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UNIVERSITY OF CALIFORNIA SAN DIEGO
SAN DIEGO STATE UNIVERSITY

Examining Psychosocial Determinants of Antiretroviral Adherence Trajectories among Black
Adults with HIV

A Dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Philosophy

in

Clinical Psychology

by

Vanessa Bianca Serrano

Committee in charge:

University of California San Diego
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DISSERTATION APPROVAL PAGE

The Dissertation of Vanessa Bianca Serrano is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

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2026

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PEER-REVIEWED PUBLICATIONS

1. Lobo, J.D., **Serrano, V.B.**, Sundermann, E.E., Campbell, L.M., Gouaux, B., Letendre, S., Bondi, M.W., & Moore, D.J. (2025). Cerebral spinal fluid markers of Alzheimer's-related pathology relate to aMCI among people with HIV. *BMC Neurology*, 26(1), 91. <https://doi.org/10.1186/s12883-025-04585-8>.
2. Paltin, D., Prescott, M., Ma, J., Yeager, L. Ham, Serrano, V.B., Narez, J., Delgado, J., Burke, L., Gouaux, B., Beckwith, M., Morris, S.R., Moore, D.J., & Montoya, J.L. (2025). Barriers and Facilitators to PrEP Adherence among Transgender and Non-binary Individuals: A Mixed-Methods Analysis of Psychosocial Factors and Health Belief Model Constructs. *AIDS Behav*, 29, 3687–3702. <https://doi.org/10.1007/s10461-025-04810-y>
3. Miller-Perusse, M., Horvath, K. J., Montoya, J. L., Moore, D. J., Carrico, A. W., & **Serrano, V. B.** (2025). Minority stress and stimulant use among US adult sexual minority men: A systematic review. *Drug and Alcohol Dependence Reports*, 15, 100333. <https://doi.org/10.1016/j.dadr.2025.100333>

4. Prescott, M., Yeager, S., Ham, L., Rivera Saldana C., **Serrano, V.B.**, Narez, J., Paltin, D., Delgado, J., Moore, D.J., & Montoya, J.L. (2024). A comparative study between human coders and generative artificial intelligence: Consistency in themes, reliability, and time for qualitative thematic analysis. *JMIR AI*, 3, e54482. doi: 10.2196/54482.
5. **Serrano, V.B.**, Pasipanodya, E.C., Montoya, J.L., Heaton, R.K., Jeste, D.V., & Moore, D.J. (2023). Reactivity of health-related quality of life to perceived stress: The buffering role of psychosocial resources in a longitudinal study of adults with and without HIV. *Journal of Clinical Psychology in Medical Settings*, 31(1), 174-185. <https://doi.org/10.1007/s10880-023-09962-4>
6. **Serrano, V.B.**, Moore, D.J., Morris, S., Hoenigl, M., Tang, B., Liao, A., & Montoya, J.L. (2023). Efficacy of daily text messaging to support adherence to HIV pre-exposure prophylaxis (PrEP) among stimulant-using men who have sex with men. *Substance Use and Misuse*, 58(3), 465-469. doi: 10.1080/10826084.2023.2165409.
7. Yeager, S., **Serrano, V. B.**, Paltin, D., Fisher, A., Willging, C., Karris, M., Aarons, G. A., Rangel, A., Flynn, R., Bolan, R., Moore, D. J., & Montoya, J. L. (2023). Qualitative examination of the impact of the COVID-19 pandemic and adherence to pre-exposure prophylaxis (PrEP) among sexual and gender minorities. *AIDS Education and Prevention*, 35(4). doi: 10.1521/aeap.2023.35.4.255.
8. Ham, L., Montoya, J.L., **Serrano, V.B.**, Yeager, S., Paltin, D., Pasipanodya, E.C., Marquine, M., Hoenigl, M., Garcia, R., Kua, J., Rodriguez, H., Gant, V., Rojas, S., & Moore, D.J. (2023). High psychosocial burden relates to worse antiretroviral treatment adherence among Black/African-American persons with HIV. *AIDS Patient Care STDS*, 37(2), 103-113. doi: 10.1089/apc.2022.0180.
9. Kohli, M., **Serrano, V.B.**, Montoya, J. L., Gouaux, B., Atkinson, J. H., & Moore, D. J. (2022). Daily self-report of substance use via text message corresponds to retrospective assessment in people with HIV who use methamphetamine. *Addiction Research & Theory*, 31(1), 29–36. <https://doi.org/10.1080/16066359.2022.2101639>.
10. Sun-Suslow, N., Balon, E., Montoya, J. L., Saloner, R., Campbell, L. M., **Serrano, V.B.**, Ellis, R. J., & Moore, D. J. (2022). Frailty syndrome is associated with poorer self-reported sleep quality among older persons with human immunodeficiency virus. *AIDS research and human retroviruses*, 38(2), 87–96. <https://doi.org/10.1089/AID.2020.0158>
11. **Serrano, V.B.**, Montoya, J.L., Campbell, L.M., Sundermann, E.E., Iudicello, J., Letendre, S., Heaton, R.K., & Moore, D.J. (2021). The relationship between vascular endothelial growth factor (VEGF) and amnesic mild cognitive impairment among older adults living with HIV. *Journal of Neurovirology*, 27(6), 885–894. <https://doi.org/10.1007/s13365-021-01001-y>.
12. Kohli, M., Pasipanodya, E. C., Montoya, J. L., Marquine, M., Hoenigl, M., **Serrano, V.B.**, Cushman, C., Garcia, R., Kua, J., Gant, V., Rojas, S., & Moore, D. J. (2020). A culturally adapted SMS text messaging intervention to promote antiretroviral therapy adherence among African Americans: Protocol for a single-arm trial. *JMIR Research Protocols*, 9(12), e21592. <https://doi.org/10.2196/21592>
13. Sun-Suslow, N., Saloner, R., **Serrano, V.B.**, Umlauf, A., Morgan, E. E., Ellis, R. J., Letendre, S., Grant, I., & Heaton, R. K. (2020). Lifetime methamphetamine use disorder and reported sleep quality in adults living with HIV. *AIDS and Behavior*, 24(11), 3071–3082. <https://doi.org/10.1007/s10461-020-02857-7>

14. Sun-Suslow, N., Pasipanodya, E., Morgan, E., Kohli, M., **Serrano, V.B.**, Letendre, S., Jeste, D. V., & Moore, D. J. (2020). Social support moderates D-dimer and self-rated successful aging within people with HIV and older adults. *Journal of Behavioral Medicine*, 43(6), 979–988. <https://doi.org/10.1007/s10865-020-00141-6>
15. Saloner, R., Campbell, L.M., **Serrano, V.B.**, Montoya, J.L., Pasipanodya, E., Paolillo, E.W., Franklin, D, Ellis, R.J., Letendre, S.J., Collier, A.C., Clifford, D., Gelman, B.B., Marra, C.M., McCutchan, A.J. Morgello, S., Sacktor, N., Jeste, D.V., Grant, I., Heaton, R.K., Moore, D.J., & the CHARTER and HNRP Groups. (2019). Neurocognitive SuperAging in older adults living with HIV: demographic, neuromedical and everyday functioning correlates. *Journal of the International Neuropsychological Society*, 25(5), 507-519. doi: 10.1017/S1355617719000018.

Manuscripts Under Review

1. **Serrano, V.B.**, Prescott, M., Moore, D. J., & Montoya, J.L. (Under Review). Health Belief Model-Informed Predictors and Complementary Psychosocial Factors Associated with Antiretroviral Therapy Adherence among Black Adults with HIV.
2. **Serrano, V.B.**, Prescott, M., Paltin, D., Maves, A., Rivera-Saldana, C., Montoya, J.L., Yeager, & Moore, D. J. (Under Review). Psychosocial determinants of antiretroviral adherence among Black adults with HIV.

Research Presentations

1. **Serrano, V.B.**, Prescott, M., Montoya, J.L., & Moore, D.J. Health Belief Model Predictors of Antiretroviral Adherence among Black Adults with HIV. Oral presentation (Live Research Spotlight) at the Society of Behavioral Medicine, Chicago, IL, April 2026.
2. Selva Kumar, D., Riegel, B., Pond, H., Liu, H., **Serrano, V.B.**, Tripolone, J., Breault, C., Cohen, R., & Salmoirago-Blotcher, E. Associations between Cognitive Function with Functional Capacity and Health-Related Quality of Life among Patients with Heart Failure and Mild Cognitive Impairment. Poster presented at the Society of Behavioral Medicine, Chicago, IL, April 2026.
3. **Serrano, V.B.**, Pond, H., Liu, H., Gathright, E., Selva Kumar, D., Tripolone, J., Breault, C., Riegel, B., & Salmoirago-Blotcher, E. Relationship between Sleep Quality and Vagal Control among Patients with Heart Failure and Mild Cognitive Impairment. Poster presentation at the Mind Brain Research Day, Department of Psychiatry and Human Behavior, Warren Alpert Medical School at Brown University, Providence, RI, March 2026.
4. **Serrano, V.B.**, Prescott, M., Paltin, D., Maves, A., Rivera-Saldana, C., Montoya, J.L., Yeager, S., & Moore, D.J. (2025, May). Social determinants of antiretroviral adherence among Black adults with HIV. Poster presented at the 2025 Association for Psychological Science, Washington, D.C.
5. **Serrano, V.B.**, Luu, B.K., Villers, E., Bondi, M.W., Letendre, S., Lobo, J.D., Moore, D.J., & Sundermann, E.E. (2025, May). Peripheral inflammation may indicate Alzheimer’s Disease risk in people with HIV. Poster presented at the UC San Diego Department of Psychiatry Lewis L. Judd Young Investigators Symposium, San Diego, CA.

6. Miller-Perusse, M., Montoya, J.L., Moore, D.J., Horvath, K.J., & **Serrano, V.B.** (2024, August). Minority stress and stimulant use among sexual minority men in the US: A systematic review. Poster presented at the National LGBTQ Health Conference 2024, Atlanta, GA.
7. **Serrano, V.B.**, Montoya, J.L., & Moore, D.J. (2024, June). The association between substance use and quality of life among Black people with HIV in the Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) Study. Oral presentation at the College on Problems of Drug Dependence 86th Annual Meeting, Montreal, Quebec, Canada.
8. **Serrano, V.B.**, Prescott, M., Rivera-Saldana, C., Narez, J., Maves, A., Yeager, S., Paltin, D., Montoya, J.L., & Moore, D.J. (2024, April). Latent growth curve modeling to estimate ART adherence patterns among Black adults with HIV. Poster presented at the UC San Diego Department of Psychiatry Lewis L. Judd Young Investigators Symposium, San Diego, CA.
9. **Serrano, V.B.**, & Amir, N. (2024, April). Developing group telehealth interventions for diverse populations: Balancing flexibility with treatment fidelity. Abstract presented at the 2024 Epidemiology Research Exchange, San Diego, CA.
10. **Serrano, V.B.**, Montoya, J.L., Pasipanodya, E.C., & Moore, D.J. (2023, June). Depression severity predicts antiretroviral therapy adherence among Black people with HIV in the Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) Study. ePoster (5-minute poster spotlight) presented at Adherence 2023, Fajardo, Puerto Rico.
11. **Serrano, V.B.**, Montoya, J.L., Pasipanodya, E.C., & Moore, D.J. (2023, June). The role of past substance use on ART adherence among Black adults with HIV. Poster presented at the College on Problems of Drug Dependence 85th Annual Meeting, Denver, CO.
12. Ham, L., Montoya, J.L., Schiavon, S., Pasipanodya, E.C., Marquine, M., Hoenigl, M., **Serrano, V.B.**, Garcia, R., Kua, J., Rodriguez, H., Gant, V., Rojas, S., & Moore, D.J. (2022, April). High psychosocial burden relates to worse antiretroviral treatment adherence among Black/African-American persons with HIV. Oral presentation (Live Research Spotlight) at the Society for Behavioral Medicine annual meeting, Baltimore, MD.
13. **Serrano, V.B.**, Montoya, J.L., Kohli, M., Pasipanodya, E.C., Marquine, M., Hoenigl, M., Kua, J., Rodriguez, H., Gant, V., Rojas, S., & Moore, D.J. (2022, April). The association between self-efficacy for medication management and antiretroviral adherence among African Americans living with HIV. Poster presented at the 43rd Annual Meeting & Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD.
14. Kohli, M., **Serrano, V.B.**, Montoya, J.L., Gouaux, B., Atkinson, J.H., & Moore, D.J. (2022, April). Daily self-report of substance use via text message corresponds to retrospective assessment in people with HIV who use methamphetamine. Poster presented at the 43rd Annual Meeting & Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD.
15. Fisher, A., Montoya, J.L., **Serrano, V.B.**, Schiavon, S., Rangel, A., Lyman, P., Flynn, R., Willging, C., Karris, M., Aarons, G., & Moore, D.J. (2022, April). A community-engaged approach to assess Covid-19 pandemic-related impacts to pre-exposure prophylaxis (PrEP) adherence among sexual and gender minorities. Poster presented at the 43rd annual meeting of the Society of Behavioral Medicine, Baltimore, MD.

16. Montoya, J.L., **Serrano, V.B.**, Fisher, A., Rangel, A., Lyman, P., Flynn, R., Willging, C., Karris, M., Aarons, G.A., & Moore, D.J. (2021, December). A community-engaged approach to inform adaptations to a technology-based intervention to support pre-exposure prophylaxis (PrEP) adherence among sexual and gender minorities. Oral presentation at the 14th Annual Conference on the Science of Dissemination and Implementation in Health, Virtual.
17. **Serrano, V.B.**, Moore, D.J., Morris, S., & Montoya, J.L. (2021, June). The effectiveness of daily text messaging to support adherence to HIV pre-exposure prophylaxis (PrEP) among meth-using men who have sex with men. Poster presented at the 83rd College on Problems of Drug Dependence, virtual meeting.
18. **Serrano, V.B.**, Montoya, J.L., Campbell, L.M., Sundermann, E., Letendre, S.L., Heaton, R.K., & Moore, D.J. (2019, October). Markers of inflammation and coagulation and their relation to aMCI and HAND. Poster presented at the 49th annual Society for Neuroscience meeting, Chicago, IL.
19. Balon, E., Sun-Suslow, N., Montoya, J.L., Saloner, R., Campbell, L.M., **Serrano, V.B.**, Ellis, R., & Moore, D.J. (2019, October). Increased frailty symptoms relate to poorer self-reported sleep quality among older people living with HIV. Abstract presented at the 10th International Workshop on HIV and Aging, New York, NY.
20. Pasipanodya, E.C., **Serrano, V.B.**, Montoya, J.L., Heaton, R.K., & Moore, D.J. (2019, March). Reactivity of HRQoL to perceived stress: The buffering role of mastery in a longitudinal study of aging adults living with and without HIV. Poster presented at the 40th annual Society for Behavioral Medicine meeting, Washington DC.
21. Saloner, R., Campbell, L.M., **Serrano, V.B.**, Montoya, J.L., Pasipanodya, E., Paolillo, E.W., ...& Moore, D.J. (2019, February). Neurocognitive SuperAging in persons living with HIV: demographic, neuromedical and everyday functioning correlates. Oral presentation at the 47th International Neuropsychological Society Annual Conference, New York, NY.
22. **Serrano, V.B.**, & Head, D. (2018, November). Moderators of age effects on allocentric processing. Poster presented at the 48th annual Society for Neuroscience meeting, San Diego, CA.
23. **Serrano, V.B.**, Pasipanodya, E.C., Montoya, J.L., Heaton, R.K., & Moore, D.J. (2018, April). Perceived stress and quality of life in older persons living with HIV. Poster presented at the 98th annual Western Psychological Association Convention, Portland, OR. Oral presentation at the 2018 Advancing Diversity in Aging Research (ADAR) Summit, Boston, MA.
24. Delgadillo, J.D., Campbell, L.M., Heaton, A., Rooney, A.S., **Serrano, V.B.**, Marquine, M.J., Jeste, D.V., Moore, D.J., & Moore, R.C. (2018, April). The relationship of religiosity/spirituality with clinico-demographics and positive psychological factors among persons living with HIV. Poster presented at the 98th annual Western Psychological Association Convention, Portland, OR.

ABSTRACT OF THE DISSERTATION

Examining Psychosocial Determinants of Antiretroviral Adherence Trajectories among Black
Adults with HIV

by

Vanessa Bianca Serrano

Doctor of Philosophy in Clinical Psychology

University of California San Diego, 2026
San Diego State University, 2026

Professor David J. Moore, Co-Chair
Professor Jessica L. Montoya, Co-Chair

Black people with HIV (PWH) experience persistent disparities in antiretroviral therapy (ART) adherence and HIV-related health outcomes in the United States. These disparities are shaped by interacting psychosocial, community, and structural-level factors. This three-paper dissertation integrated archival longitudinal data and newly collected multi-method data to: 1) examine psychosocial determinants of health (PSDOH) as predictors of ART adherence, 2) examine Health Belief Model (HBM) constructs and related psychosocial predictors of ART adherence, and 3) characterize experiences related to living with HIV, ART adherence, HIV care navigation, resilience, social support, and community cohesion among Black PWH in Southern California.

Study 1 (N = 91) examined PSDOH as predictors of longitudinal ART adherence among Black PWH enrolled in the culturally adapted Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) text messaging intervention. ART adherence was assessed using a visual analog scale (VAS), a 3-item self-report adherence measure, and daily text message responses. Housing instability was associated with lower adherence across all adherence measures, while higher health literacy was associated with better text message-reported adherence.

Study 2 (N = 91) examined HBM constructs and related psychosocial factors as predictors of longitudinal ART adherence using the same iC-CHANGE cohort. Greater self-efficacy was associated with higher adherence on retrospective adherence measures (i.e., VAS and a 3-item self-report adherence measure), while greater perceived barriers were associated with lower adherence across adherence outcomes.

Study 3 (N = 20) used a multi-method design guided by the Socioecological Model to examine experiences related to living with HIV, ART adherence, HIV care navigation, resilience, social support, and community cohesion among Black PWH in Southern California. Adherence was supported through routines, interpersonal support, and motivations related to maintaining health, while barriers included disrupted routines, psychosocial burden, and healthcare-system challenges. Participants also described limited perceptions of Black community cohesion in Southern California, and desires for stronger culturally specific support systems.

Together, the three studies underscore that ART adherence among Black PWH is shaped by interacting psychosocial, structural, and community-level influences, and support the

importance of socioecologically grounded and culturally responsive approaches to HIV care and well-being among Black PWH.

Chapter 1: INTRODUCTION

Despite the scaling up of evidence-based interventions to End the HIV Epidemic (EHE) in the U.S., several communities most affected by HIV continue to lag behind the EHE goal of reducing new HIV infections by 90% by 2030. African American/Black (Black) people with HIV (PWH) account for a large proportion of HIV diagnoses in the U.S. and experience persistent disparities across the HIV care continuum, including antiretroviral therapy (ART) adherence and viral suppression (Centers for Disease Control and Prevention [CDC], 2019; CDC, 2024; Kaiser Family Foundation, 2024). Black individuals represented 42% of all new HIV diagnoses reported in 2019 despite comprising only 13% of the total United States population (CDC, 2019). Black men and women are also more likely to die from HIV than their non-Hispanic White counterparts (U.S. Department of Health and Human Services, 2019). Furthermore, Black PWH have poorer outcomes across the HIV care continuum, including lower rates of viral suppression and ART adherence (Simoni et al., 2012; Tchakoute et al., 2022). Thus, ART adherence remains a critical intervention target for reducing HIV-related disparities among Black PWH. Understanding why these disparities persist requires examining influences that operate across multiple levels: from individual beliefs and behaviors to interpersonal relationships, community context, healthcare systems, and broader structural conditions. Given the potential influence of determinants operating across multiple socioecological levels, the Socioecological Model (SEM; Bronfenbrenner, 1979) provides an organizing framework for this multilevel perspective and guides the present dissertation.

Disparities in ART adherence exist among Black PWH despite advances in HIV treatment. Newer ART regimens generally yield better adherence than older formulations due to the development of once-daily pills that reduce pill burden and the complexity of dosing

schedules (Tapper et al., 2004). Furthermore, long-acting injectable ART is now available, which may simplify the complexity of ART adherence for some PWH. Despite these advances, many PWH continue to be prescribed oral, daily ART regimens, and many individuals experience difficulty with the daily administration of pills at the same time each day (Tapper et al., 2004; U.S. Food and Drug Administration, 2021). Several studies have demonstrated poorer ART adherence among Black PWH compared to White PWH, including lower odds of 100% adherence and higher likelihood of detectable HIV RNA levels (Adeyemi et al., 2013; Torian et al., 2014). The lower proportion of Black PWH with viral suppression has sparked research focused on understanding factors underlying these disparities. From a socioecological perspective, ART adherence is not solely an individual-level behavior, but rather embedded within and shaped by interpersonal, community, healthcare-system, and structural contexts that may differentially affect Black PWH.

Various factors drive the health disparities experienced by Black PWH, operating across multiple levels, including neighborhood and geographic attributes, healthcare access, education, social relationships, and structural inequities. The Socioecological Model (SEM) offers a framework for organizing these multilevel influences (Bronfenbrenner, 1979; McLeroy et al., 1988). SEM conceptualizes health behaviors and outcomes as shaped by interacting factors across individual, interpersonal, community, healthcare-system, and structural levels. Guided by the SEM, the present dissertation examines psychosocial, community, and structural-level determinants of ART adherence and healthcare engagement among Black PWH. Within this framework, psychosocial determinants of health, such as self-efficacy, social support, resilience, and perceptions of barriers to care, represent potentially modifiable factors through which

broader community and structural conditions may influence ART adherence and healthcare engagement.

Consistent with the SEM, models of social determinants of health (SDOH) categorize conditions in the environment that affect health outcomes (U.S. Department of Health and Human Services [U.S. HHS], 2022). SDOH are the conditions in the environments where people are born, live, learn, work, interact, and age (U.S. HHS, 2022). These determinants shape health outcomes and can lead to disparities among different populations. At the structural level, determinants encompass systemic factors such as economic policies, healthcare regulations, and national health strategies that govern the conditions of daily life. At the community and interpersonal levels, social and community networks represent the immediate social environment, including relationships and support systems that affect health, such as family connections, community engagement, and local organizations. Neighborhood and environment focus on the environmental and occupational settings that impact health, including housing quality, employment status, and access to resources. At the healthcare-system level, access to comprehensive, high-quality health care services is another driver of health outcomes due to the influence of timely medical care on long-term health. Understanding how these SEM levels interact is essential for addressing health inequities and improving public health outcomes, particularly for populations such as Black PWH who face compounding disadvantages across multiple levels.

Consistent with the SEM, poor HIV disease outcomes among Black PWH, including unsuppressed viral load, are associated with factors across all socioecological levels: structural (e.g., accessibility of healthcare, housing stability), community (e.g., societal stigma toward HIV, community cohesion), interpersonal (e.g., social support, healthcare relationships), and

individual (e.g., self-efficacy for managing health; Kaufman et al., 2014; Storholm et al., 2019).

Considering that individual-level psychosocial resources may be the synergistic product of several SDOH levels, psychosocial determinants of health warrant additional attention among Black PWH. Low or inadequate psychosocial resources, including stress management, social support, hopefulness, resilience, and self-efficacy, may drive disparities in ART adherence, maintenance of health behaviors, and engagement with healthcare among Black PWH (Emlet, 2006; Huang et al., 2013; Stewart et al., 2005; Webel et al., 2014; Whitehead et al., 2014).

Conversely, modifiable psychosocial determinants of health such as social support, resilience, and self-efficacy may be improved to support healthcare utilization and ART adherence (Sandelowski et al., 2009). These positive psychosocial determinants, however, may be lower in areas where PWH perceptions of community cohesion are low (Cené et al., 2011). Within the SEM, psychosocial resources at the individual level are not formed in isolation. Rather, psychosocial resources are shaped by conditions experienced within the community, structural, and interpersonal levels. This multilevel interdependence is a core reason why the SEM provides a particularly fitting framework for understanding ART adherence disparities among Black PWH.

Within the SEM, the elevated risk of poor psychosocial resources among Black PWH reflects influences at multiple levels: structural-level factors, such as racism, stigma, medical mistrust, and unequal access to quality healthcare facilities, as well as individual-level factors, such as loneliness and low social support (Blackstock et al., 2015; Dale et al., 2018; Kelso et al., 2014; Malika et al., 2023; Parcesepe et al., 2018; Zekeri, 2018). In a study of social networks and social isolation, Emlet (2006) found that among PWH of color, 54% were at risk of social isolation and had significantly lower scores on a social support network scale than other

participants in the study. Similarly, Malika et al. (2023) found loneliness to be related to lower ART adherence among Black PWH and to worse physical and mental health outcomes. Another study found that among Black PWH, participants were more likely to be non-adherent to ART if they had high psychological distress (Gross et al., 2016). Conversely, other research suggests that among PWH, social support through a combination of sources, including family and friends, healthcare staff, and peers, aids in navigating the healthcare system and supports adherence to treatment (Li et al., 2018). Considered together, these findings highlight that psychosocial factors operating at the individual and interpersonal levels of the SEM, such as loneliness, social support, self-efficacy, and psychological distress, are key determinants of ART adherence and healthcare utilization among Black PWH. Closely examining these SEM-level influences may be beneficial for identifying individuals at risk for poor ART adherence and for developing targeted interventions.

At the individual level of the SEM, the Health Belief Model (HBM) provides a complementary framework for understanding how individual beliefs and perceptions may influence health behaviors such as ART adherence. According to the HBM, individuals are more likely to engage in health-promoting behaviors when they perceive a health condition as severe, believe treatment will be beneficial, perceive fewer barriers to action, and feel confident in their ability to successfully perform the behavior (Rosenstock et al., 1988; Rosenstock et al., 1990). Prior research applying components of the HBM to ART adherence has identified self-efficacy and perceived barriers as important predictors of medication adherence among PWH (Johnson et al., 2007; Simoni et al., 2006). However, these relationships have not been consistently explored among exclusively Black PWH, who may experience ART adherence through unique cultural,

social, and structural realities, including stigma, distrust of healthcare systems, limited social support, and structural barriers to care.

Moving from the individual to the community-level factors posited by the SEM, research suggests a sense of community cohesion is particularly important to PWH (Dulin et al., 2018). There are regional differences in the population size, density, and dispersion of Black PWH (CDC, 2018), which may result in different lived experiences and psychosocial interactions. Most research and interventions for Black PWH are targeted to geographic locations where the Black community comprises a large proportion of the population (Magnus et al., 2010; Sutton et al., 2017). Consequently, little is known about adherence outcomes in smaller communities of Black PWH where fewer resources and supports may exist. Black PWH with strong community cohesion report positive HIV outcomes, including high ART adherence and viral suppression (George et al., 2009; Knight & Schatz, 2022). Black PWH living in regions with a larger network of Black individuals may benefit from shared experiences and resilience within the community (Qiao et al., 2019). Less is known about how these community-level SEM factors, such as resilience and community cohesion, operate among Black PWH living in EHE jurisdictions with a lower proportion of Black PWH, where the community-level resources observed and measured by the majority of existing research may simply be less available.

At the community level of the SEM, regional differences among Black communities in the U.S. suggest that Black PWH in Southern California may experience lower community cohesion than those living in EHE jurisdictions with larger and more cohesive Black communities (CDC, 2018; CDC, 2022). Understanding the influence of social support and community cohesion holds great value, as lower cohesion may represent an important barrier to engaging Black PWH in HIV care (Knight & Schatz, 2022). There is little literature specifically

examining community cohesion as it relates to ART adherence among Black PWH, and even less research that uses qualitative approaches to understand attitudes and beliefs about HIV treatment in geographic regions where the proportion of Black individuals is low. Because modifiable SEM-level factors, including individual-level psychosocial resources (e.g., social support, resilience, and self-efficacy) and community-level factors (e.g., cohesion) may be improved to promote healthcare utilization and ART adherence (Sandelowski et al., 2009), research in this area may help identify modifiable intervention targets for reducing health disparities experienced by Black PWH in communities with a low proportion of Black PWH.

At the healthcare-system and individual levels of the SEM, mobile health (mHealth) technology has emerged as a promising modality for ART adherence support given its cost-effectiveness and accessibility. Various mHealth interventions for HIV prevention and treatment have been culturally tailored for Black individuals (Vitsupakorn et al., 2023). One such intervention, individualized Texting for Adherence Building (iTAB), is a personalized, two-way, fully automated text-messaging system designed to support medication adherence (Kohli et al., 2020; Moore et al., 2013; Moore et al., 2015; Moore et al., 2018). The iTAB intervention has been successfully implemented in many subgroups of PWH who may have difficulty adhering to ART, including people who use substances and people with co-occurring bipolar disorder, and was culturally tailored for Black PWH in the Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) study (Kohli et al., 2020).

The iC-CHANGE study represents a rich source of longitudinal data for the exploration of psychosocial factors that may influence ART adherence among Black PWH. Participants in iC-CHANGE received daily, two-way text messages to support ART adherence and completed psychosocial assessments throughout the intervention period. Relative to many existing studies,

iC-CHANGE included day-level self-reported ART adherence through text message responses, multiple self-report adherence measures, a rich psychosocial measurement battery, and a cohort of exclusively Black PWH receiving a culturally tailored, theory-based intervention. Other analyses of iC-CHANGE data suggest that psychosocial determinants of health, including self-efficacy and medical mistrust, are associated with ART adherence among Black PWH (Ham et al., 2023). Taken together, the iC-CHANGE dataset affords the opportunity to examine longitudinal ART adherence among Black PWH and identify predictors operating across multiple SEM levels to better understand adherence over time.

In addition to quantitative longitudinal analyses, qualitative and multi-method approaches are needed to understand how Black PWH describe and navigate factors across all levels of the SEM, including individual experiences with adherence, interpersonal relationships, community cohesion, healthcare engagement, and structural resources, in their daily lives. Quantitative analyses can identify associations between psychosocial determinants and adherence outcomes, but qualitative approaches provide additional insight into how these determinants are experienced, interpreted, and managed within broader socioecological contexts (Hamilton & Finley, 2020). This is particularly important given that ART adherence is not simply a medication-taking behavior; it is a socioecological behavior shaped by individual beliefs, daily routines (individual level), relationships and social support (interpersonal level), community norms and cohesion (community level), provider interactions (healthcare-system level), and policies governing access to care and housing (structural level).

The present three-paper dissertation examined determinants of ART adherence across multiple socioecological levels among Black PWH using both archival longitudinal data from iC-CHANGE and newly collected multi-method data. Papers 1 and 2 used archival iC-CHANGE

data to examine predictors of longitudinal ART adherence among Black PWH who participated in a culturally tailored mHealth intervention. Paper 1 examined psychosocial determinants of health operating at the structural level (e.g., housing stability) and the individual level (e.g., healthcare literacy) as predictors of longitudinal ART adherence across multiple adherence measures. Paper 2 examined selected HBM constructs and related psychosocial factors (i.e., factors operating at the individual level) as predictors of adherence across multiple measurement approaches. Paper 3 extended this work through new data collection with Black PWH in Southern California, using quantitative psychosocial assessments and qualitative interviews to examine adherence and healthcare navigation across all socioecological levels: individual, interpersonal, community, healthcare-system, and structural. By integrating archival longitudinal analyses with newly collected multi-method data, this dissertation sought to identify challenges and future intervention targets for reducing health disparities experienced by Black PWH, particularly in an EHE jurisdiction with a relatively low proportion of Black PWH.

Chapter 2: STUDY 1
Psychosocial Determinants of ART Adherence among Black Adults with HIV

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Abstract

Background: Black people with HIV (PWH) experience lower rates of antiretroviral therapy (ART) adherence compared to other racial/ethnic groups. Disparities in psychosocial determinants of health (PSDOH) disproportionately affect Black communities and may contribute to adherence gaps. The iC-CHANGE study evaluated the efficacy of a personalized, culturally adapted text messaging intervention to improve ART adherence among exclusively Black PWH. We examined the relationship between PSDOH and longitudinal ART adherence.

Methods: 90 Black PWH were administered a text-messaging intervention and attended in person study visits (12-week intervals). Measures of ART adherence included a visual analog scale, quantitative questionnaire, and text message responses. The relationship between PSDOH and ART adherence measures were evaluated using linear and logistic mixed effects regression.

Results: Majority of the participants (n=90) were male (82.0%) and mean (SD) age was 46.5 (11.7) years at baseline. Housing instability was associated with lower ART adherence on the 3-item self-report adherence scale ($\beta = -4.04, p = .001$), the visual analog adherence scale ($\beta = -4.15, p = .02$), and text message responses ($\beta = -.03, p = .02$). Older age was also associated with higher adherence on the visual analog scale ($\beta = 0.003, p = .008$), but lower adherence in daily text message responses ($\beta = -0.06, p = .03$). Health literacy also showed a positive association with text message responses ($\beta = 0.03, p < .02$).

Conclusion: These findings highlight the need for targeted interventions addressing housing stability and health literacy to improve ART adherence among Black individuals with HIV.

Keywords: HIV, Black/African American, Social Determinants of Health, ART, Adherence

Introduction

African American/Black (henceforward referred to as Black) people are disproportionately affected by HIV in the United States. In 2022, Black individuals made up 14% of the U.S. population yet accounted for almost 40% of new HIV diagnoses and people with HIV (Prevention, 2022). Black people with HIV (PWH) also experience increased risks for suboptimal HIV-related outcomes, including challenges with antiretroviral treatment (ART) adherence. A smaller percentage of Black American PWH achieve viral suppression compared to their Hispanic/Latinx or White counterparts. In 2022, only 53% of Black PWH were virally suppressed, compared to 63% of White PWH (Foundation, 2024). One estimate indicated that Black PWH had 1.61 times the odds of suboptimal (<95%) ART adherence compared to White PWH (C et al., 2022).

Social determinants of health (SDOH) are the nonmedical factors in the environments where people are born, live, learn, work, interact, and age that influence health outcomes (U.S. Department of Health and Human Services, 2020). SDOH can be grouped into five domains: economic stability, education, healthcare access and quality, neighborhood and built environment, and social/community support. Black PWH frequently experience suboptimal SDOH in each of these domains, driving health disparities (Dominguez-Dominguez et al., 2024). For example, HIV-related outcomes have been tied to SDOH such as access to healthcare, affordable housing, stigmatizing attitudes towards HIV, social support, community cohesion, and self-efficacy for managing health (Kaufman et al., 2014; Storholm et al., 2019). Within this broader SDOH framework, psychosocial determinants of health (PSDOH) represent the mechanisms through which structural and contextual SDOH are internalized and experienced, including stress, stigma, and social context. These psychosocial determinants of health (PSDOH)

are particularly salient for Black PWH, as they reflect the lived consequences of structural inequities and may exert direct influence on health behaviors such as ART adherence.

For Black PWH, suboptimal PSDOH have been associated with lower receipt of, and poorer adherence to, ART (Landovitz et al., 2017; Simoni et al., 2012). Various PSDOH measures exist, with differences in the specific variables used to capture SDOH domains that also tap into the unique psychosocial experiences of PWH (Hinnant et al., 2022). Specific to PWH, some groups have selected HIV-specific variables as potential SDOH indicators (e.g., HIV-related discrimination being used as a measure of community support; (Dominguez-Dominguez et al., 2024). Using similar measures, understanding the influence of PSDOH on ART adherence is critical to better support the HIV outcomes of Black adults in HIV care.

Methods for supporting and measuring ART adherence are limited, especially for mobile health (mHealth) interventions. Current interventions using text messaging to improve ART adherence target various demographics of PWH. Most interventions show improved adherence, with text message reminders proving to be an effective form of support (Horvath et al., 2012). However, many studies lacked comprehensive adherence results or demographic-specific analyses. Individual-level factors such as race, age, and substance use behaviors have emerged as significant predictors of adherence and program engagement. Overall, personalized and frequent text messaging appears to be a promising strategy to enhance ART adherence among PWH. However, further research is needed to explore demographic nuances and specifically PSDOH as predictors of intervention success to optimize the effectiveness of these interventions. This project builds on current literature by examining the efficacy of an mHealth intervention to improve ART adherence that was culturally tailored for Black PWH.

The Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) study recruited a longitudinal cohort of Black PWH to participate in a mHealth study to promote ART adherence. The individualized Texting for Adherence Building (iTAB) intervention was developed as a two-way short message service (SMS) text messaging intervention to improve ART adherence and associated virologic suppression among PWH (Kohli et al., 2020; Moore et al., 2018; Moore et al., 2013; Moore et al., 2015). To address lower levels of engagement in HIV care among Black PWH in Southern California, iTAB was culturally adapted for Black PWH in the iC-CHANGE study (Kohli et al., 2020). Prior analyses of the iC-CHANGE data suggested various psychosocial determinants of health (i.e., self-efficacy, medical mistrust) were associated with ART adherence among Black PWH (Ham et al., 2023). Despite informative findings from iC-CHANGE and existing research, critical gaps in understanding modifiable determinants of ART adherence among Black PWH exist.

Considering the potential influence of PSDOH on HIV care outcomes, particularly among Black PWH, we sought to examine the role of PSDOH in ART adherence examining three self-report measures of ART adherence across the longitudinal iC-CHANGE study as the outcomes (i.e., a 3-item self-report measure, a visual analog scale (VAS), and daily text message responses to the mobile phone intervention). In this secondary analysis of iC-CHANGE data, guided by existing measures, we modeled each SDOH domain: education (as measured by health literacy and years of education), economic stability (as measured by family income), healthcare access (as measured by healthcare utilization), neighborhood/built environment (as measured by housing stability), and community support specific to HIV (as measured by HIV disclosure). While our hypotheses were exploratory relating to which specific PSDOH domains would be

associated the strongest with ART, we hypothesized that lower values of each domain would relate to lower ART adherence.

Methods

Participants

Participants were 90 Black/African American PWH who were actively receiving care for HIV from November 2017 to July 2019 at [redacted for blind review] in [redacted for blind review], a community health center focused on aiding low-income and medically underserved communities. Recruitment for the iC-CHANGE text messaging intervention was completed through patient pools of Black/African American PWH at [redacted for blind review]. All participants were required to have been taking ART for at least two months at the time of enrollment. Participants were required to be English speaking and able to provide informed consent. Those with obstacles to their ability to participate in all visits such as severe neurocognitive impairments like dementia were excluded from enrollment. Similarly, those who were not be able to complete the entire duration of the study or would not be present in [redacted for blind review] for the necessary 24 or 48 weeks were excluded as well. All study procedures received Institutional Review Board approval by [redacted for blind review].

Measures

Psychosocial Determinants of Health. While previous studies have conceptualized and measured specific SDOH in various ways, many have adapted measures to include more psychosocially relevant measures that encapsulate the unique interpersonal experiences subsumed with an HIV diagnosis. Thus, our SDOH indicators were guided by existing literature on PSDOH specific to PWH (Dominguez-Dominguez et al., 2024; Menza et al., 2021). As such, we identified measures collected at baseline that corresponded to the five key domains of SDOH

while tailoring to the experience of living with HIV (inclusive of two HIV-specific measures), as hypothesized predictors of ART adherence:

Education. Total number of years of education and health literacy were examined to represent education. Health literacy was measured using the Short Assessment of Health Literacy-English (SAHL-E), an 18-item assessment intended to measure a participant's understanding of medical terms (Lee et al., 2010). SAHL-E measures understanding of these medical terms by assessing for correct pronunciation and asking participants to select which out of the two provided words is most similar or has a closer association to a target medical term (e.g. if the target word is *syphilis* and the two provided words are *contraception* and *condom*, the correct answer would be *condom*). Correct answers receive a score of 1 while “*don't know*” and wrong answers—like associating *syphilis* with *contraception*, or mispronouncing syphilis—would be counted as 0. SAHL-E scores are calculated by totaling the number of correct answers with the highest score possible being 18 and scores between 0 and 14 indicating low health literacy.

Economic Stability: Family income was used as a measure of economic stability, with demographic questionnaire options ranging from less than \$10,000 to \$150,000 or more.

Healthcare Utilization: While all participants were receiving care at FHCS, variations in individuals' level of healthcare utilization were captured using Utilizations of Care, a 9-item self-report questionnaire from the HIV Cost and Services Utilization Study (HCSUS; Berry et al., 1999). Items asked participants about their usage of services in the past 6 months such as dental care, alternative therapies (e.g. acupuncture), doctors' visits, the emergency room, etc. Participants would answer “yes” or “no” to the usage of these services. Higher scores would indicate more healthcare utilization in the past 6 months.

Housing Stability: Housing stability was examined as a measure of neighborhood/built environment. Specifically, individuals shared their usual sleeping location [stable housing (e.g., in your own apartment, room, or house) versus less stable housing (e.g., in a friend or relative's housing, in a hotel/motel room, in a car/vehicle)]. Based on these responses, individuals were categorized as having stable housing or lacking stable housing.

Community Support (specific to PWH): Community support was captured through HIV disclosure in this study. While not a direct measure of community support, HIV disclosure reflects an individual's level of social engagement and openness about their HIV status, which can influence access to support systems and receipt of support relating to HIV. Participants were asked whether they had disclosed their HIV status to various individuals or groups, including people living with them, family members, friends, or colleagues at work. Based on their responses, participants were categorized as either having disclosed their HIV status or not disclosed it.

Outcomes:

3-item Adherence Scale. ART adherence over the past 30 days was measured using a 3-item ART adherence scale (Wilson et al., 2016; Wilson et al., 2020). This scale was administered at baseline and then every 12 weeks over the course of the study. The first item asked participants how many days in the past 30 they missed at least one dose of their HIV medication, with responses ranging from 0 to 30. The second item assessed how well they believed they followed their prescribed medication regimen, with Likert-type responses ranging from "very poor" to "excellent." The third item asked participants how often they took their medication as prescribed, with responses ranging from "never" to "always." Consistent with Wilson et al.'s scoring procedures (2020), responses to these three adherence items were transformed to a 0–100

scale, where 0 indicated the lowest adherence and 100 indicated perfect adherence. A summary adherence score was calculated as the average of the three individual items, and the adherence score was analyzed as a continuous variable. This longitudinal adherence score served as an outcome measure in our analyses.

Visual Analog Scale (VAS). A visual analog scale (VAS) provided another measure of participant self-reported adherence. The VAS was administered at baseline and then every 12 weeks over the course of the study. Participants would mark an “X” on a line with anchors from 0-100 indicating what percentage of their HIV medications they had taken in the past month. The “X” on the VAS would then correspond to what percent of their medication participants perceived themselves to have taken in the past month (i.e., placing an X on the middle of the line would be counted as “50%”). These longitudinal participant-plotted percentage scores served as an outcome measure in our analyses.

Text Messaging Adherence. Text messaging through the iC-CHANGE iTAB messaging system was used to measure self-reported adherence to ART (Kohli et al., 2020; Moore et al., 2018; Moore et al., 2013; Moore et al., 2015). Participants chose to participate in either the 24-week or 48-week text-messaging intervention with a majority choosing the 48-week duration. Participants would respond with “Y” (indicating yes), “N” (indicating no), or “S” (indicating snooze, i.e., a request to receive a text message in one hour) in response to text message prompts of whether they had taken their medication. No (“N”) responses would receive an encouraging medication adherence message prompting them to reach out to their care team (e.g. *“Please take a moment for your health ASAP. Call us if you need assistance or have a question”*). Three consecutive no (“N”) responses, or nonresponse, would trigger an automated message about study noncompliance. In addition to the message, FHCS D care coordinators would contact the

participant about their noncompliance and discuss potential barriers to engagement. Participants were considered adherent to ART for a given day if they responded “Y” and non-adherent if they either did not respond or responded “N” via text message with iTAB. The proportion of “Y” responses over a 12-week interval was calculated, resulting in up to four “epochs” of ART adherence measures across the 48-week study. These longitudinal epochs served as an outcome measure in our analyses.

Statistical Analysis

Mixed effects linear and logistic models were used to evaluate changes in self-reported adherence measures over study visits. The mixed effects models evaluated a linear time effect with random intercepts (i.e., random subject effect) to account for within-person correlation across repeated measures. Separate models were fit for each ART adherence outcome, including the visual analog scale, 3-item quantitative adherence questionnaire, and adherence assessed via text message responses. PSDOH variables available in the iC-CHANGE dataset were identified a priori and mapped to the five established SDOH domains (economic stability, education, healthcare access and quality, neighborhood and built environment, and social/community context), recognizing that available indicators reflected psychosocial and contextual dimensions of these domains rather than comprehensive structural measures. Each PSDOH indicator was entered as an independent predictor in models examining longitudinal ART adherence. Demographic variables were screened for their univariate association with the outcome (i.e., ART adherence) and were included in the multivariable models if the variable had a significant result ($p > .2$) in either analysis. All models adjusted for time and relevant demographic covariates.

Results

Participant demographics are reported in **Table 1**. Of covariates screened, only age at baseline was found to be significantly associated with the outcome (i.e., ART adherence as measured by the 3-item adherence self-report scale and the VAS), and thus included in the final models. Prior to model estimation, missingness across variables included in the analyses was evaluated and found to be low. Outcome missingness was 2.26% for the 3-item adherence measure and 1.98% for the visual analog scale adherence measure, whereas the derived text message adherence outcome contained no missing values because it was calculated as the proportion of affirmative responses across text message prompts. Missingness among predictor variables ranged from 0% to 4.24%, (i.e., 0.85% for economic stability, 0% for housing stability, 0% for community support, 4.24% for education, 1.41% for health literacy, and 1.13% for healthcare utilization). Mixed-effects models were estimated using maximum likelihood, allowing participants with incomplete observations to contribute available data to model estimation.

Table 1. Participant characteristics.

Variable	Descriptive Statistics (n=91)
48-week study (vs. 24-week study)	83 (92%)
Age (median)	50 years (IQR: 36-57, range 23-66)
Gender identity	
Male	74 (82%)
Female	12 (15%)
Genderqueer/gender non-conforming	1 (1%)
Transwoman	1 (1%)
Education	
Completed high school/ GED	8 (8.9%)
Some college	18 (19.8%)
Completed college	47 (51.6%)
Some graduate education	10 (11%)
Graduate degree	2 (2.2%)
Ethnicity other than Black	
Hispanic/Latino/Spanish	9 (10%)
American Indian or Alaska Native	9 (10%)
Asian American or Asian Origin	1 (1%)
White	3 (3%)
Other	5 (5%)
Income	
<\$10,000	41 (46%)
\$10,000 to \$19,999	26 (29%)
>\$20,000	22 (24%)
Employment status	
Full-time employment	19 (20%)
On disability	26 (28%)
Unemployed	27 (29%)
Relationship status	
Single	69 (76%)
In a committed relationship	16 (17%)
Other	5 (5%)
HIV disclosure	
Ever disclosed	82 (90%)
Disclosed to family	66 (80%)
Disclosed to friends	72 (87%)

The first mixed effects model (PSDOH predicting the 3-item self-report scale scores across study visits; **Table 2**), with a linear time effect and random intercepts indicated a significant main effect of housing instability ($b = -4.04, p < .001$). The main effect of housing stability suggests a significant difference in ART adherence as measured by the 3-item self-report scale across study visits, such that individuals who lacked consistent housing had lower adherence (i.e., a 4-point decrease in the self-report adherence measure) than individuals who identified having stable housing. No other significant main effects were observed.

For our second model (PSDOH predicting VAS scores; **Table 3**), the mixed effects model with a linear time effect and random intercepts indicated a significant main effect of housing stability ($b = -4.15, p = .02$) and age ($.003 p < .001$). The main effect of housing stability suggests a significant difference in ART adherence as measured by the VAS across study visits, such that individuals who lacked consistent housing had lower adherence than individuals who reported having stable housing. Similarly, the main effect of age indicated that individuals who are older report greater ART adherence as measured by the VAS across study visits ($b = 0.003, p = .008$).

The third model (PSDOH predicting daily text message responses; **Table 4**) used a mixed effects logistic regression model with a linear time effect and random intercepts. In this model, housing stability was statistically significant ($b = -.03, p = .02$), indicating that individuals who lacked consistent housing had a lower proportion of “yes” text message responses compared to those who were stably housed. Further, greater health literacy was associated with greater ART adherence as measured by text message responses ($b = .03, p < .001$). Age also remained a significant predictor in this model, such that individuals of older ages reported lower ART adherence ($b = -0.06, p = .03$).

Table 2. Final model for the 3-item measure of ART adherence as predicted by PSDOH.

	3-Item Self-report Scale				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i>
<i>Education</i>	-1.57	1.24	-1.27	.21	-4.00, .85
<i>Health Literacy</i>	.87	1.30	.67	.51	-1.68, 3.42
<i>Economic Stability</i>	.99	1.11	.90	.37	-1.17, 3.17
<i>Healthcare Utilization</i>	1.27	.82	1.54	.13	-0.33, 2.87
<i>Housing Stability</i>	-4.04	1.21	-3.35	.001	-6.41, -1.68
<i>Community Support</i>	-9.40	7.39	-1.27	.21	-23.86, 5.06

Note: Age was significantly associated with both the visual analog scale and text message responses, and thus included in both final models as a covariate. Outcome missingness for the 3-item measure of ART adherence was 2.26%.

Table 3. Final model for the visual analog scale (VAS) of ART adherence as predicted by PSDOH.

	Visual Analog Scale				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i>
<i>Education</i>	-.94	1.18	-.79	.43	-3.29, 1.41
<i>Health Literacy</i>	1.29	1.18	1.10	.28	-1.05, 3.62
<i>Economic Stability</i>	.56	1.01	.55	.58	-1.45, 2.57
<i>Healthcare Utilization</i>	.82	1.10	.75	.46	-1.37, 3.00
<i>Housing Stability</i>	-4.15	1.10	-3.78	<.001	-6.33, -1.96
<i>Community Support</i>	-7.87	6.92	-1.14	.26	-21.65, 5.90

Note: Age was significantly associated with both the visual analog scale and text message responses, and thus included in both final models as a covariate. Outcome missingness for the VAS was 1.98%.

Table 4.Final model for the text message adherence measure of ART adherence as predicted by PSDOH.

	Text Message Responses				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i>
<i>Education</i>	-.01	.01	-.99	.32	-.02, .01
<i>Health Literacy</i>	.03	<.00	6.26	<.001	.02, .04
<i>Economic Stability</i>	.02	.01	1.60	.11	-.00, .04
<i>Healthcare Utilization</i>	.01	.01	.63	.53	-.02, .03
<i>Housing Stability</i>	-.03	.01	-2.36	.02	-.06, -.01
<i>Community Support</i>	.04	.07	.55	.58	-.10, .18

Note: Age was significantly associated with both the visual analog scale and text message responses, and thus included in both final models as a covariate. The derived text message adherence outcome contained no missing values because it was calculated as the proportion of affirmative responses across text message prompts

Discussion

The current longitudinal study employed linear and logistic mixed effects regression models to examine the association between PSDOH and ART adherence among Black PWH who participated in a daily text messaging intervention to support ART adherence. Our results reveal that housing stability is a critical factor influencing ART adherence, as demonstrated by the significant associations observed among a 3-item self-report measure of ART adherence, a VAS, as well as the text message response model. Other significant predictors of ART adherence included age and health literacy. Taken together, this research may help to identify specific PSDOH that may be targeted for improvement to better support ART adherence among Black PWH.

Our finding that housing stability is a salient predictor of ART adherence aligns with prior research emphasizing the significant impact of housing instability on health outcomes and medication adherence. Most broadly, access to housing is a critical PSDOH that can affect mental and physical health across individuals regardless of HIV status (Baggett et al., 2013;

Breakey et al., 1989; Wright, 1990). Experiencing housing instability contributes to stress, anxiety, and other mental health symptoms that negatively impact physical health outcomes (Baggett et al., 2013). Related, a systematic review and meta-analysis examining multiple chronic health conditions (inclusive of 9 studies specific to PWH) reported that alongside food insecurity, housing instability most consistently impacted medication adherence (Wilder et al., 2021). Specific to PWH, Galarraga et al. (Galarraga et al., 2018) established that unstable housing is a significant predictor of HIV biomarkers (i.e., CD4 cell count, viral load). Related, housing instability has been reported to impact overall retention in HIV care (Rajabiun et al., 2018). The Rajabiun et al. (2018) study found that not only was housing stability associated with significantly higher rates of ART prescriptions and viral suppression, but also retention in care (compared to individuals who remained or became unstably housed during the study period (Rajabiun et al., 2018).

Further explaining these similar findings, housing instability may complicate health disparities by creating environments that hinder access to health services, increasing the likelihood of missed appointments, and leading to inconsistent ART adherence (Colbert et al., 2010; Walburn et al., 2012). This is particularly relevant for PWH, where consistent ART adherence is crucial for therapeutic efficacy and viral suppression. In further support of the strong influence of housing on ART adherence, a systematic review by Aidala et al. (Aidala et al., 2016) corroborates these findings by demonstrating that lack of stable housing is a significant barrier to remaining in HIV care, ART adherence, and viral suppression, and risk of forward transmission. Studies highlighted in the Aidala review (Aidala et al., 2016) expand that individuals experiencing housing instability face significant challenges such as increased stress, disrupted access to healthcare, and unstable living conditions, all of which can adversely affect

their ability to adhere to prescribed treatments. The review’s findings underscore that individuals without stable housing frequently encounter difficulties in maintaining consistent healthcare practices, which aligns with our observation of lower ART adherence among those experiencing unstable housing. Taken together, our findings are supported by prior research suggesting the importance of housing on ART adherence, and further extends such research by specifically examining Black PWH—a population disproportionately impacted by HIV and health disparities.

Health literacy was significantly associated with ART adherence in our text message response models, and this finding aligns with existing research linking higher health literacy with better health outcomes and adherence to treatment among PWH (Wawrzyniak et al., 2013; Wolf et al., 2007). For Black PWH, however, health literacy is often intertwined with broader socioeconomic and systemic factors. Research shows that Black individuals face unique barriers to effective health literacy, including historical mistrust of the healthcare system, cultural differences in health communication, and disparities in access to quality health education (Muvuka et al., 2020). These factors may exacerbate challenges in navigating treatment regimens and healthcare systems. Across diverse health conditions among Black adults, culturally tailored and interactive approaches such as storytelling and culturally appropriate graphics can improve health outcomes by making health information more relevant and accessible to target populations (Muvuka et al., 2020). Such tailored interventions can help bridge gaps in understanding and enhance ART adherence among Black PWH. Thus, our research in combination with existing research supports the need for culturally competent health literacy programs that take into account the unique experiences and needs of Black communities, and specifically, Black PWH.

Age showed differential associations with ART adherence, such that older age was associated with higher adherence in the VAS model but lower adherence in the text message responses model of ART adherence. Previous research supports the notion that older adults often face unique challenges related to daily ART adherence, including managing complex medication regimens and comorbidities (Masters et al., 2019). Thus, the differential association of age with the study's different adherence measures suggests that older adults might experience barriers in responding to daily, real-time adherence tracking methods like text messages, potentially due to technological barriers or cognitive decline associated with age (Kuerbis et al., 2017), and instead have higher perceptions of adherence when asked to subjectively recall their adherence during study visits. Taken together, particularly older adults in this population may benefit from tailored attention to methods of supporting ART adherence depending on their familiarity and comfort with technology.

Despite the contributions of our research to the existing body of literature on PSDOH among Black PWH, there are limitations to the present study. First, participants were already receiving care within FHCSO, and thus may not be representative of the broader population of Black PWH across the care continuum (e.g., individuals who have yet to be linked to consistent care). While this is a limitation, it is notable that participants self-selected to be a part of this study due to perceiving themselves to have difficulty with ART adherence. Second, relating to the 3-item self-report measure of adherence as well as VAS, participants completed these measures every 12 weeks during their regular visits to FHCSO. As such, it is possible that recall biases potentially influenced their self-reports. Third, our strongest and most consistent indicator of ART adherence across models of ART adherence was housing stability, as measured by consistent sleeping location. While these findings are meaningful and informative for identifying

PSDOH that are most salient for ART adherence, little is known of the longitudinal histories of our participants and their housing stability (e.g., how long they had been unstably housed). Finally, while text messaging data was carefully monitored and participants were asked to provide feedback if they encountered any technical difficulties, given the nature of the automated text messaging system that generated text message responses, there is potential for occasional technical errors that prevented an accurate measure of ART adherence (e.g., if a text message was not sent as planned).

Our study underscores the critical importance of housing stability, age, and health literacy as key factors influencing ART adherence among Black PWH. Interventions that address suboptimal PSDOH (e.g., housing stability) have the potential to improve or support ART adherence. For instance, programs aimed at improving housing stability could be integrated with health literacy initiatives. Such comprehensive approaches are crucial for overcoming the barriers that exacerbate health disparities and for fostering environments that facilitate rather than hinder ART adherence. Additional longitudinal studies are essential to gain a deeper understanding of how PSDOH (e.g., housing stability) and individual-level factors (e.g., age) interact over time and to assess the long-term impact of comprehensive interventions on ART adherence. By addressing these PSDOH in clinical care, we can work towards more effective strategies that not only improve adherence but also contribute to better overall health outcomes for Black PWH.

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Chapter 3: STUDY 2
**Health Belief Model-Informed Predictors and Complementary Psychosocial Factors
Associated with Antiretroviral Therapy Adherence among Black Adults with HIV**

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Abstract

Objective: Black individuals in the United States are disproportionately affected by HIV and experience disparities in antiretroviral therapy (ART) adherence. This study examined components of the Health Belief Model (HBM) and related psychosocial factors as predictors of ART adherence across multiple adherence measures.

Methods: Participants were 91 Black adults with HIV recruited from a federally qualified health center (FQHC) and enrolled in a single-arm text messaging-based adherence support intervention. ART adherence was assessed using three measures: (1) a continuous adherence measure, (2) a visual analog scale (VAS), and (3) daily text message-reported responses. Selected HBM constructs (perceived benefits, perceived severity, perceived barriers, and self-efficacy) and related psychosocial factors (supports and beliefs) were examined as predictors of these three adherence outcomes. Linear mixed-effects models assessed associations between psychosocial predictors and longitudinal adherence outcomes.

Results: The sample was primarily comprised of men and older individuals, most of whom had disclosed their HIV status to others. In multivariable models including all predictors, greater self-efficacy was associated with higher adherence on both the continuous adherence measure ($\beta = .18, t = 2.11, p = .04$) and VAS ($\beta = .21, t = 2.54, p = .01$), but not the daily text message responses. Greater perceived barriers were associated with lower adherence on the continuous adherence measure and VAS (p 's $< .001$) and showed a trend toward lower text message responses ($t = -0.79, p = .06$). Greater supports for adherence was marginally associated with higher VAS scores ($t = 1.95, p = .06$). Other psychosocial predictors were not significantly associated with adherence outcomes.

Conclusions: In this older cohort of Black adults receiving HIV care, self-efficacy and perceived barriers emerged as the most salient correlates of retrospective self-reported ART adherence. Findings support the potential value of interventions that strengthen self-efficacy and reduce perceived adherence challenges.

Keywords: HIV, medication adherence, Health Belief Model, psychosocial predictors, self-efficacy, African Americans, Longitudinal Studies, Treatment Outcome

Introduction

Antiretroviral therapy (ART) adherence is critical for achieving HIV viral suppression, improving health outcomes, and preventing HIV transmission among people with HIV (PWH). However, maintaining consistent ART adherence can be challenging and is influenced by multiple psychosocial and behavioral factors, including attitudes and beliefs about HIV and its treatment (Do et al., 2010). Black PWH continue to experience lower rates of ART adherence and poorer HIV-related outcomes compared to White PWH (Tchakoute et al., 2022; Adeyemi et al., 2013; Kaiser Family Foundation, 2024). Accordingly, identifying modifiable psychosocial factors associated with ART adherence among Black PWH remains an important area of investigation.

Understanding the psychosocial and behavioral mechanisms associated with ART adherence is critical in populations disproportionately affected by HIV. The Health Belief Model (HBM) offers a framework for examining how individual beliefs and perceptions influence health-related behaviors such as medication adherence (Rosenstock et al., 1990). According to the HBM, individuals are more likely to engage in health-promoting behaviors when they perceive a health threat as severe, believe they are susceptible to that threat, recognize benefits to taking action, and perceive minimal barriers to doing so. The model also incorporates the concept of self-efficacy, or the belief in one's ability to successfully perform a behavior (Rosenstock, Strecher, & Becker, 1988). In the context of ART adherence, this means that beliefs about the seriousness of HIV, the effectiveness of ART, the difficulty of managing a daily regimen, and confidence in one's ability to adhere all play a role in whether a person takes their medication consistently.

Prior research applying components of the HBM, such as self-efficacy, to ART adherence has shown that these factors are strong predictors of whether people with HIV take medication as prescribed (Simoni et al., 2006; Johnson et al., 2007). However, these relationships have not been consistently explored among exclusively Black PWH, who may experience ART adherence through the lens of unique cultural, social, and structural realities, including stigma, distrust of healthcare systems, and limited social support. A deeper understanding of how HBM constructs operate within this population may help identify new leverage points for intervention.

In addition to clarifying predictors of ART adherence, observing differences in methods of measuring adherence is also of great importance. Traditional methods such as self-report questionnaires offer insight into adherence behaviors but are subject to recall and social desirability biases. More objective or behavioral indicators, such as viral load or pharmacy refill data, are often unavailable in research studies or in community-based contexts. In recent years, mobile health (mHealth) approaches, particularly text messaging, have emerged as innovative tools to support and assess adherence. These measures allow for more real-time data. Text messaging interventions offer reminders, encouragement, and information that may reduce barriers and increase self-efficacy for ART adherence (Pop-Eleches et al., 2011; Finitis et al., 2014). Further, SMS-based adherence measures may capture day-to-day adherence behavior more proximally than retrospective self-report and have demonstrated stronger associations with biologic indicators of HIV outcomes in prior work (Bangsberg, 2008; Berg & Arnsten, 2006).

The present study aimed to examine multiple measures of ART adherence, including a self-reported continuous measure of adherence, a visual analog scale (VAS), and text message responses, among Black adults with HIV. Study participants were receiving care at a large federally-qualified health center (FQHC) and elected to participate in a study providing text

messaging to support ART adherence (Kohli et al., 2020; Pasipanodya et al, 2020). We assessed associations between four of six HBM constructs (perceived benefits of ART, severity of non-adherence, barriers to ART adherence, and self-efficacy for managing ART) alongside related psychosocial factors (supports and beliefs about ART adherence) and three complementary longitudinal adherence outcomes. By using multiple measures of ART adherence, this study aimed to identify psychosocial predictors of ART adherence in a sample at elevated risk for non-adherence and poorer HIV outcomes. We hypothesized that greater perceived benefits, self-efficacy, and supports and lower perceived barriers would be associated with higher ART adherence across measures.

Methods

Participants

Participants were a clinic-based sample of 90 Black/African American adults with HIV who were receiving HIV care at a large FQHC serving low-income and medically underserved populations. Although recruitment focused on Black adults with HIV receiving care at the FQHC broadly, the final sample was predominantly older Black men, most of whom had disclosed their HIV status to others. Study enrollment took place between November 2017 and July 2019 as part of the Individual Community Care for HIV/AIDS Now: Getting Engaged (iC-CHANGE) study (Kohli et al., 2020; Pasipanodya et al, 2020; Ham et al., 2023). In the iC-CHANGE study, participants received daily text message reminders for ART, and attended in person study visits at 12-week intervals to complete psychosocial questionnaires (91.2% completed 48-week study interval). To be eligible, participants had to have a current ART prescription and to have been prescribed ART for at least two months at the time of enrollment. Additional inclusion criteria included the ability to speak English and provide informed consent. Individuals were excluded if

they had severe neurocognitive impairments (e.g., dementia) that would prevent meaningful participation or if they were unable to commit to completing the study due to expected relocation or extended absence from the San Diego area during the study period (24 or 48 weeks). All participants provided written informed consent prior to participation and were treated in accordance with the American Psychological Association's Ethical Principles of Psychologists and Code of Conduct. Study procedures were approved by the Institutional Review Board at the University of California, San Diego (IRB #161608).

Measures

Demographics. All participants had demographic information collected at baseline including self-reported data on their age, sex at birth, gender, highest education level attained, annual income individual and household, marital status, employment status, ethnicity, race, and HIV disclosure. Given its significance to psychosocial functioning and adherence, depressive symptoms were also assessed at baseline using the Beck Depression Inventory-II (BDI-II; Beck, 1996), a 21-item self-report questionnaire intended to measure the prevalence and severity of depressive symptoms over the past two weeks. Higher scores were associated with higher severity of depressive symptoms (e.g. 0 = "I do not feel sad", 3 = "I am so sad or unhappy that I can't stand it"). A total score was derived by summing across the 21-item measure (range: 0-63) and examined as a continuous variable.

Selected HBM Constructs (Measured at baseline)

Constructs from the HBM were approximated using items drawn from multiple instruments, rather than measured using a single standardized HBM scale, each described below.

Perceived benefits of ART and Perceived severity of HIV without ART. Both perceived benefits of ART and perceived severity of HIV without ART were captured at baseline using a

30-item Beliefs Related to Medications self-report measure, adapted from the Horne et al (1999) Belief about Medicines Questionnaire to be specific to PWH and ART. In the 30-item scale, participants rated their agreement with each statement on a 5-point Likert scale, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Four items relating to the benefit of taking ART (e.g., *My health at present depends on my anti-HIV medicines*) were used to derive a score for perceived benefits of ART, with higher scores indicating greater perceived benefits ($\alpha = .72$). Similarly, four items relating to perceived severity of HIV without ART (e.g., *Without my anti-HIV medication, I would be very ill*) were used to derive a score for perceived severity, with higher scores indicating greater perceived severity ($\alpha = .71$).

Barriers to ART Adherence. Barriers to ART adherence were similarly assessed at baseline with a questionnaire that identified potential obstacles that could interfere with participants' ability to take their medications as prescribed ($\alpha = .79$). Participants were asked to indicate whether any of the listed barriers had ever caused them to skip their medications, with responses recorded as "yes" (1) or "no" (0). The barriers included a range of factors, such as physical and emotional challenges (e.g., being depressed), concerns about side effects, stigma or discrimination, financial or logistical challenges (e.g., transportation problems, lack of insurance), and personal or cultural beliefs. Participants were also asked about factors like forgetting to take medications, feeling that the medications were unnecessary or harmful, and social influences such as sharing medications with others. The total number of barriers endorsed by each participant was calculated by summing the "yes" responses across the items. A higher count of endorsed barriers indicated more perceived obstacles to consistent ART adherence.

Self-Efficacy for Managing Medications and Treatments. Self-efficacy was measured at baseline using a 26-item self-report questionnaire ($\alpha = .96$) adapted from PROMIS (Cella, 2007),

a measurement of various health domains that has been validated for use in ethnically diverse samples (Reeve, 2007). Items were measured from 1-5 with 1 corresponding to “Not at all confident” and 5 to “Very confident”. Items were differentiated between medication (e.g. “*I know what to do when my medication refill looks different than usual*”) and treatments (e.g. “*I can follow a full treatment plan (including medication, diet, physical activity)*”). Higher scores were associated with greater self-efficacy in managing medications and treatments.

Related Psychosocial Measures (Measured at baseline)

Supports to ART Adherence. Supports to ART adherence were assessed at baseline using a questionnaire designed to capture various strategies and factors that may facilitate medication adherence ($\alpha = .44$). This low internal consistency likely reflects the heterogeneous nature of potential supports, which were designed to capture a broad range of behavioral, interpersonal, and structural supports rather than a single underlying construct. Specifically, participants were asked to indicate whether specific support mechanisms had ever helped them in taking their medications, with responses recorded as either "yes" (1) or "no" (0). The items assessed included both external supports (e.g., reminders from others or using a pill box) and internal factors (e.g., understanding the importance of medications or believing in their effectiveness). Some examples of support mechanisms assessed in the questionnaire included taking medications at the same time of day, using a medication diary or alarm, having someone remind them to take their medication, feeling healthy, understanding the purpose of the medications, and having a supportive relationship with healthcare providers. Each of these items was used to capture different dimensions of support that participants may have relied on in adhering to ART. The total number of supports endorsed by each participant was calculated by summing the "yes"

responses across all items. A higher count of endorsed supports indicated greater identification and use of strategies to aid adherence to ART.

Beliefs about ART. Beliefs about ART were assessed at baseline using three items adapted from prior work by Bird & Bogart (2005), to capture beliefs related to HIV and its treatment ($\alpha = .78$). The three items examined focused on participants' perceptions regarding the safety and effectiveness of HIV medications. Participants rated their agreement with each statement on a 5-point Likert scale, ranging from 1 (*Strongly Agree*) to 5 (*Strongly Disagree*), with higher scores indicating stronger beliefs in the effectiveness of ART.

ART Adherence Outcomes (Measured Longitudinally Every 12 Weeks)

Continuous Self-Reported Adherence Measure. Participants completed self-report assessments of ART adherence at baseline and every 12 weeks thereafter, using a 3-item measure of adherence (Wilson, 2016). These items captured participants' perceived adherence over the past 30 days. Responses were scored such that higher values indicated better adherence, with the exception of the item asking how many days the participant had missed at least one dose (“In the last 30 days, on how many days did you miss at least one dose of any of your HIV medicines?”), which was reverse coded. Scores for that item were constrained between 0 and 30 to reflect the number of missed days.

Visual Analog Scale (VAS). A visual analog scale was also used to assess self-perceived ART adherence, recorded at baseline and at 12-week study intervals. Participants were asked to indicate the percentage of their ART medications they believed they had taken in the past 30 days by placing an “X” along a horizontal line ranging from 0 to 100. The placement of the “X” was translated into a numeric value (e.g., a mark at the midpoint of the line was recorded as

50%). This method allowed for a more intuitive, continuous measure of adherence compared to the categorical format of the questionnaire.

Daily Text Message-Reported Responses. ART adherence was also measured through participants' engagement with the iTAB (Individualized Texting for Adherence Building) text messaging system, implemented as part of the iC-CHANGE intervention. From this intervention, we derived 12-week epochs of ART adherence as measured by text message responses.

Specifically, participants opted into either a 24-week or 48-week messaging protocol, with most choosing the longer study duration (n=83). Daily medication reminders were delivered via SMS, prompting participants to reply "Y" (yes), "N" (no), or "S" (snooze for one hour) based on whether they had taken their ART medication. Example prompts included messages such as "You are an asset to your community! Please take your [participant-selected preferred medication name]." If a participant responded "N," the system automatically sent a supportive message encouraging medication adherence and offering help if needed (e.g., "Please take a moment for your health ASAP. Call us if you need assistance or have a question"). If participants failed to respond or replied "N" for three consecutive prompts, a non-compliance alert was triggered, which led to follow-up outreach by care coordinators at the FQHC to explore possible barriers to adherence and re-engage participants in care. From this system, 12-week epochs were derived by capturing the proportion of "Yes" responses to the total number of messages sent.

Statistical Analyses

To examine the relationship between HBM constructs and ART adherence across study visits, we conducted a series of linear mixed-effects regressions. The three adherence outcomes were modeled separately: (1) the continuous self-reported adherence measure (Wilson, 2016), (2) the VAS, and (3) the proportion of text messages responses within the 12-week epochs. All

models included a random intercept for participant, to account for within-subject correlation across study visits. For each outcome, all HBM constructs and related psychosocial measures was included simultaneously in each model, reflecting the theoretical assumption that beliefs interact and co-contribute to adherence behavior. Baseline demographic and behavioral variables (i.e., all variables in Table 1) were screened for their association with the outcomes and included in final models if they were trending towards statistical significance at $\alpha = 0.1$.

Results

Adherence at study conclusion for each measure was relatively high, such that mean adherence as measures by questionnaire was 82.93 (SD = 19.30), mean adherence as measured by VAS was 90.89 (SD = 28.03), and the mean proportion of affirmative text message responses to reminder prompts relative to total reminders sent was 80.02 (SD = 20.60). We examined whether HBM constructs and related psychosocial measures predicted ART adherence across three outcome measures, using full models that simultaneously included all six predictors: perceived benefits of ART, perceived severity of non-adherence, perceived barriers of ART adherence, self-efficacy for medication-taking, supports for ART adherence, and beliefs about ART. Multicollinearity across predictors was low (VIFs < 3.11), thus, we proceeded with examining full models to provide a more robust account of adherence behavior than individual predictor models, consistent with the components of the HBM's theoretical structure. Among screened covariates (listed in Table 5), only depression was associated with adherence outcomes, and thus included in final models (presented in Tables 5-8).

Table 5 Participant characteristics

Variable	Descriptive Statistics (n=91)
48-week study (vs. 24-week study)	83 (91.2%)
Age (median)	50 years (IQR: 36-57, range 23-66)
Gender identity	
Male	74 (81.3%)
Female	12 (15%)
Genderqueer/gender non-conforming	1 (1.1%)
Transwoman	1 (1.1%)
Education	
Completed high school/ GED	8 (8.9%)
Some college	18 (19.8%)
Completed college	47 (51.6%)
Some or completed post-graduate education	12 (13.3%)
Ethnicity	
Hispanic/Latino/Spanish	9 (9.9%)
Self-identified races other than Black	
American Indian or Alaska Native	9 (9.9%)
Asian American or Asian Origin	1 (1.1%)
White	3 (3.3%)
Other	5 (5.5%)
Income	
<\$10,000	41 (45.1%)
\$10,000 to \$19,999	26 (28.6%)
>\$20,000	22 (24.2%)
Employment status	
Full-time employment	19 (20.9%)
Receiving disability benefits	26 (28.6%)
Unemployed	27 (29.7%)
Relationship status	
Single	69 (75.8%)
In a committed relationship	16 (17.6%)
HIV disclosure	
Ever disclosed	82 (90.1%)
Disclosed to family	66 (72.5%)
Disclosed to friends	72 (79.1%)
Beck Depression Inventory	11.6 (9.8)

In the unadjusted model predicting adherence as measured by the continuous self-reported adherence measure, greater self-efficacy ($\beta = .38$, $SE = .11$, $t = 3.5$, $p < .001$), lower perceived barriers ($\beta = -.98$, $SE = .41$, $t = -2.40$, $p = .02$), and greater perceived supports ($\beta = 1.66$, $SE = .67$, $t = 2.49$, $p = .01$) were associated with higher ART adherence. No other variables reached statistical significance (all $p > .05$). When controlling for depression, self-efficacy and perceived barriers remained significant but perceived supports did not (Table 6).

Table 6. Final multivariable model of Health Belief Model-informed predictors and complementary psychosocial factors associated with antiretroviral therapy adherence, as measured by continuous adherence measure.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
<i>Study Visit</i>	0.04	0.57	0.07	.94	[-1.06, 1.15]
<i>Beliefs about ART</i>	-0.35	0.67	-0.52	.60	[-1.66, 0.96]
<i>Perceived benefits of ART</i>	0.13	0.78	0.16	.87	[-1.40, 1.66]
<i>Perceived severity of non-adherence</i>	-0.96	0.67	-1.43	.16	[-2.28, 0.36]
<i>Supports for ART adherence</i>	0.58	0.51	1.14	.26	[-0.42, 1.58]
<i>Self-efficacy for medication-taking</i>	0.18	0.08	2.11	.04	[0.01, 0.34]
<i>Perceived barriers to ART adherence</i>	-1.24	0.31	-3.94	<.001	[-1.86, -0.62]

Note: this final model includes depression (Beck Depression Inventory score) as a covariate due to its univariate association with the three adherence outcome measures.

In the unadjusted model of adherence based on the VAS, greater self-efficacy ($\beta = 0.39$, $SE = 0.11$, $t = 3.46$, $p < .001$), lower perceived barriers ($\beta = -0.98$, $SE = 0.42$, $t = -2.32$, $p = .02$), and greater supports for ART ($\beta = 1.85$, $SE = 0.70$, $t = 2.66$, $p = .01$) were significantly associated with higher ART adherence. Of the remaining predictors, perceived benefits of ART ($\beta = 1.88$, $p = .08$) and perceived severity of HIV non-adherence ($\beta = -1.62$, $p = .08$) trended toward significance. When controlling for depression, supports for ART adherence lowered to marginal significance ($p = .06$); notably, the internal consistency of the supports measure was

low ($\alpha = .44$), which may limit the interpretability of this finding. Self-efficacy and barriers to adherence remained significant predictors (Table 7).

Table 7. Final multivariable model of Health Belief Model-informed predictors and complementary psychosocial factors associated with antiretroviral therapy adherence, as measured by the VAS (visual analog scale).

<i>Predictor</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
<i>Study Visit</i>	0.12	0.41	0.31	.76	[-0.67, 0.91]
<i>Beliefs about ART</i>	-0.26	0.66	-0.40	.69	[-1.55, 1.03]
<i>Perceived benefits of ART</i>	0.54	0.76	0.71	.48	[-0.96, 2.04]
<i>Perceived severity of non-adherence</i>	-1.01	0.66	-1.53	.13	[-2.31, 0.29]
<i>Supports for ART adherence</i>	0.62	0.50	1.24	.06	[-0.36, 1.61]
<i>Self-efficacy for medication-taking</i>	0.21	0.08	2.54	.01	[0.05, 0.37]
<i>Perceived barriers to ART adherence</i>	-1.09	0.31	-3.54	<.001	[-1.69, -0.48]

Note: this final model includes depression (Beck Depression Inventory score) as a covariate due to its univariate association with the three adherence outcome measures.

For the daily text message responses, greater perceived barriers to ART adherence was associated with a lower ART adherence ($\beta = -0.012$, $SE = 0.006$, $t = -2.00$, $p = .049$) in the unadjusted model (i.e., model without depression included as a covariate). Perceived barriers to ART adherence showed a trend-level association after controlling for depression ($p = .06$; see Table 8). Other HBM predictors were not significantly associated with the daily text message responses.

Table 8. Final multivariable model of Health Belief Model-informed predictors and complementary psychosocial factors associated with antiretroviral therapy (ART) adherence, as measured by confirmatory responses to daily ART text message reminders.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
<i>Study Visit</i>	0.003	0.007	0.39	.66	[-0.01, 0.02]
<i>Beliefs about ART</i>	-0.002	0.009	-0.24	.81	[-0.02, 0.02]
<i>Perceived benefits of ART</i>	0.003	0.011	0.25	.81	[-0.02, 0.02]
<i>Perceived severity of non-adherence</i>	0.001	0.009	0.14	.89	[-0.02, 0.02]
<i>Supports for ART adherence</i>	0.002	0.007	0.23	.82	[-0.01, 0.02]
<i>Self-efficacy for medication-taking</i>	0.001	0.002	0.67	.51	[-0.01, 0.02]
<i>Perceived barriers to ART adherence</i>	-0.004	0.004	-1.79	.06	[-0.01, 0.01]

Note: this final model includes depression (Beck Depression Inventory score) as a covariate due to its univariate association with the three adherence outcome measures.

Discussion

This study examined psychosocial predictors of ART adherence in a sample of Black, predominantly older men, living with HIV, using constructs from the HBM and related psychosocial variables (supports and beliefs about ART). Across the three longitudinal ART adherence outcome measures, we found that self-efficacy and perceived barriers were consistently associated with ART adherence in questionnaire-based measures of adherence, though not a text message-based measure of engagement and adherence. These findings suggest that within this sample, confidence in one's ability to manage ART-taking as well as barriers to ART-taking (e.g., logistical challenges) may be particularly influential factors in overall ART adherence over time. Other HBM variables, including perceived severity and perceived benefits, showed weaker or marginal associations with adherence outcomes.

Among several studies examining PWH, self-efficacy has been found to be a consistent and salient predictor of ART adherence (Adefolalu et al., 2014; Zhang et al, 2016; Ashaba et al., 2024; Hosseini et al., 2024). Nevertheless, considering the disproportionate impact of HIV on Black individuals, studies specific to this population are of great importance. In this sample of predominantly older Black men with HIV, we found self-efficacy to be a significant predictor of adherence for retrospective self-reported measures of adherence (i.e., study visits occurring every 12 weeks), though not a significant predictor of text message responses to adherence prompts that were provided on a daily basis. The findings of the present study are similar to a study from Voisin et al (2017), in which higher self-efficacy, as well as fewer behavioral barriers (e.g., not engaging in consistent substance use), were found to be associated with better ART adherence among young Black men who have sex with men, as measured by a self-report scale that was then dichotomized by greater or less than 90% adherence. Another study examining older Black adults with HIV also found self-efficacy to be a significant predictor of ART adherence (measured by self-report questionnaire that was dichotomized by 95% adherence; McCoy et al., 2016). Our study mirrors these findings, further supporting that self-efficacy remains a salient predictor of ART adherence among Black PWH. Nevertheless, the lack of association between self-efficacy and daily text message responses may suggest that different adherence measurement approaches capture somewhat distinct aspects of adherence-related behavior. Because SMS-based adherence measures may more proximally reflect day-to-day adherence behavior, these findings raise the possibility that self-efficacy may be more strongly related to perceptions or retrospective reporting of adherence than to moment-to-moment adherence behavior itself. This distinction further highlights the importance of considering how different adherence measurement approaches may capture distinct aspects of adherence behavior.

Taken together, these findings suggest that self-efficacy may play an important role in how individuals perceive, manage, and report ART adherence behaviors. As a construct capturing confidence in one's ability to execute adherence-related behaviors, self-efficacy is closely linked to medication-taking in the context of common barriers (e.g., side effects, competing demands, stigma). Higher self-efficacy may facilitate planning, persistence, and the ability to maintain adherence despite psychosocial challenges, which may be particularly salient for Black PWH.

While our study was not limited to younger individuals or men, as in prior research (McCoy et al., 2016; Voisin et al., 2017), it contributes to the literature by examining a broader set of HBM-informed and related constructs in relation to ART adherence. Further, considering that our sample consisted of predominantly older Black men with HIV engaged in HIV care, these findings explore predictors of adherence among a population historically underrepresented in research. Although previous studies have applied HBM constructs to this context, many have relied on cross-sectional study designs or have focused primarily on international samples of PWH. For example, Addo et al (2022), guided by the HBM, identified perceived barriers and self-efficacy as significant predictors of ART adherence, those these associations were examined cross-sectionally. Similarly, Yu et al. (2022) found self-efficacy to be a significant predictor of ART adherence in a cross-sectional study of older Chinese PWH. Together, these studies support the relevance of HBM constructs for understanding ART adherence. Our findings extend this work by examining multiple HBM and related constructs concurrently within a U.S. clinic - based sample of Black adults with HIV, and more specifically among older Black men who self-identified as experiencing adherence challenges. Notably, self-efficacy and perceived barriers emerged as the most consistent predictors, suggesting they may function as more proximal

determinants of adherence compared to constructs such as perceived severity and perceived benefits. Further, these findings suggest that perceived barriers may reflect a range of contextual challenges experienced by participants, shaping adherence behavior.

Our use of multiple measures of ART adherence provided a more comprehensive picture of adherence behavior, however, these measures do not represent equivalent indicators of the same underlying behavior, considering the timeline of measures (e.g., daily self-report text message responses versus 12-week interval in person questionnaires). While self-report methods such as the VAS and questionnaires remain standard in clinical settings, incorporating behavioral measures, such as daily text message responses, offers additional insight into daily medication-taking in real-time contexts (Horvath et al., 2012). Notably, the text message responses reflect participants' engagement with the intervention (i.e., responding to prompts) as well as adherence behavior, whereas the VAS and questionnaire assess retrospective self-reported adherence. A meta-analysis of two randomized controlled trials by found that text message reminders were associated with improved adherence (Horvath et al., 2012). The effectiveness of text messages has been found in numerous other studies. Although the text message responses yielded fewer significant predictors, we observed a marginal association with perceived barriers, reinforcing the importance of reducing day-to-day obstacles to ART use. The distinction between measures of adherence in the present study is important, as predictors of engagement with a text messaging monitoring system may differ from predictors of retrospective reports of medication-taking itself. Further, a lack of response to a text message prompt may not necessarily indicate an ART dose was not taken. In fact, definitive "No" responses to the text message prompts were relatively rare. Self-efficacy, despite being a significant predictor in other adherence models and in prior literature, was not a significant predictor in the model of affirmative daily text message

responses. One possible explanation is that individuals with higher self-efficacy may be less likely to respond to daily text message prompts because they require less external support through engagement with the text messaging intervention, yet still report high adherence retrospectively during study visits. In contrast, individuals experiencing greater barriers may be more likely to engage with text-based reminders, as these supports directly address challenges to adherence. These distinctions meaningfully shape the interpretation of the present findings. The daily SMS prompts used in the present study were originally developed to assess ART adherence behaviors in real time and specifically referenced medication-taking behavior (e.g., “*You are special. Please take your [preferred medication name].*”). Additionally, participants were enrolled in the broader intervention based on self-identified ART adherence challenges. Nevertheless, because responding to daily prompts also requires ongoing participation in the intervention itself, it remains difficult to fully disentangle adherence behavior from engagement with adherence monitoring. Thus, while the SMS outcome was designed to reflect daily ART adherence, it may also partially capture engagement-related processes. Under this interpretation, the divergence across adherence outcomes may suggest that retrospective self-report measures and daily SMS responses capture overlapping but distinct aspects of adherence-related behavior. Accordingly, the text message responses should not be interpreted as directly interchangeable with the retrospective self-report adherence measures.

Most of the observed associations between HBM-informed and related constructs and ART adherence remained statistically significant even after accounting for depressive symptoms, a known barrier to ART adherence (Tao et al., 2018). When controlling for depression, self-efficacy remained a significant predictor in both the continuous self-reported adherence measure and VAS adherence models, suggesting a robust role in medication-taking behavior. Perceived

barriers also showed significant or trend-like associations across all three outcomes, suggesting that interventions targeting logistical, psychological, and social barriers may be particularly impactful in this population (Hossain et al., 2022).

This study has several strengths. First, it focused on Black PWH, a population that remains disproportionately affected by HIV. Second, it examined multiple HBM-informed and related constructs, allowing for a more nuanced understanding of adherence determinants beyond single-construct approaches. Finally, the use of multiple adherence outcome measures allowed for examination of how psychosocial predictors may differ across distinct operationalizations of adherence and intervention engagement. Nevertheless, there are limitations of the present study. First, the sample size of our study was relatively small, and our sample may not be representative of the broader population of Black PWH in the U.S. Second, all predictors and outcomes were assessed through self-report or behavioral proxies, and we did not include HIV viral load data or pharmacy refill information as objective indicators of adherence. While the use of text messages as an adherence proxy is innovative, it may not fully capture actual medication use. Thirdly, our sample consisted primarily of older, clinic-engaged, highly HIV disclosed, Black men in San Diego, which while also a strength, may nevertheless limit generalizability to women, younger individuals, those who are not “out” about their HIV status, or those not engaged in care. Further, these findings may not generalize to other Black communities and people not engaged in care. Lastly, HBM constructs were assessed using items drawn from multiple instruments rather than a single validated HBM scale. While this approach allowed for coverage of several constructs, it did not include all constructs of the HBM (perceived susceptibility and cues to action), and may have introduced variability in construct validity and limited comparability with studies using standardized HBM measures. Additionally, the supports checklist demonstrated low internal

consistency, likely reflecting that it was designed to capture a broad range of adherence support strategies rather than a single underlying construct. Thus, this precludes us from making direct comparisons of subscales belonging to a singular, robust, validated scale. Relatedly, the use of items from multiple instruments may have attenuated associations due to inconsistent measurement; thus, null findings for perceived benefits and perceived severity may reflect measurement limitations rather than the absence of true effects of examining the HBM, in its entirety, in this context. Cumulatively, the present findings cannot distinguish whether the non-significant associations observed for perceived benefits and severity reflect limitations in measurement or the absence of meaningful relationships in this sample.

Overall, findings from this study emphasize the relevance of self-efficacy and perceived barriers as key determinants of ART adherence among Black PWH. Interventions aiming to improve adherence in this population may benefit from strategies that bolster confidence in one's ability to take ART consistently and address barriers to adherence. While not the scope of the current project, future work may seek to explore the historical and structural factors that may drive the disparities experienced by Black PWH. Given the importance of supporting ART adherence among Black PWH, such theory-informed approaches are urgently needed to reduce gaps in care and improve health equity.

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Chapter 4: STUDY 3
**A Socioecological Multi-Method Study of HIV Care Engagement, Resilience, and
Community Context Among Black Adults Living with HIV in Southern California**

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Abstract

Objective: Black people with HIV (PWH) experience persistent disparities in antiretroviral therapy (ART) adherence and HIV care engagement, shaped by interacting psychosocial, healthcare-system, and structural factors. This mixed-method study examined lived experiences of Black PWH in Southern California, with particular attention to how resilience, social support, and community context interact to shape ART adherence and HIV care engagement.

Methods: Twenty community-dwelling Black PWH completed quantitative psychosocial assessments and semi-structured qualitative interviews. Quantitative measures assessed psychosocial and health-related constructs, including resilience, depression, social support, quality of life, and ART adherence. Qualitative interviews explored experiences living with HIV, adherence supports and barriers, healthcare experiences, resilience, social support, community cohesion, and health and well-being resources. Qualitative data were analyzed using rapid qualitative analytic methods within a socioecological framework.

Results: Participants frequently described historical HIV challenges, including earlier periods characterized by substantial mortality, stigma, and burdensome medication regimens. Although participants generally described modern HIV treatment as more manageable, and psychosocial resources were generally high as measured by quantitative questionnaires, HIV continued to carry significant emotional, interpersonal, and structural burdens. Complementary quantitative and qualitative data suggested adherence was commonly supported through structured routines, interpersonal support, and personal motivations related to maintaining health and protecting others, whereas barriers included disrupted routines, housing and insurance instability, mental health concerns, stigma, and healthcare-system challenges. Participants emphasized the importance of empathetic and culturally responsive healthcare relationships and frequently

described fragmented social support and limited perceptions of Black community cohesion in Southern California. Many participants additionally expressed a desire for stronger culturally specific support systems and community visibility.

Conclusions: Findings underscore the importance of socioecologically grounded and culturally responsive approaches to supporting Black PWH, including ART adherence interventions addressing not only medication-taking behavior, but also broader interpersonal, healthcare-system, community, and structural influences shaping HIV care engagement and quality of life.

Introduction

Black/African American (henceforth referred to as Black) adults remain disproportionately affected by HIV in the United States compared to other racial/ethnic groups, with disparities evident in HIV diagnosis, ART adherence, care engagement, and viral suppression (Centers for Disease Control and Prevention [CDC], 2025). Black individuals accounted for 38% of HIV diagnoses in the United States in 2023 despite representing a substantially smaller proportion of the U.S. population (CDC, 2025). Racial disparities in ART adherence have also been consistently documented. In the MACH14 pooled analysis of 13 U.S.-based studies using electronic drug monitoring, Black people with HIV (PWH) demonstrated lower ART adherence than White PWH even after adjustment for demographic characteristics, depression, and substance use (Simoni et al., 2012). More recent work similarly suggests that social determinants of health substantially contribute to racial disparities in ART adherence and viral suppression among Black PWH (Patel et al., 2024).

In San Diego County, Black individuals accounted for approximately 20% of new HIV diagnoses in 2024 while comprising roughly 5% of the county population (County of San Diego, 2025). ART adherence remains critically important because consistent adherence is necessary to achieve and maintain viral suppression, improve health outcomes, and prevent HIV transmission (HIV.gov, 2026; Panel on Antiretroviral Guidelines for Adults and Adolescents, 2025). Prior work by our group identified disparities in viral suppression among Black adults receiving HIV care in San Diego, which motivated development of iC-CHANGE, a culturally tailored adherence intervention designed for Black PWH (Kohli et al., 2020; Pasipanodya et al., 2020; Ham et al., 2023). Although this work highlighted the importance of culturally responsive adherence support and identified multilevel barriers to HIV care engagement, less is known

about how Black PWH in Southern California understand and navigate broader experiences related to resilience, healthcare relationships, social support, community cohesion, and long-term experiences living with HIV. Additional qualitative exploration conducted in tandem with quantitative assessments may therefore help clarify how these interconnected social, structural, and cultural experiences shape HIV care engagement and well-being in daily life.

ART adherence among Black PWH is shaped by more than individual motivation or medication-taking routines. The Socioecological Model provides a useful framework for understanding HIV care engagement because it conceptualizes health behavior as the result of interacting influences across multiple levels, including individual, interpersonal, healthcare-system, community, and structural factors (Kaufman et al., 2014). Prior research among Black PWH has demonstrated that discrimination, medical mistrust, housing instability, stigma, and healthcare access barriers may all affect HIV care engagement and ART adherence (Bogart et al., 2010; Dong et al., 2022; Filippone et al., 2023). Similarly, resilience among PWH may reflect not only individual coping ability, but also access to social support, community resources, spirituality, and supportive healthcare relationships (Dulin et al., 2018; Fletcher et al., 2020; Qiao et al., 2019).

Qualitative research may be particularly useful for understanding how Black PWH experience these overlapping influences in daily life. Prior qualitative work has highlighted the importance of stigma, social support, provider relationships, and structural barriers in shaping HIV care engagement among Black PWH (Filippone et al., 2023; Quinn et al., 2018). Formative work conducted during development of the iC-CHANGE intervention similarly demonstrated that Black PWH described adherence supports and barriers across individual, interpersonal, and structural levels, including medication routines, disclosure concerns, mental health, unstable

housing, and provider communication (Pasipanodya et al., 2020). Together, these findings suggest that improving HIV outcomes among Black PWH may require approaches that address not only ART adherence behavior itself, but also the broader social, structural, and cultural contexts in which HIV care occurs. Additional qualitative exploration may therefore help clarify how Black PWH understand resilience, healthcare engagement, social support, and community context within their day-to-day lives.

Guided by the Socioecological Model, the present mixed-method study examined multilevel influences on ART adherence and HIV care engagement among Black PWH in Southern California, integrating quantitative psychosocial assessment with qualitative exploration of resilience, healthcare navigation, and community context. The objective of the present study was to identify modifiable supports and barriers that may inform more patient-centered, culturally responsive, and socioecological approaches to supporting ART adherence and HIV care engagement among Black PWH.

Method

Participants and Procedures

Participants were 20 community-dwelling Black PWH recruited from Southern California, primarily San Diego county. Eligibility criteria included identifying as Black/African American, living with HIV, being at least 18 years of age, and ability to complete study procedures in English. Participants completed a single study visit comprised of quantitative questionnaires and a semi-structured qualitative interview, consistent with a convergent parallel mixed-methods design. Most study visits were conducted in person, with one participant completing procedures remotely via videoconferencing. Semi-structured interviews were audio-recorded and professionally transcribed prior to analysis. Participants received financial

compensation (\$45) for study participation. All study procedures were approved by the University of California San Diego Institutional Review Board (UCSD IRB #807379), and all participants provided informed consent prior to participation.

Measures: Quantitative Measures

Resilience. Resilience was assessed using the 10-item Connor-Davidson Resilience Scale (CD-RISC-10), a self-report measure assessing perceived ability to cope with stress, adversity, and trauma (Campbell-Sills & Stein, 2007; Connor & Davidson, 2003). Participants rated each item on a 5-point Likert scale ranging from 0 (“not true at all”) to 4 (“true nearly all of the time”), resulting in total scores ranging from 0 to 40, with higher scores indicating greater resilience. Sample items include “I am able to adapt to change” and “I believe I can achieve my goals.”

Social/Emotional Support and Loneliness. Perceived emotional support, instrumental support, and loneliness were assessed using self-report measures derived from the Social Relationships domain of the NIH Toolbox Emotion Battery (Salsman et al., 2013). Participants rated the frequency of experiences during the past month using 5-point Likert-type response scales ranging from 1 (“never”) to 5 (“always”). Emotional support items assessed perceived availability of empathy, encouragement, and understanding from others, whereas instrumental support items assessed perceived availability of tangible assistance with daily tasks and practical needs. Loneliness items assessed subjective feelings of social isolation and disconnection from others. Higher scores on the emotional and instrumental support measures (range: 5-40) reflected greater perceived support, whereas higher loneliness scores (range: 5-25) reflected greater perceived loneliness and social isolation.

Health-Related Quality of Life. Health-related quality of life (QoL) was assessed using the Medical Outcomes Study Short Form-36 (SF-36), a widely used 36-item measure assessing physical and mental health-related quality of life (Ware, 2000). The SF-36 includes eight subscales contributing to physical and mental health summary scores, with higher scores reflecting better quality of life and functioning.

Supports and Barriers to ART Adherence. Supports and barriers to ART adherence were assessed at baseline using self-report checklists examining factors perceived as facilitating or interfering with medication adherence. Participants indicated whether specific supports or barriers had affected their adherence using dichotomous “yes” or “no” responses. Support items included strategies such as medication reminders, pill boxes, routines, and supportive healthcare relationships, whereas barrier items included factors such as stigma, side effects, transportation difficulties, mental health concerns, and forgetting medications. Total support and barrier scores were calculated by summing endorsed items, with higher scores reflecting greater perceived supports or barriers to adherence.

Depressive Symptoms. Depressive symptoms were assessed using the Beck Depression Inventory-II (BDI-II), a widely used 21-item self-report measure assessing cognitive, emotional, behavioral, and somatic symptoms of depression (Beck et al., 1996). Participants rated symptoms experienced over the previous two weeks using response options ranging from 0 to 3, with higher total scores indicating greater depressive symptom severity.

Visual Analog Scale of ART Adherence. A visual analog scale (VAS) was used to assess self-perceived ART adherence. Participants were asked to indicate the percentage of ART medications they believed they had taken during the previous 30 days by placing an “X” along a

horizontal line ranging from 0% to 100%. Responses were converted into continuous numeric adherence values, with higher scores indicating greater self-reported adherence.

Three-Item Self-Report ART Adherence Measure. Participants additionally completed a 3-item self-report measure assessing ART adherence over the prior 30 days (Wilson et al., 2016). Items assessed perceived adherence and missed medication doses during the past month. Responses were scored such that higher values reflected better adherence, with calculated scores ranging from 0-100. The item assessing the number of days participants missed at least one medication dose (“In the last 30 days, on how many days did you miss at least one dose of any of your HIV medicines?”) was reverse coded, with scores constrained between 0 and 30 days.

Measures: Qualitative Semi-Structured Interview

The semi-structured interview guide was developed to explore participants’ experiences living with HIV, barriers and facilitators to ART adherence, experiences navigating HIV care systems, resilience processes, social support, community cohesion, and resources needed to support community health. Interview questions were organized into two broad domains. The first domain focused on HIV-related experiences and healthcare engagement, including experiences living with HIV, adherence supports and barriers, experiences navigating HIV care, and suggestions for improving HIV care. The second domain explored resilience, social support, and community cohesion, including sources of resilience, impacts of resilience on health, social support and connectedness, perceptions of Black community cohesion in Southern California, and resources needed to support community health and well-being. Interviews lasted approximately 45 minutes.

Rapid Qualitative Analysis. A rapid qualitative analytic approach was utilized to identify key themes across interviews while maintaining methodological rigor (Hamilton, 2013;

Hamilton & Finley, 2020). Interview transcripts were reviewed and summarized by two members of the research team, using a standardized summary template developed from a priori domains reflected in the interview guide. Domains included HIV care experiences, adherence supports and barriers, resilience, social support, community cohesion, and community resource needs. Summaries were subsequently organized into matrix tables to facilitate systematic comparison of themes across participants and domains. Two members of the research team then reviewed transcript summaries and collaboratively identified recurring themes and patterns. Discrepancies in interpretation were resolved through discussion and consensus. Findings were ultimately organized using a socioecological framework to characterize influences across individual, interpersonal, community, healthcare-system, and structural domains (Table 9).

Data Missingness. Demographic information was available for all 20 participants. Quantitative psychosocial data were available for 19 of 20 participants, with one participant missing the psychosocial assessment battery. Descriptive statistics were calculated using all available quantitative data. Importantly, all 20 participants completed the qualitative interview and were included in the qualitative analyses.

Table 9. Themes Organized within the Socioecological Framework

Socioecological Level	Theme	Description	Exemplar Quote
Individual	Living Through Multiple Eras of HIV	Participants described experiences living across multiple HIV treatment eras, including earlier periods of HIV characterized by high mortality, stigma, and burdensome medication regimens.	<i>“Ups and downs. They haven't been the greatest. Some days it's good days and bad days.”</i> Participant 16

Table 9. Themes Organized within the Socioecological Framework (continued)

Socioecological Level	Theme	Description	Exemplar Quote
Individual	Adherence Routines and Medication Management	Participants described adherence as closely tied to aids, structured routines, environmental consistency, and daily behavioral habits.	<i>“Having my pill box, because it has the days of the week and it's for a whole month. If you miss a day, you definitely know.”</i> Participant 2
	Emotional Burden of HIV	Participants described emotional exhaustion, disclosure concerns, and the ongoing psychological weight of lifelong HIV management.	<i>“Then other times, it's wanting to feel normal without having to take medicine every day.”</i> Participant 9
	Resilience and Coping	Participants described resilience as shaped by adaptation over time, spirituality, optimism, and surviving earlier periods of the HIV epidemic.	<i>“You just gotta keep on goin' when the one door close... One door closes, keep on knockin' on the doors until one answers that have what you need.”</i> Participant 6
Interpersonal	Family, Partner, and Peer Support	Participants described family members, partners, peers, and support groups as important sources of emotional support and adherence encouragement.	<i>“As long as you have support, you can maintain some type of sanity when you have support from people that understand what you're going through.”</i> Participant 3
	Fragmented Social Support	Participants described support systems as fragmented across different social contexts and relationships.	<i>“In the Black community, in some families, they treat the person with HIV like a pariah.”</i> Participant 4
	Interpersonal Motivations for Adherence	Participants described motivations for adherence that included protecting partners, maintaining independence, and remaining healthy for loved ones.	<i>“I just wanted to not get anybody else sick... From a public health concern, that has always been the driver for me takin' my medicine.”</i> Participant 5

Table 9. Themes Organized within the Socioecological Framework (continued)

Socioecological Level	Theme	Description	Exemplar Quote
Community	Black Community Cohesion and Visibility	Participants described limited perceptions of Black community cohesion in Southern California and a desire for stronger culturally specific support systems and visibility.	<i>"There's some instances you feel welcome, and some instances, you're not."</i> Participant 1
	HIV Stigma and Community Attitudes	Participants described stigma, judgment, and disclosure concerns within broader community and religious environments.	<i>"Even in the government, there's stigma."</i> Participant 10
Healthcare-System	Empathetic and Relationship-Centered Care	Participants valued providers who demonstrated empathy, continuity, collaboration, and holistic care.	<i>"My doctor. He made me feel like a person. He made me feel not dirty, not filthy. He made me feel good."</i> Participant 7
	Medical Mistrust and Care Disruptions	Participants described provider turnover, insurance instability, dismissive interactions, and mistrust as barriers to HIV care engagement.	<i>"When a individual has biased attitudes, that kind of attitude, I feel that."</i> Participant 8
Structural	Structural Resource Access	Participants identified Ryan White services, case management, and HIV-focused organizations as important supports for care engagement.	<i>"It's like when you think about it, or you seen that resource that people with HIV, it makes me feel like it's not really that bad after all, 'cause you have a lot of these resources you can rely and depend on. It's not like your life is completely over."</i> Participant 9
	Representation and Structural Stigma	Participants described the importance of representation in healthcare settings and discussed broader experiences of racialized, gendered, and HIV-related stigma.	<i>"What are we doing to mobilize the Black community members... to try to encourage these students to develop skill sets that is gonna yield more favorable and inclusive diverse outcome?"</i> Participant 5

Results

Participant Characteristics & Descriptive Quantitative Findings

Twenty Black PWH participated in the study. Quantitative findings indicated generally high ART adherence (see Table 2). Participant age ranged 27 to 77 years, with mean age being 61.35 (11.37). Mean self-reported ART adherence was high across both the 3-item adherence measure ($M = 83.98$, $SD = 21.40$) and visual analog scale adherence measure ($M = 89.33$, $SD = 18.30$), suggesting that many participants perceived themselves as consistently adherent to ART. Participants additionally reported relatively high resilience scores on the Connor-Davidson Resilience Scale ($M = 30.78$, $SD = 6.41$), aligning with qualitative narratives describing long-term adaptation, perseverance, spirituality, and coping despite adversity. Participants also reported relatively high levels of emotional ($M = 33.00$, $SD = 7.34$) and instrumental social support ($M = 28.22$, $SD = 9.60$). Although mean loneliness scores were relatively low overall ($M = 11.39$, $SD = 5.01$), variability in loneliness suggested that some participants continued to experience social isolation despite broader patterns of resilience and support.

At the same time, quantitative findings also reflected ongoing psychosocial burden and variability in well-being. Mean depressive symptom severity on the BDI-II fell within the minimal symptom range overall ($M = 8.59$, $SD = 8.60$). Participants demonstrated variability in both physical ($M = 43.43$, $SD = 12.21$) and mental health-related quality of life ($M = 51.55$, $SD = 11.41$). Participants endorsed more supports ($M = 12.90$, $SD = 8.03$) than barriers ($M = 4.10$, $SD = 4.55$) to ART adherence overall, consistent with qualitative findings highlighting the importance of routines, interpersonal support, healthcare relationships, and structural resources in supporting long-term HIV care engagement.

Table 10. Participant Characteristics and Quantitative Measures Among Black PWH

Characteristic	N = 20^a
Gender	
Female	8 (40%)
Male	12 (60%)
Age	61.35 (11.37)
Depressive symptom severity (BDI-II)	8.59 (8.60)
Education	
Less Than High School	1 (5%)
High School	3 (15%)
Some College	10 (50%)
College Degree	5 (25%)
Graduate Degree	1 (5%)
Mental Health QOL Summary (MOS-SF 36)	51.55 (11.41)
Physical Health QOL Summary (MOS-SF 36)	43.43 (12.21)
Resilience (CD-RISC-10)	30.78 (6.41)
Emotional Support (NIH Toolbox Emotion Battery)	33 (7.34)
Instrumental Support (NIH Toolbox Emotion Battery)	28.22 (9.60)
Loneliness (NIH Toolbox Emotion Battery)	11.39 (5.01)
3-Item Self-Report Scale of Adherence	83.98 (21.40)

Table 10. Participant Characteristics and Quantitative Measures Among Black PWH (continued)

Characteristic	N = 20 ^a
Visual Analog Scale ART Adherence	89.33 (18.30)
Supports for ART Adherence Checklist Total	12.90 (8.03)
Barriers to ART Adherence Checklist Total	4.10 (4.55)
^a n (%); Mean (SD), <i>BDI-II</i> = Beck Depression Inventory-II; <i>MOS SF-36</i> = Medical Outcomes Study Short Form 36; <i>CD-RISC-10</i> = Connor-Davidson Resilience Scale; ART = antiretroviral therapy.	

Qualitative Results

Individual-Level Factors

Living Through Multiple Eras of HIV

Participants frequently described living with HIV across multiple decades and HIV treatment eras. Many participants who were diagnosed in the 1980s and 1990s recalled initially believing that HIV was a “death sentence” and described witnessing substantial illness and death during earlier periods of the epidemic. Participants also described earlier, multi-pill treatment regimens as physically demanding, unpredictable, and associated with substantial side effects. As one participant diagnosed in the 1980s described:

It was terrible at first when I first learned it. Thought I was gonna die in the first few months and especially when my CD4 count was below 200. They told me that I had only six months to a year to live. (Participant 11)

Similarly, another participant described becoming more carefree financially and professionally after diagnosis because they did not expect to survive long-term:

I was suicidal and when they told me I was positive they told me at the—in the '80s they sit there and say good news and bad news... Good news is I was in good health, the bad news is that I'd be dead in one to three years... I basically told off my boss. I said I'm not doing this [laughter]. I said I don't have to take any of this shit... (Participant 12)

Another participant voiced concern that early HIV medications themselves were dangerous:

Initially, I was like, 'I'm not takin' no medicine.' People were dyin' and takin' medicine. Everyone around me was dyin'. I'm like, 'I'm not takin' any crap.' (Participant 1)

Participants frequently contrasted these earlier experiences with current simplified regimens, particularly one-pill daily medications. Several participants described modern HIV treatment as substantially easier to manage and more integrated into daily life than earlier regimens involving numerous medications, strict schedules, and severe side effects.

Adherence Routines and Medication Management

Adherence was frequently described as closely tied to daily routines and environmental consistency. Common adherence supports included pill boxes, alarms, medication packets, visual reminders, medication delivery systems, and pairing medications with existing habits or routines. One participant described keeping medications in the same location each day to maintain consistency:

I have a little Petri dish now... a little dish that I take it when I get home from work and put it in there. That way, I know it's sitting there, so I know I didn't take it or not. I've got that down now. (Participant 13)

Another participant described integrating medication-taking into their morning coffee routine:

For the HIV medicine, I take every day early in the mornin'. First thing I would take. Yeah, while I'm havin' my coffee. (Participant 1)

Despite improvements in treatment, participants described HIV as continuing to carry substantial emotional weight. Participants discussed emotional exhaustion related to lifelong medication management, fear, disclosure concerns, and frustration associated with HIV.

One participant described emotional fatigue associated with lifelong medication use:

Forgot... didn't feel like takin' 'em... I don't like really takin' pills like that... parts of me wants to go back to my old self, but it's like really can't do that. (Participant 9)

At the same time, participants described adherence barriers including disrupted routines, alcohol use, unstable housing, side effects, mental health concerns, scheduling demands, and general life instability. These barriers were often interconnected and compounded during periods of instability or stress.

Resilience and Coping

Participants commonly described resilience as shaped by external influences rather than solely internal coping ability. Family relationships, spirituality, religion, personal growth, and responsibility toward others were frequently described as helping participants continue managing HIV over time. Participants additionally described becoming more accepting of HIV with time and experience, particularly as treatment improved and survival expectations changed.

One participant described maintaining a positive outlook despite ongoing challenges:

This too shall pass... stuff is gonna happen. However, it's about how you respond, how you address it, and how you learn from it. (Participant 14)

Another participant described resilience as accepting hardship as part of life:

A lot of it's cést la vie, it's life. What are you gonna do? (Participant 15)

Several participants additionally framed resilience in terms of surviving earlier periods of the HIV epidemic and adapting to changing medical and social conditions surrounding HIV.

As one participant explained:

I did overcome a lot of stuff so let me overcome this. (Participant 16)

Interpersonal-Level Factors

Family, Partners, and Social Support

Participants frequently described interpersonal relationships and social support as important influences on adherence and adjustment to HIV. Family members, romantic partners, peer groups, and support groups were often described as helping participants maintain adherence and remain engaged in care.

One participant described extensive family acceptance and support following diagnosis:

My mother said, 'If that's all that's wrong with you, and you are alive'... my family accepted it. (Participant 17)

Others described HIV support groups and peer-based spaces as meaningful sources of encouragement and advocacy. One participant specifically described appreciation for support spaces centered around Black and Brown communities:

There were a lot of Black organizations that were doing the work... and we fought for clinics to stay and to be in the community instead of us travelling to other communities. (Participant 15)

Participants described receiving support from multiple sources, including family, romantic partners, peer groups, religious communities, healthcare providers, and HIV support organizations. However, support systems were often described as fragmented rather than fully integrated across different areas of life. Participants frequently described selectively disclosing HIV status depending on social context because of fears regarding stigma, judgment, or misunderstanding. One participant described navigating disclosure differently depending on setting:

I have family members that I know for sure that I don't talk about it around them... because stigmatism within the black community. To be honest, and at church as well. (Participant 10)

Participants additionally noted that public understanding of HIV had improved over time, reducing some stigma and secrecy surrounding HIV. One participant described pursuing social work and gerontology in order to advocate for aging PWH:

While I may not be experiencing some of the negative social effects of HIV like many others, I can still be that support to those that are, give them that voice. (Participant 14)

Consistent with these qualitative findings, quantitative measures indicated variability in perceived social and emotional support across participants.

Interpersonal Motivations for Adherence

Beyond practical adherence supports, participants also described adherence motivations extending beyond personal health, including protecting partners, maintaining independence, and remaining healthy for loved ones.

One participant described preventing HIV transmission as their primary motivation for adherence:

I just wanted to not get anybody else sick... From a public health concern, that has always been the driver for me takin' my medicine. (Participant 5)

Community-Level Factors

Black Community Cohesion and Visibility

Most participants described limited perceptions of strong Black community cohesion in San Diego compared to larger Black communities in cities such as Atlanta, New York City, or regions of the Southern United States. Participants attributed this fragmentation to the relatively small Black population in San Diego, neighborhood segregation, lack of visibility, and experiences of discrimination. One participant contrasted Southern California with experiences living elsewhere:

Back East, I had genuine friends, but here... a lot of superficial shit goes on here in California. (Participant 3)

Another participant described the absence of a unified community voice:

No strength, no voice... (Participant 18)

Similarly, another participant reflected on the relative invisibility of Black communities in San Diego:

Every time you see somebody Black, I'd get so excited because you don't see that many. (Participant 20)

Conversely, another participant acknowledged awareness of Black community spaces but described difficulty locating and accessing them:

I know that they're out there. I would like to connect with them. It's just finding functions and stuff. (Participant 19)

Despite these challenges, multiple participants highlighted the healthcare and HIV-related resources available in California, particularly Southern California. One participant raised in the South reflected:

I really couldn't imagine living in rural America being HIV positive in the South... (Participant 10)

Community Stigma and Social Attitudes

Participants described HIV stigma as persisting within broader community, religious, and social environments. Several participants discussed stigma within Black communities and churches as continuing to shape disclosure decisions and social experiences.

One participant described fears of bullying and social judgment after diagnosis:

I was thinkin' people would make fun of me or talk down about me... (Participant 7)

Participants additionally emphasized the need for broader HIV education and greater community awareness surrounding HIV.

Healthcare-System Factors

Healthcare Relationships and Provider Experiences

Participants generally described HIV care experiences positively when providers demonstrated empathy, continuity, and relationship-centered care. Long-term provider relationships were highly valued, and participants frequently emphasized appreciation for providers who considered their broader health and social circumstances rather than HIV alone. One participant described their physician as highly empathetic at the time of diagnosis:

My doctor. He made me feel like a person. He made me feel not dirty, not filthy. He made me feel good... (Participant 7)

Multiple participants described appreciating comprehensive HIV care models in which providers coordinated care across multiple chronic conditions (e.g., hypertension, diabetes):

She wasn't just looking at my HIV; she was looking at the whole entire picture. (Participant 13)

Participants additionally valued collaborative and conversational approaches to care that highlighted their agency and lived experience. One participant recalled their physician stating:

You living in that body longer than I am. I'm just taking it for these few minutes that you're here with me. (Participant 2)

At the same time, participants described negative healthcare experiences related to provider turnover, insurance instability, delayed linkage to care, transportation barriers, and experiences of mistrust or dismissal.

One participant observed differences in care and provider interactions when transitioning from private insurance to Medi-Cal:

My medical mistrust was heightened... The privilege gets wiped away. He just didn't understand the triggers and the traumas. (Participant 5)

Another participant described delays in establishing consistent HIV care because of insurance-related barriers:

It shouldn't have taken me a year... all that stuff takes forever. (Participant 9)

Structural Factors

Resources, Representation, and Stigma

Several participants described Ryan White HIV/AIDS Program services, case management, and HIV-focused community organizations as critical structural supports that facilitated care engagement and treatment continuity. Participants additionally emphasized the need for greater representation across HIV care providers and more culturally responsive healthcare environments. One participant specifically emphasized the importance of greater racial representation within healthcare settings:

There need to be more Black doctors, Black nurses because there really is not.
(Participant 8)

Participants also described HIV stigma as intertwined with broader experiences of race, sexuality, gender, religion, and institutional marginalization. One participant described experiences of abuse and lack of confidentiality surrounding HIV status while serving in the military:

It's supposedly confidential [HIV testing], and it wasn't. Because of that, I went through a lot of abusive situations... (Participant 6)

Similarly, another participant highlighted the unique experiences of Black women living with HIV and described how intersecting forms of stigma affected their experiences:

Everything attacks our womanhood... What can I do right? (Participant 5)

Participants frequently framed broader structural and community conditions as directly affecting long-term well-being, healthcare engagement, resilience, and quality of life beyond HIV treatment alone.

Mixed-Methods Integration

Taken together, quantitative and qualitative findings converged in several key areas, while also revealing meaningful tensions that neither data source alone could fully capture. Quantitative data indicated generally high self-reported ART adherence ($M = 89.33$, $SD = 18.30$ on the VAS), and qualitative narratives provided direct explanatory context for this pattern: participants described embedding medication-taking within structured daily routines and drawing on interpersonal motivations, including protecting partners and remaining present for loved ones, that extended adherence beyond self-interest alone. Similarly, quantitative findings indicated that participants endorsed substantially more supports than barriers to adherence ($M = 12.90$ vs. $M = 4.10$), a pattern consistent with qualitative descriptions of multiple overlapping support sources, including family, peer networks, Ryan White services, and supportive provider relationships. Quantitative measures of resilience were also notably high ($M = 30.78$ on the CD-RISC-10), and qualitative data expanded this finding by revealing that resilience is shaped by surviving earlier periods of the epidemic, spiritual resources, and long-term adaptation to shifting medical and social conditions surrounding HIV. Points of divergence and elaboration were also evident. Although mean loneliness scores were relatively low at the group level ($M = 11.39$), qualitative findings revealed substantial interpersonal complexity not captured by the quantitative score: participants described support systems as fragmented across contexts, with HIV-related, familial, and community support functioning largely in parallel rather than cohesively, and disclosure-related stigma constraining the social integration that might otherwise buffer loneliness. Similarly, while mean depressive symptom severity fell within the minimal range ($M = 8.59$), qualitative accounts documented ongoing emotional exhaustion, grief related to earlier HIV losses, and psychological burden associated with lifelong HIV management, suggesting that standard symptom measures may underestimate the cumulative emotional weight of long-term

HIV survivorship among this cohort. Collectively, these convergences and elaborations support a socioecological model of ART adherence and healthcare engagement for Black PWH in Southern California.

Discussion

The present mixed-method study examined the lived experiences of HIV, ART adherence, healthcare engagement, resilience, social support, and community cohesion among Black PWH in Southern California using a socioecological framework. Findings demonstrated that participants' experiences with HIV and adherence were shaped not solely by individual factors like personal motivation or medication-taking behavior, but by interacting interpersonal, healthcare-system, cultural, and structural influences. Participants described living across multiple eras of HIV treatment, navigating persistent stigma and discrimination, developing adherence routines embedded within daily life, and relying on fragmented but meaningful systems of social and structural support. Collectively, these findings support socioecological conceptualizations of HIV care engagement, which emphasize that adherence behaviors emerge within broader interpersonal, healthcare, community, and structural environments rather than through individual decision-making alone (Kaufman et al., 2014).

The mixed-method design strengthened the interpretation of findings by contextualizing quantitative psychosocial measures within participants' lived experiences. While quantitative assessments captured variability in depressive symptoms, social support, resilience, and quality of life, qualitative interviews clarified how these experiences were shaped by fragmented support systems, provider relationships, HIV-related stigma, healthcare navigation, and broader structural barriers. In particular, participants' narratives highlighted how psychosocial functioning and adherence experiences were closely tied to environmental stability, continuity in

care, and social connectedness, extending prior work demonstrating the importance of social determinants of health for HIV-related outcomes among Black PWH (Patel et al., 2024).

Notably, the mean age of the sample was 61 years, reflecting a cohort of older adults and long-term survivors living with HIV. Related to this context, one notable finding was that participants frequently described living with HIV across multiple treatment eras and recognized substantial improvements in HIV treatment simplicity and survivability over time. Participants diagnosed during earlier phases of the epidemic frequently described expecting death shortly after diagnosis and witnessing severe illness and mortality among peers and community members. Earlier HIV treatment regimens were additionally described as physically burdensome and disruptive to daily functioning. Despite advances in HIV treatment, participants described lingering emotional effects from earlier experiences of stigma, fear, discrimination, and loss. These findings parallel prior literature describing the long-term psychosocial effects of HIV-related stigma and trauma among PWH, particularly among Black adults navigating intersecting forms of marginalization (Earnshaw et al., 2013; Quinn et al., 2018). Participants' descriptions of earlier HIV experiences additionally underscore how historical contexts of HIV continue to shape present-day healthcare engagement and disclosure decisions despite major biomedical advances in treatment.

Participants frequently emphasized the importance of structured medication-taking routines and continuity in healthcare relationships. Adherence was commonly described as embedded within environmental consistency and daily behavioral routines, such as pairing medication-taking with meals, coffee, or other habitual activities. Participants additionally described adherence as motivated not solely by individual health concerns, but by interpersonal responsibilities, including protecting partners and remaining healthy for loved ones. At the same

time, participants in the present study described adherence barriers related to disrupted routines, unstable housing, insurance changes, transportation barriers, mental health concerns, and emotional exhaustion associated with lifelong HIV management. These findings closely mirror prior formative work in which Black PWH reporting high psychosocial burden were found to have lower rates of ART adherence (Ham et al., 2023). Similar structural and psychosocial barriers have been identified in qualitative work examining HIV care inequities among Black and Latino PWH, including housing instability, healthcare-system complexity, and challenges navigating insurance and care systems (Filippone et al., 2023).

Healthcare system experiences also emerged as highly influential to participants' perceptions of HIV care engagement and well-being. Positive healthcare experiences were often characterized by empathy, trust, continuity, collaborative communication, and comprehensive care models addressing both HIV and broader psychosocial or medical concerns. Participants frequently described valuing providers who recognized their lived experiences and treated them holistically rather than focusing narrowly on HIV status alone. These findings align with prior literature demonstrating the importance of culturally responsive and relationship-centered HIV care among Black PWH (Bogart et al., 2017; Li et al., 2018). Conversely, participants described provider turnover, insurance instability, delayed linkage to care, dismissive interactions, and experiences of medical mistrust as undermining engagement and trust in healthcare systems. Several participants specifically discussed how race and HIV status shaped healthcare interactions and perceptions of provider understanding. These findings are consistent with prior research linking discrimination and medical mistrust to reduced ART adherence and poorer HIV care engagement among Black PWH (Bogart et al., 2010; Dong et al., 2022).

Resilience emerged as a multi-level construct shaped by interpersonal relationships, spirituality, community support, and broader social environments rather than solely internal coping ability. Participants frequently described resilience as reinforced through family relationships, religion, social support, advocacy, and surviving earlier periods of the HIV epidemic. This finding is consistent with prior resilience literature suggesting that resilience among Black PWH is supported through social, institutional, and community resources in addition to individual coping processes (Smith et al., 2015; Dulin et al., 2018; Fletcher et al., 2020; Qiao et al., 2019). Participants additionally described resilience as developing through adaptation to HIV over time, particularly as treatment improved and survival expectations shifted. However, support systems were often described as fragmented across different areas of life, with HIV-related support, family support, religious communities, and broader community engagement functioning separately rather than cohesively. This fragmentation may reflect both persistent HIV stigma and the broader social organization of Black communities within Southern California.

Importantly, most participants described limited perceptions of Black community cohesion within San Diego and Southern California more broadly. Participants frequently compared Southern California unfavorably to regions with larger and more visible Black communities, such as Atlanta, New York City, and the Southern United States. Participants attributed this fragmentation to the relatively small and geographically dispersed Black population within San Diego, limited visibility of Black communities, neighborhood segregation, and difficulty locating culturally specific community spaces. These findings extend prior work suggesting that social connectedness and social capital are associated with psychosocial well-being and HIV outcomes among Black PWH (Hussen et al., 2018). Similarly, Quinn et al. (2018)

found that Black men living with HIV described both social support and community stigma as important influences on HIV care engagement. The present findings build on this literature by suggesting that regional and geographic context may meaningfully shape opportunities for social support, visibility, and community belonging among Black PWH in Southern California specifically.

Participants also highlighted broader structural and cultural factors affecting HIV-related experiences and healthcare engagement. HIV stigma was frequently described as intertwined with race, sexuality, religion, gender, and broader experiences of marginalization. Participants discussed experiences of stigma within Black communities, churches, military settings, and healthcare environments, and several participants specifically highlighted the need for greater representation of Black healthcare providers and more culturally responsive HIV care. These findings are highly consistent with prior socioecological models of HIV care engagement emphasizing that structural racism, discrimination, and inequitable healthcare access shape HIV-related outcomes among Black PWH (Kaufman et al., 2014). Black women living with HIV additionally described navigating intersecting forms of racialized and gendered stigma affecting healthcare experiences and psychosocial well-being. This aligns with prior resilience and stigma research among Black women living with HIV demonstrating the importance of considering intersectionality and broader social context within HIV care and intervention development (Fletcher et al., 2020; Qiao et al., 2019).

The present findings have important clinical and public health implications. Interventions aimed at improving ART adherence among Black PWH may benefit from extending beyond medication reminders or adherence monitoring alone. Participants' narratives suggest that continuity of care, culturally responsive provider relationships, social connectedness, structural

resource accessibility, and broader community support systems may all influence HIV care engagement and adherence. These findings additionally support the importance of comprehensive and humanistic HIV care models that integrate psychosocial support, case management, and structural resource navigation alongside adherence-focused interventions. Prior intervention work has similarly demonstrated that culturally congruent and tailored adherence interventions may improve HIV-related outcomes among Black PWH (Bogart et al., 2017; Kohli et al., 2020). Participants' descriptions of fragmented community support and limited Black community visibility further suggest potential value in interventions fostering culturally specific peer support, community-building opportunities, and social connection among Black PWH.

Several limitations should be considered when interpreting findings. First, the sample size was small and geographically limited to Southern California, which may limit generalizability to other Black communities living with HIV but may be informative for other geographical regions with a small and dispersed Black population. Second, participants self-selected into participation, which may introduce selection bias. Related, ART adherence was relatively high in this sample, and may not represent the experiences of Black PWH challenged by ART adherence. Third, ART adherence was measured through self-report and may not be fully accurate due to the potential of recall or social desirability biases. Fourth, although rapid qualitative analysis facilitates timely and systematic synthesis of qualitative data, it may provide less interpretive depth than more intensive qualitative analytic approaches (Hamilton & Finley, 2020). Finally, quantitative analyses were cross-sectional, descriptive and exploratory, limiting statistical inference and quantitative integration across findings and timespans.

Despite these limitations, the study possesses several notable strengths. The mixed-method design allowed for integration of quantitative psychosocial assessments with rich

qualitative data describing lived experiences among Black PWH. Additionally, the socioecological framework facilitated examination of multilevel influences on HIV care engagement, resilience, adherence, and community experiences. The present study also contributes to a relatively limited body of qualitative and mixed-method research specifically focused on Black PWH in Southern California and highlights important regional and structural influences shaping HIV-related experiences.

Taken together, Black PWH in Southern California described experiences shaped by resilience, social support, healthcare relationships, stigma, and broader structural inequities. Although participants recognized substantial advances in HIV treatment and survivability over time, findings additionally underscore persistent psychosocial and structural challenges affecting healthcare engagement and quality of life. Multi-level approaches incorporating culturally responsive care, continuity in provider relationships, social support, and structural resource accessibility may help support ART adherence and well-being among Black PWH.

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Chapter 4, in full, has been submitted for publication of the material as it may appear in *Ethnicity and Health*. Serrano, Vanessa B.; Prescott, Maximo; Peretti, Matteo; Montoya, Jessica L.; Moore, David J. The dissertation author was the primary researcher and author of this paper.

Chapter 5: DISCUSSION

The present three-paper dissertation examined psychosocial, structural, and community-level determinants of ART adherence and healthcare engagement among Black people with HIV (PWH). Across the three studies, findings supported the central premise that ART adherence is not simply an individual medication-taking behavior, but rather a health behavior shaped by interacting social determinants of health, psychosocial resources, health beliefs, healthcare relationships, and broader community and structural contexts. This is consistent with socioecological models of HIV care, which emphasize that adherence and healthcare engagement are influenced by factors operating across individual, interpersonal, community, healthcare-system, and structural levels (Kaufman et al., 2014; Storholm et al., 2019).

Study 1 used archival longitudinal data from the iC-CHANGE study to examine psychosocial determinants of health as predictors of ART adherence across three adherence measures: a 3-item self-report adherence scale, a visual analog scale (VAS), and daily text message responses. Findings indicated that housing instability was the most consistent predictor of poorer ART adherence across all three adherence outcomes. Health literacy was also associated with higher adherence as measured by text message responses, while age showed different patterns across adherence measures. Specifically, older age was associated with higher adherence on the VAS but lower adherence in daily text message responses. Taken together, these findings suggest that structural and contextual determinants, particularly housing stability, may play a central role in shaping ART adherence among Black PWH. These findings align with prior work showing that housing instability is associated with lower ART adherence, poorer retention in care, and lower rates of viral suppression among PWH (Aidala et al., 2016; Galarraga et al., 2018; Rajabiun et al., 2018).

Study 2 further examined ART adherence using the same iC-CHANGE archival dataset, but focused on Health Belief Model (HBM) constructs and related psychosocial factors. Across longitudinal adherence outcomes, self-efficacy and perceived barriers emerged as the most salient correlates of ART adherence, particularly for retrospective self-report measures. Greater self-efficacy was associated with higher adherence on the 3-item self-report adherence scale and VAS, while greater perceived barriers were associated with lower adherence on these same measures and showed a trend toward lower text message-reported adherence. These findings support prior research identifying self-efficacy and barriers as important predictors of ART adherence among PWH (Johnson et al., 2007; Simoni et al., 2006). Importantly, the findings also suggest that adherence interventions for Black PWH may benefit from strengthening confidence in medication-taking while reducing practical, psychological, and structural barriers that interfere with adherence.

Together, Studies 1 and 2 demonstrate that both structural conditions and individual-level psychosocial beliefs are relevant to ART adherence among Black PWH. Housing instability and health literacy speak to broader social determinants of health, whereas self-efficacy and perceived barriers reflect psychosocial and behavioral mechanisms more proximal to medication-taking. Rather than competing explanations, these findings suggest that adherence is shaped by multiple levels of influence. For example, housing instability may make it more difficult to maintain routines, store medication, attend appointments, or respond consistently to text message prompts, while low self-efficacy and high perceived barriers may further reduce individual confidence in one's ability to adhere under difficult circumstances. Thus, individual beliefs about adherence may be shaped by the structural realities in which adherence occurs.

Study 3 extended this work through new mixed-method data collection with Black PWH in Southern California. Using quantitative psychosocial assessments and qualitative interviews, this study examined lived experiences of Black PWH, with particular attention to how resilience, social support, community cohesion, and community resource needs interact to shape ART adherence and healthcare navigation. Findings demonstrated that participants' experiences with HIV and adherence were shaped by healthcare-system factors, social relationships, cultural context, and structural resources. Participants described the importance of medication-taking routines, continuity in provider relationships, trust, empathy, culturally responsive care, and access to HIV-related and non-HIV-specific resources. Participants also described resilience as a multi-level construct shaped by relationships, spirituality, responsibility to others, and social support systems, consistent with prior research emphasizing the interpersonal and community dimensions of resilience among Black PWH (Dulin et al., 2018; Qiao et al., 2019; Rzeszutek et al., 2017).

A major contribution of Study 3 was its attention to regional and community context. Participants frequently described limited perceptions of Black community cohesion in San Diego, and more broadly Southern California, often comparing the region unfavorably to areas with larger and more visible Black communities. This finding extends prior work suggesting that community cohesion and social connectedness may influence psychosocial well-being, healthcare engagement and HIV outcomes among Black PWH (Hussen et al., 2022; Qiao et al., 2019). Although participants identified sources of resilience and support, these supports were often fragmented across family, faith, healthcare, HIV-specific services, and broader community settings. This fragmentation may be especially important in regions where Black communities are smaller, more geographically dispersed, or less visible.

Across the dissertation, findings point to the importance of multi-level approaches to improving ART adherence and HIV care engagement among Black PWH. Medication reminders and adherence monitoring may be helpful, but are unlikely to fully address the structural and psychosocial barriers that shape ART adherence behavior. Interventions may be strengthened by integrating adherence support with housing and resource navigation, health literacy support, culturally responsive communication, provider continuity, and strategies to strengthen self-efficacy. Similarly, community-building and peer support interventions may be particularly important for Black PWH in regions with lower perceived Black community cohesion. These approaches are consistent with prior work suggesting that culturally congruent and tailored interventions can improve HIV-related outcomes among Black PWH (Bogart et al., 2017; Kohli et al., 2020).

The findings also highlight the value of using multiple adherence measures. Across Studies 1 and 2, predictors were not always consistent across retrospective self-report measures and daily text message responses. These differences may reflect meaningful differences in what each adherence measure captures. Retrospective self-report measures may better reflect perceived overall adherence and confidence in medication management, whereas daily text message responses may capture more proximal medication-taking behavior, engagement with technology, or responsiveness to intervention prompts. This is particularly relevant for older adults, who may report high perceived adherence while experiencing greater difficulty with daily technology-based reporting. Future research should continue to examine how different adherence measurement approaches perform among Black PWH and how these measures may reflect distinct dimensions of adherence behavior.

Several limitations should be considered. First, Studies 1 and 2 relied on archival data from a sample of Black PWH already receiving HIV care and enrolled in a text messaging intervention to support ART adherence, which may limit generalizability to individuals who are not linked to care or who are less engaged in healthcare. Second, adherence outcomes relied on self-report and text message responses rather than biological outcomes such as viral load or pharmacy refill data. Third, Study 3 included a relatively small sample recruited from Southern California, which may limit generalizability to Black PWH living in other geographic regions. Finally, because the dissertation included both archival analyses and newly collected multi-method data, the samples and measures were not fully identical across studies. Nevertheless, this design allowed the dissertation to examine adherence and healthcare engagement from complementary quantitative and qualitative perspectives.

Despite these limitations, the dissertation has several strengths. The first two studies used longitudinal adherence data from an exclusively Black cohort of PWH participating in a culturally tailored mHealth intervention. The use of multiple adherence measures allowed for comparison across self-report and text message-based outcomes. The third study provided rich qualitative context for understanding how Black PWH experience adherence, resilience, healthcare relationships, social support, and community cohesion in daily life and provided these data in tandem with quantitative measures on the same participants. Together, the three studies provide a more comprehensive understanding of ART adherence and healthcare engagement among Black PWH than any single method or dataset would allow.

Considering the limitations and strengths of the present dissertation, several future directions and implications emerge. Findings from Study 1 suggest that housing instability may represent an important intervention target for improving ART adherence among Black PWH.

More broadly, these findings underscore the importance of addressing adherence through multilevel approaches that extend beyond individual behavior change alone. At the structural and community levels, interventions may benefit from incorporating resource navigation and linkage to housing supports, financial assistance programs, HIV-specific services, and healthcare resources. For Black PWH in Southern California, this may include increasing awareness of Ryan White services, local HIV clinics, and other safety-net resources. While access to these resources remains constrained by broader structural factors, facilitating awareness and navigation of available services may represent an important first step in supporting individuals experiencing housing instability. At the interpersonal level, findings from Study 1 also highlight the potential value of strengthening social support networks. Individuals experiencing housing instability may benefit from supportive relationships capable of providing emotional, informational, or practical assistance during periods of need. Future interventions may therefore consider not only connecting individuals to formal services, but also supporting the development and maintenance of interpersonal networks that can serve as protective resources during times of instability. Future research should build upon these findings by examining interactions between housing instability and psychosocial determinants of health, including self-efficacy and community cohesion, to determine whether these factors mitigate or exacerbate the effects of structural disadvantages on ART adherence. Such research may help identify individuals who are particularly resilient despite adverse structural circumstances, as well as those most vulnerable to poor adherence outcomes. Future studies should also evaluate these relationships in larger and more diverse samples of Black PWH, particularly among individuals who are not yet engaged in care or who are at elevated risk for poor adherence and HIV-related outcomes, as the present sample was already connected to HIV care and enrolled in a culturally tailored intervention.

Implications from Study 2 center on the importance of self-efficacy and perceived barriers as predictors of ART adherence. The self-efficacy measure examined in the present dissertation encompassed confidence in managing medications, attending healthcare appointments, and coping with health-related challenges. As such, interventions designed to strengthen these capacities may hold promise for improving adherence outcomes. Skills-based interventions focused on problem-solving, healthcare navigation, and self-management may help individuals build confidence in their ability to successfully engage in HIV care (Areri et al., 2020). To this point, in the Areri et al. (2020) systematic review, multi-component strategies, combining skills training, phone counseling, and technology-assisted tools, were found to be highly effective in improving medication adherence and quality of life. Although self-efficacy emerged as an important correlate of adherence for individuals enrolled in iC-CHANGE, notably, these participants were already engaged in HIV care and enrolled in a culturally tailored intervention. Future research should therefore evaluate these relationships in larger and more diverse samples, including Black PWH at elevated risk for poor adherence or disengagement from care, to determine the generalizability of these findings and identify populations most likely to benefit from targeted intervention. Similarly, the finding that perceived barriers were associated with poorer adherence suggests the importance of identifying and addressing barriers at the individual level. Notably, the barriers assessed in the present dissertation spanned multiple socioecological levels, including individual-level barriers (e.g., forgetting medications), interpersonal barriers (e.g., concerns about others observing medications), and structural barriers (e.g., insurance difficulties or medication costs). Future intervention efforts may therefore benefit from adopting an individualized or “N-of-1” approach in which providers work collaboratively with patients to identify the specific barriers they experience and tailor strategies accordingly.

(McDonald et al., 2017; Shaffer et al., 2018). Such an approach may be particularly valuable given the considerable heterogeneity in barriers reported by PWH. Future research should also examine whether age influences engagement with mHealth interventions and text message-based adherence monitoring, as age emerged as a significant covariate across studies. Additionally, incorporating objective indicators of adherence and HIV outcomes, such as pharmacy refill data, electronic medical record data, and viral suppression, alongside self-report measures may strengthen future evaluations of intervention effectiveness. Randomized controlled trials targeting self-efficacy and individualized barriers would further clarify the causal effects of these intervention strategies on ART adherence and HIV-related outcomes.

Findings from Study 3 further suggest that future interventions may benefit from moving beyond a sole focus on medication-taking behavior and instead consider the broader social and community contexts in which adherence occurs. Participants frequently described the importance of supportive healthcare relationships, social support networks, and culturally responsive care. Participants also described limited perceptions of Black community cohesion in Southern California and expressed a desire for stronger culturally specific support systems and community visibility. Future research should continue to examine how community connectedness, representation, and culturally responsive programming may influence HIV care engagement and well-being among Black PWH. Longitudinal research examining changes in community cohesion over time, as well as additional qualitative and mixed-method studies, may provide valuable insight into how these community-level factors shape ART adherence and healthcare engagement and inform the development of culturally responsive interventions.

Collectively, findings across the three studies suggest that improving ART adherence among Black PWH may require coordinated efforts across structural, community, interpersonal,

and individual levels. Future intervention development and research efforts should continue to examine how factors operating across these levels interact to influence adherence and broader HIV-related health outcomes.

Synthesized, this dissertation identified several modifiable determinants of ART adherence and healthcare engagement among Black PWH, including housing stability, health literacy, self-efficacy, perceived barriers, healthcare relationships, social support, and community cohesion. Across the three manuscripts, findings underscore that adherence support for Black PWH should extend beyond individual-level behavior change and address the broader structural, psychosocial, and community contexts in which HIV care occurs. Future interventions should consider integrated, culturally responsive, and socioecologically grounded approaches that support not only medication-taking, but also housing stability, provider trust, social connectedness, and community-level resources. Such approaches may help reduce HIV-related disparities and support the long-term health and well-being of Black PWH.

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