia's stay at home / shelter in place orders were in effect. **At that time**, what was your opinion of those orders?

- I thought they were unnecessary and should not have been enacted (1)
- I thought they were necessary for a while but lasted too long (2)
- I thought they were necessary and lasted the right length of time (3)
- I thought they were necessary but didn't last long enough (4)
- Decline to answer (5)

22 With what you know now about the coronavirus Crisis, what is your current opinion of last Spring's stay at home orders?

- They turned out to be unnecessary and should not have been enact (1)
 - They turned out to be necessary but lasted too long (2)
 - They turned out to be necessary and lasted the right length of time (3)
 - They turned out to be necessary but didn't last long enough (4)
 - Decline to answer (5)
-

23 For the following questions, please choose which option you most agree with:

	Very unlikely (1)	Unlikely (2)	Likely (3)	Very likely (4)	Decline to answer (5)
<p>If coronavirus vaccine was approved and licensed for use in the U.S. and you <u>DID NOT</u> have to pay out of pocket for it, how likely is it that you would get it for yourself? (1)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>If a coronavirus vaccine was approved and licensed for use in the U.S. and you <u>DID</u> have to pay out of pocket for it, how likely is it that you would get it for yourself? (2)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Display This Question:

If For the following questions, please choose which option you most agree with: = Very unlikely

Or For the following questions, please choose which option you most agree with: = Unlikely

24 If you **would choose NOT to get a coronavirus vaccine**, what would be the reason(s)?
Please select all that apply:

- I do not believe in the use of vaccines (1)
- I cannot afford the cost to get vaccinated (2)
- I would be concerned about the safety of the vaccine for everybody (3)
- I would be concerned about the effectiveness of the vaccines for everybody (4)
- I would be concerned about the safety of the vaccine for African Americans (5)
- I would be concerned about the safety of the vaccine for people living with HIV (6)
- I would be concerned about the effectiveness of the vaccine for African Americans (7)
- I would be concerned about the effectiveness of the vaccine for people living with HIV (8)
- I do not think the vaccine would have been tested sufficiently for everybody (9)
- I do not think the vaccine would have been tested sufficiently for African Americans (10)
- I do not think the vaccine would have been tested sufficiently for people living with HIV (11)
- I believe that my body can fight coronavirus alone and does not need help (12)
- I do not believe coronavirus is a serious threat (13)
- Other (please specify) (14)
-
- Decline to answer (15)

Display This Question:

If For the following questions, please choose which option you most agree with: = Likely

Or For the following questions, please choose which option you most agree with: = Very likely

25 If you **would choose to get a coronavirus vaccine**, what would be the reason(s)? Please select all that apply.

- To protect my own health (1)
 - To protect the health of my family (2)
 - To protect the health of members of my household (3)
 - To protect the health of the community (4)
 - I get all vaccines that are recommended for me (5)
 - It's my duty to get vaccinated (6)
 - Other (please specify) (7)
-
- Decline to answer (8)
-

26 As a direct result of the coronavirus crisis, my quality of life has been most impacted by (select all that apply):

- Financial instability (1)
 - Increased work hours (2)
 - Isolation / loneliness (3)
 - Limited access to healthcare (4)
 - Loss of employment (5)
 - Unable to do things that bring me joy (6)
 - Worry about my health (7)
 - Worry about the health of my loved ones (8)
 - Worry / Fear about the future (e.g. threat of the virus, economy, etc.) (9)
 - Decline to answer (10)
-

27 Assuming that the amount of testing for coronavirus remains the same, which of these statements do you think is the most true:

In March 2021 the number of new cases of coronavirus diagnosed each week in Georgia will:

- Decrease rapidly (1)
- Decrease slowly (2)
- Level off (3)
- Increase slowly (4)
- Increase rapidly (5)
- Decline to answer (6)



28 What are your main concerns if you were to contract the coronavirus? (300 characters)



29 Is there anything encouraging that has come out of the Covid-19 pandemic? (300 characters)



30 What is the one thing that concerns you the MOST about the coronavirus crisis and why? (300 characters)

End of Block: Vaccine(s) and Healthcare Seeking Questions

Start of Block: Impact of COVID-19 on health seeking

31 Has the coronavirus Crisis led to any of the following problems accessing medical care (Select all that apply)?

- Unable to attend a healthcare providers appointment (1)
- Unable to obtain medications that you normally take (2)
- Unable to afford medical care (3)
- Decline to answer (4)

Display This Question:

If Has the coronavirus Crisis led to any of the following problems accessing medical care (Select al... = Unable to attend a healthcare providers appointment

31-1 Why were you unable to attend a healthcare provider's appointment? (**Select all that apply**)

- Because I was worried about catching the coronavirus (1)
- Because I was too sick to leave the house (2)
- Because my healthcare facility was closed because of the pandemic (3)
- Because I did not have any transportation to get to the facility (4)
- Because my healthcare provider was only seeing patients over the internet or by phone and I did not have internet access or a cellphone (5)
- Decline to answer (6)

Display This Question:

If Has the coronavirus Crisis led to any of the following problems accessing medical care (Select al... = Unable to obtain medications that you normally take

31-2 Were any of the medications that you were unable to get ones for your HIV?

- No (1)
- Yes (2)
- Decline to answer (3)
-

Display This Question:

If Has the coronavirus Crisis led to any of the following problems accessing medical care (Select al... = Unable to afford medical care

31-3 Why were you unable to afford medical care? (**Select all that apply**)

- Lost my insurance (1)
- Lost my job (2)
- Too expensive (3)
- Decline to answer (4)
-

32 How much has the coronavirus crisis interrupted the care you receive for mental health (for example, counselors, therapist, support groups)?

- Not at all (1)
- Somewhat (2)
- A lot (3)
- Decline to answer (4)
-

33 **During the early stages of the coronavirus crisis** (Spring 2020) was there ever a period of time of **one week or more** when you were off treatment for HIV (not taking medications)?

- No (1)
 - Yes (2)
 - Decline to answer (3)
-

34 **During the most recent three months (December 2020 - present)**, has there been a period of time of **one week or more** when you were off treatment for HIV (not taking medications)?

- No (1)
 - Yes (2)
 - Decline to answer (3)
-

35 During the early days of the coronavirus crisis (Spring 2020), how often did you take your HIV medications (antiretrovirals) as prescribed?

- All (100%) of the time (1)
 - Almost all (95-99%) of the time (2)
 - A lot (75-94%) of the time (3)
 - Some (75-50%) of the time (4)
 - Almost never (49-1%) of the time (5)
 - None (0%) of the time (6)
 - Decline to answer (7)
-

36 In the last three months (December 2020 - present), how often have you taken your HIV medications (antiretrovirals) as prescribed?

- All (100%) of the time (1)
- Almost all (95-99%) of the time (2)
- A lot (75-94%) of the time (3)
- Some (75-50%) of the time (4)
- Almost never (49-1%) of the time (5)
- None (0%) of the time (6)
- Decline to answer (7)

End of Block: Impact of COVID-19 on health seeking

Start of Block: Last 30 Days

Q82 This next set of questions asks about the last 30 days. Please think about the last 30 days when answering these questions.

37 During the last 30 days, how many days did you **miss at least one dose** of any of your HIV medications (antiretrovirals)?

- 0 days (1)
 - 1-2 days (2)
 - 3-7 days (3)
 - 8-10 days (4)
 - More than 10 days (5)
 - Decline to answer (6)
-

38 During the last 30 days, how successful were you at taking your HIV medications (antiretrovirals) **as prescribed**?

- Very poor (1)
 - Poor (2)
 - Fair (3)
 - Good (4)
 - Very good (5)
 - Excellent (6)
 - Decline to answer (7)
-

39 Has the coronavirus crisis led to any of the following?

	Yes (1)	No (2)	Don't know (3)	Decline to answer (4)
You or a member of your household losing employment, having to stop working, or having to work fewer hours (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You or a member of your household having to work outside home during the pandemic because of the essential work duties or financial restraints (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You or the household member requesting or receiving unemployment benefits (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having to spend time taking care of children (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of other sources of financial support, like food stamps, by you or a member of your household (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Loss of your housing, or becoming homeless (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A change in your health insurance coverage (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of your health insurance (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining insurance as part of emergency coverage or Medicaid (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulty paying for basic needs, including food, clothing, shelter, and heat (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of usual source of food (like food pantry or free or reduced cost meals) (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

40 Please tell me how many days you have felt the following ways during the past week.

	<1 day (1)	1-2 days (2)	3-4 days (3)	5-7 days (4)	Decline to answer (5)
I was bothered by things that usually don't bother me (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had trouble keeping my mind on what I was doing (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt depressed (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that everything I did was an effort (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt hopeful about the future (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt fearful (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I couldn't sleep or my sleep was restless (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was happy (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt lonely (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could not "get going" (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

41 In the past month, did you talk to anyone in your social support network (for example friends, family, or others who support you) about things that are important to you?

- No (1)
 - Yes (2)
 - Decline to answer (3)
-

Display This Question:

If In the past month, did you talk to anyone in your social support network (for example friends, fa... = No

42 If no, why not?

- I did not have anyone to talk with about things that are important to me (1)
 - I have people I can talk to but I chose not to talk to any of them about things that are important to me (2)
-

Display This Question:

If In the past month, did you talk to anyone in your social support network (for example friends, fa... = Yes

43 If yes, how many people did you talk to?

- 1 person (1)
 - 2 or 3 different people (2)
 - 4 or 5 different people (3)
 - 6 or more different people (4)
 - Decline to answer (5)
-

44 All in all, during the past month, how satisfied have you been with the social support that you have received from others?

- Very dissatisfied (1)
- Dissatisfied (2)
- Neither satisfied nor dissatisfied (3)
- Satisfied (4)
- Very satisfied (5)
- Decline to answer (6)

End of Block: Last 30 Days

Start of Block: Future Participation

45 Are you willing to participate in an individual interview or a group discussion sometime in the near future?

- Yes, an individual interview only (1)
- Yes, a group discussion only (2)
- Yes, either an individual interview or a group discussion (3)
- No (4)

End of Block: Future Participation
