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ASSESSING THE RELATIONSHIP BETWEEN RACISM IN MEDICINE, MEDICAL MISTRUST AND CARDIOVASCULAR DISEASE AMONG BLACK AMERICAN ADULTS

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M.D., All Saints University College of Medicine, 2017
M.P.H., Central Michigan University, 2020

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A Dissertation Approved on

April 23, 2024

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DEDICATION

This dissertation is dedicated to God and my immediate family.

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I am extremely grateful to my awesome God for His favor and honor that has empowered me to successfully complete my doctoral degree. This dissertation would have never been possible without God giving me good health, wisdom, and diligence to complete my doctoral degree. Praise forever be unto God for strengthening me to overcome all obstacles. I am blessed to be able to obtain a second doctorate degree, and to God be all the glory, great things He has done.

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ABSTRACT

ASSESSING THE RELATIONSHIP BETWEEN RACISM IN MEDICINE, MEDICAL MISTRUST AND CARDIOVASCULAR DISEASE AMONG BLACK AMERICAN ADULTS

Osayande Agbonlahor

April 23, 2024

Cardiovascular disease (CVD) persists as the leading preventable cause of death and disability among Black Americans in the United States. Structural and psychosocial factors such as racism have been highlighted as a fundamental cause of persistent cardiovascular health disparities in the U.S. This study examined the associations between racism in medicine, medical mistrust and CVD among Black Americans using the Minority Stress Theory as a theoretical framework. This study evaluates the sociodemographic differences in the quality of care received among Black Americans

Data from the Health Information National Trends Survey, 2022 and the Consumer Assessment of Healthcare Provider and Systems Survey, 2019 were used to test the hypothesis that experiences of racism in medicine and mistrust of health care providers and health care systems will be associated with increased odds of CVD among Black Americans. Adjusted logistic regression and ordinal logistic regression models were performed.

This dissertation follows a traditional format and includes five chapters, covering the introduction, literature review, method, results, and discussion. Chapter 1 provides an overview of CVD disparities and racism as a structural determinant. Chapter 2 synthesizes the literature on racism and CVD, racism in medicine, medical mistrust, and

introduces the Minority Stress Theory as the theoretical framework guiding the study. Chapter 3 describes the methodological approaches for the study. Chapter 4 details the results. Chapter 5 summarizes and discusses the study findings, strengths and limitations, public health implications, and recommendations for future research.

Racism in medicine and mistrust of health care providers were found to be significantly associated with higher odds of CVD among Black American adults. Mistrust of the health care system was associated with lower odds of CVD among Black Americans. This study is unique and contributes to the current science as it is the first to examine the association between racism in medicine, medical mistrust and CVD among Black Americans using the Minority Stress Theory. Results of this study could guide CVD prevention strategies for Black Americans with a focus on health care provider culturally sensitive interventions and equitable health care policies to mitigate the deleterious effects of racism on CVD.

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CHAPTER I

INTRODUCTION

Cardiovascular disease (CVD) persists as the number one preventable cause of death and disability in the United States (U.S.) (1, 2). Cardiovascular diseases include coronary artery disease, stroke, and hypertension. Notably, 650,000 deaths in the U.S. are caused by cardiovascular diseases annually, and this results in a significant burden on the U.S. health care system and economy both in terms of health care-related costs and productivity loss (3). Furthermore, according to the Centers for Disease Control and Prevention (CDC), every 34 seconds, one person dies of cardiovascular diseases in the U.S., and one in every five deaths of American adults is attributable to cardiovascular diseases and CVD-related factors (4). In addition to the death and disability, cardiovascular diseases significantly increase the risks of developing other chronic diseases such as chronic kidney disease, aortic dissection, and dementia (2, 5), further highlighting the importance of CVD prevention and control.

In the U.S., 20.1 million adults have coronary artery disease, which contributed to 382,820 deaths of Americans in 2020 (6). Further, health care-related costs for coronary artery disease are greater than $200 billion annually (7). Stroke is responsible for approximately $53 billion in health care related costs annually in the U.S. (6), with more than 795,000 adults in the U.S. affected by the death and disability associated with stroke (6). Furthermore, 47% of adults (116 million adults) in the U.S. have hypertension (8), and the mortality rate attributable to hypertension increased by 34.2% from 2009 to 2019

(6). Concerning economic burden, hypertension is responsible for about $131 billion of U.S. health care costs annually (9). Cardiovascular diseases are multifactorial in nature and as such in addition to the influence of genetics, environmental factors such as the social environment, socioeconomic status, diet, and lifestyle behaviors influence susceptibility to and risk for disease (10). The role of several individual risk factors and lifestyle behaviors in increasing CVD risk has been examined in previous research (11, 12). However, when aiming to address CVD disparities among structurally marginalized populations, it is critical to examine the interpersonal and structural factors which predispose these groups to poor cardiovascular health outcomes (11, 12).

Cardiovascular Disease Disparities in the U.S.

CVD significantly affects structurally marginalized populations, and the impact of these disparities and burden has been extensively documented in the literature (3, 6). Structurally marginalized populations include people who are at disproportionate risk of poor social, psychological, and physical health due to historical, structural, and sociopolitical conditions, and the ideologies that drive them (13). Examples include low-income individuals, members of minoritized racial/ethnic groups, members of minoritized sexual and gender groups, people with disabilities, and immigrants (13). Notably, CVD disparities result from unjust and inequitable structural and systemic disadvantages that lead to cardiovascular health inequities and mistrust of public systems that transcend generations of population groups (3, 14). For example, Black American adults are more likely than white adults to report experiences of racism and mistrust of the medical care system (15, 16), distrust of health care providers (17, 18), and poor quality of care received (19).

Historically and recently, significant disparities in CVD incidence and outcomes have been observed for Black American men and women (20-23). For example, compared to white adults, Black American adults have higher prevalence rates of cardiovascular diseases (11, 24), higher risks of developing CVD and dying from CVD complications (25), and higher age-adjusted mortality rates (6). In addition, Black Americans are less likely to receive quality cardiovascular care, including receiving preventive cardiovascular health services and surgical procedures (26, 27), and face more health care provider discrimination based on race (3, 6). Previous research found that most health care providers in the U.S. appear to have implicit bias towards Black American adults compared to white adults (28), and Black American adults who report exposure to racism in health care and medical mistrust are less likely to utilize preventive cardiovascular health services such as blood pressure screenings (29). These medical mistrust and health care provider discrimination lead to CVD disparities and inequities.

In 2020, the American Heart Association (AHA) released a call to action highlighting racism as a fundamental cause of persistent cardiovascular health disparities in the U.S. (30). Structural and psychosocial barriers in health care such as racism and experiences of racial discrimination have been discussed as key drivers for CVD disparities among Black Americans in the U.S.(20, 21), however, research examining the association between racism in medicine (i.e., health care provider discrimination, mistrust of health care providers and health care systems, and poor quality of care) on CVD disparities among Black Americans is scant.

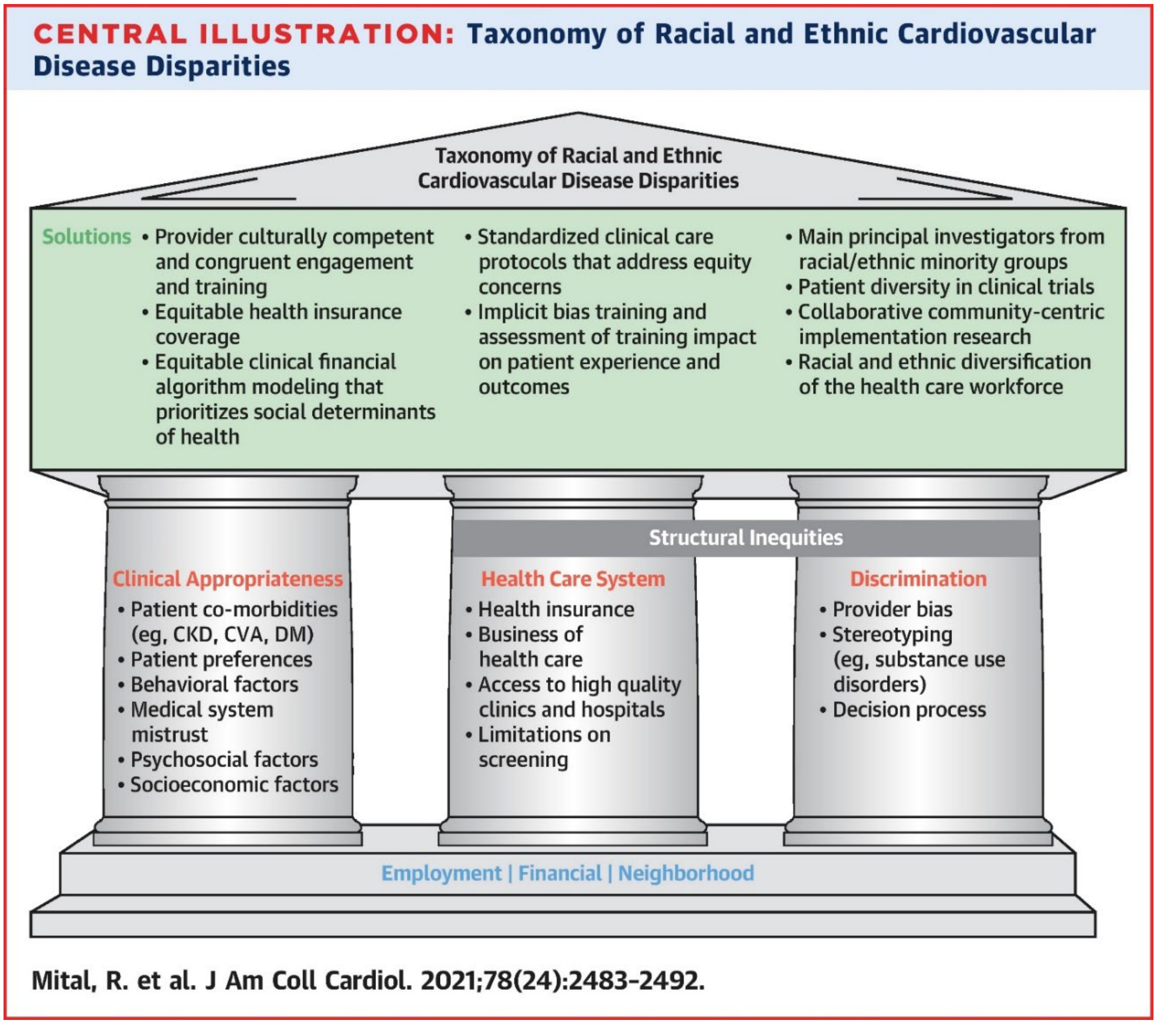


Figure 1: (31)

Racism as a Structural Determinant of CVD Disparities among Black Americans

According to the CDC, racism is defined as the systematic and structural practices that assign value to people predicated on the color of their skin (32). Moreover, racial discrimination is defined as unfair treatment predicated on skin color or perceived membership in a racial group (33). Further, Wyatt defined racism as "an organized system, rooted in an ideology of inferiority, that categorizes, ranks, and differentially allocates societal resources to human population groups. It may or may not be accompanied by individual prejudice providing the context within which stereotypes (overgeneralized labels of persons or groups), prejudice (negative judgments and attitudes), and discrimination (unfair treatment) are developed and sustained" (p. 316) (34). For the context of this paper, a brief summary of the history of racism in the U.S. will be discussed here, with a deeper discussion about its impact on CVD disparities in Chapter 2.

It is important to highlight that the experiences, identities, and perspectives of Black Americans in the U.S. have been directly and indirectly impacted by colonization and slavery. Racism is deeply rooted in U.S. society, and historically the legislations and policies implemented have been for the advantage of white people and the disadvantage of Black Americans (35, 36). Racism can be traced back to 1619 when African slaves first arrived in colonial Virginia (37), then the development of the Constitution which declared that Black Americans were to be valued as property and had no personhood. After the Civil War resulted in slavery being illegal, Jim Crow laws (1875–1968) maintained racism's integrally entrenchment in the U.S. health care system. The Hospital Survey and Construction Act (previously known as the Hill-Burton Act) was enacted in 1946 to provide for the construction of public hospitals and long-term care facilities (38). This allowed states to develop racially separate and unequal facilities, disadvantaging Black Americans. Also, these laws primarily benefited white workers because Black American workers were directly excluded from the benefits of employers, and unions were allowed to discriminate against such workers (38). In the 19th Century, physicians in the U.S. used Black American slaves residing in the South as subjects of involuntary medical experimentation, and justified this abuse in early medical journals during slavery and post-civil war by theorizing that the Black Americans slaves were sub-human (39).

Notably, Black American adults are prone to experiencing every day and lifetime racism or racial discrimination, which induces stress (40), increasing risk of CVD among this population (41-43). Previous research has discussed racial discrimination-induced stress as an important determinant of cardiovascular disparities among Black Americans (20, 21). Chronic stress due to experiencing racism can trigger the release of cortisol and catecholamines via activation of the autonomic nervous system (44, 45). This consequently leads to increased cardiovascular reactivity (44, 45). Further, the literature indicates that stress increases inflammation and allostatic load (46-48). One study found that measures of allostatic load are significantly higher in Black American men and women compared to white men and women, and that this contributes to about 3x greater mortality among Black Americans (49).

Research examining CVD in the context of health equity has evolved over the years with substantial progress being made. However, evidence exists that systems and social structures continue to harm specific populations such as Black American adults in the U.S., thus creating and perpetuating inequities (3, 13). Black American adults are among the predominant groups of people who experience cardiovascular and health disparities in the U.S. (3, 50). Historically, Black adults have been excluded from many of the rights and societal social advantages in the U.S. (50). Structural racism shapes the social determinants of health, influential drivers of cardiovascular health disparities among Black Americans (3, 20). For example, high rates of unemployment, neighborhood disadvantage, limited access to health care, lack of insurance coverage, racial discrimination, and health care provider discrimination all determine the choices Black American adults have in terms of achieving and maintaining optimal health. This also highlights the strategies needed to improve the health of this population (3, 20). Black American adults are harmed by discrimination and overt hostility in the majority of institutions including health care, education, housing, workplace, and everyday interactions in society (3).

These conditions affect behaviors and practices that can impact cardiovascular health outcomes. For example, Black American adults are less likely to have access to safe areas to walk and be physically active, more likely to experience food insecurity, less likely to have access to fresh healthy foods, and more likely to have tobacco and liquor stores in their neighborhoods (20). These structural and neighborhood disadvantages perpetuate socio-economic instability; thus, Black Americans are more likely to live in low-income neighborhoods, be unemployed, earn less for the same level of expertise, have poor job security, and thus more likely to be poor (3). Consequently, many Black American adults in the U.S. have limited financial resources to pay for health care or hold jobs that offer employer-sponsored health insurance (20).

Barriers to achieving cardiovascular health equity for Black Americans in the U.S. are broadly attributed to the invalidation of the lived experiences and humanity of Black Americans as a community, the different forms of political, social, and health care discrimination to which they are susceptible, and the paucity of data on racism and its impact on cardiovascular health disparities (3, 20, 40). Recently, advocates and civil rights groups representing Black Americans have aided in elevating the voice of the community and facilitating access to health insurance and health care (3, 20). However, standardized competencies on health equity, racism, health care provider discrimination, and training for providing quality and culturally responsive care for health professionals and health care organizations are not required in all residency programs and states in the U.S. at this time (3, 51). Therefore, most of the CVD care that Black American adults receive from health care professionals in the U.S. does not appropriately reflect an awareness of the lived experiences of this population, their unique concerns, and outcomes.

Black American adults face several barriers to cardiovascular health equity in the health care delivery system such as health care provider discrimination, mistrust of health care system, poor health insurance coverage, lack of access to health care providers and hospitals, and poor quality of care with regards to provider hesitancy to recommend and deliver life-saving treatment and surgical procedures (52-57). Potentially, one of the most significant inequities faced by Black Americans regarding the quality of cardiovascular health care provided in the U.S. is that compared with white patients, Black American patients are 13% less likely to be provided and undergo emergency lifesaving procedures such as heart transplantation (52).

Despite bearing a disproportionate burden of cardiovascular diseases, Black American adults continue to represent an underserved, highly discriminated against, and under-resourced population in clinical care in the U.S. (3, 20). Prior research has examined the associations between racism, experiences of racial discrimination, and CVD disparities among Black Americans (58-60); however; research examining the association between racism in medicine (i.e., health care provider discrimination, mistrust of health care providers and health care systems, and poor quality of care) on CVD diagnosis among Black Americans is scant.

Study Purpose and Hypotheses

The purpose of the proposed study is to examine the associations between racism in medicine (i.e., health care provider discrimination, mistrust of health care providers and health care systems, and poor quality of care) and CVD disparities among Black American adults using data from the 2022 Health Information National Trends Survey, a nationally representative survey of U.S. adults. Also, the proposed study will use the 2019 Consumer Assessment of Healthcare Providers and Systems (a large cross-sectional observational study) data to examine the associations between sociodemographic characteristics and quality of care received among Black American adults. The study will utilize the Minority Stress Theory (47, 61) as a theoretical framework as it allows for the exploration of social experiences and expectations of health care provider discrimination and racism in health care systems, biological mechanisms (stress and allostatic load), and moderators or coping responses (e.g., ethnic belonging) in cardiovascular diagnosis for Black Americans. Detailed descriptions of the theoretical framework and datasets used in this study can be found in Chapters 2 and 3 respectively.

Despite, the CVD disparities that exist among Black American adults in the U.S. and the impact of experiences of racial discrimination, studies focused on addressing the impact of health care provider racial discrimination, Black patients' mistrust of health care providers and health care systems on CVD development are limited. The proposed study is based on three hypotheses:

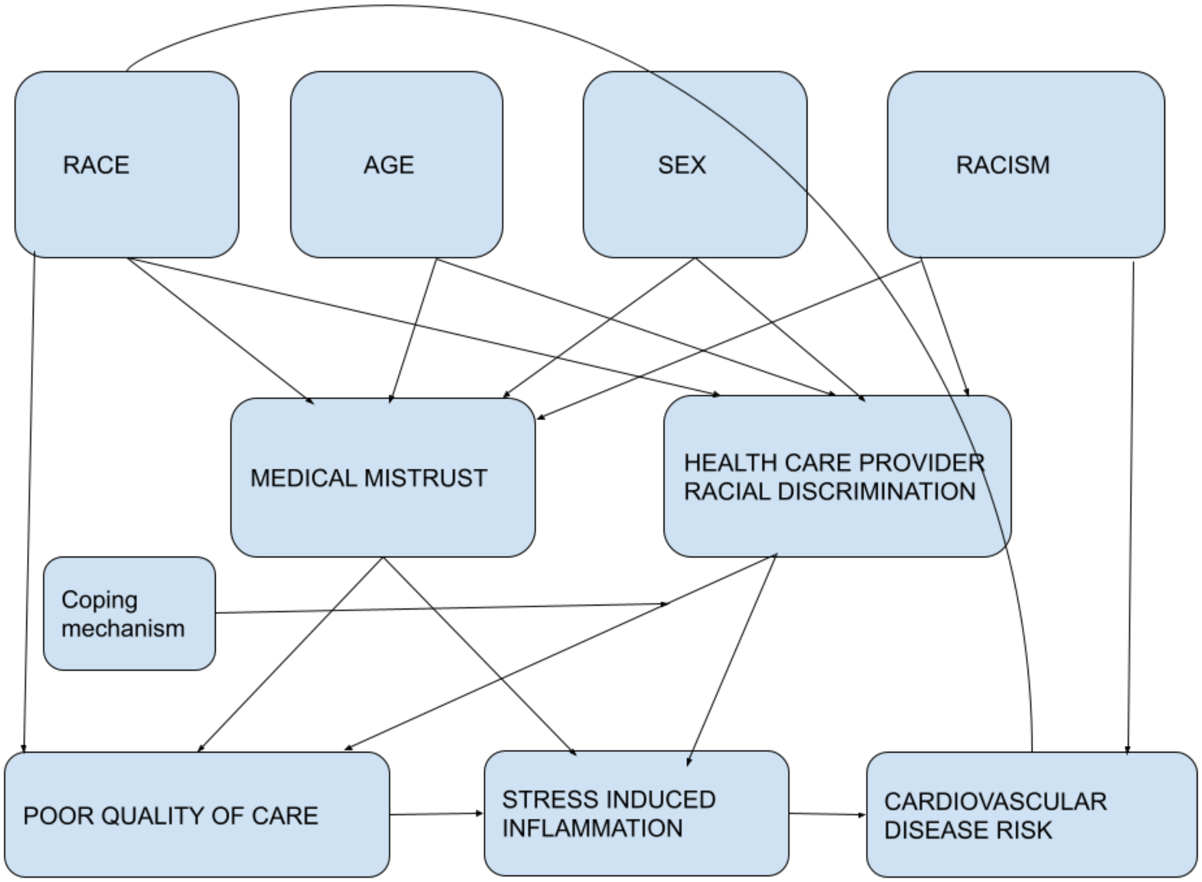
H1: Black American adults will be more likely to report experiences of health care provider discrimination and poor quality of care received compared to white adults, and this difference will significantly predict the odds of CVD diagnosis.

H2: Black American adults will be more likely to report mistrust of health care providers and mistrust of the health care system compared to white adults, and this difference will significantly predict the odds of CVD diagnosis.

H3: Among Black American adults, experiences with health care providers differ by age, sex assigned at birth, education, sexual orientation, ethnic group belonging, and income.

Below is a conceptual diagram of the study (Figure 2)

Figure 2: Conceptual Diagram of Study



Significance and Justification of Study

This study is important as it approaches CVD disparities from both a structural and interpersonal perspective using a quantitative design. Previous research and systemic reviews examining racial discrimination and CVD have utilized a quantitative design (44, 60, 62-64). However, to our knowledge, the current study's use of Minority Stress Theory to guide the examination of the association between racism in medicine, medical mistrust and CVD diagnosis among Black Americans is unique in literature. Furthermore, our examination of determinants of CVD disparities at the structural and health care provider level is necessary as health care providers (HCPs) can play a fundamental role in

CVD prevention and control by including medical mistrust, experiences with racism and health care provider discrimination in clinical assessment to aid in detecting CVD early, and in the prevention or improved prognosis for Black American adults.

The current study is also significant as it will also allow for an understanding of how mistrust of the health care system and health care providers can influence the quality of care received by Black American adults in the U.S. This study may also inform future research and public health interventions. Further, findings from this study may aid in the development and implementation of health care policies in the U.S. that include exposure to interpersonal and structural racism in clinical assessment for CVD prevention and improvement of diagnosis and treatment of Black Americans at risk for CVD.

CHAPTER II

LITERATURE REVIEW

Jones identified and defined three levels of racism: institutionalized racism internalized racism, and perceived/personally-mediated racism (65). Other levels or types of racism have also been discussed in the literature, such as structural racism (66). The proposed study will be framed in the context of CVD and Jones' three levels of racism. Additionally, the study will examine structural racism and racism in medicine and health care as key influencers of CVD disparities among Black Americans.

Structural Racism and CVD

Structural racism is defined by the American Heart Association as

> "the normalization and legitimization of an array of dynamics–historical, cultural, institutional and interpersonal–that routinely advantage White people while producing cumulative and chronic adverse outcomes for people of color that leads to differential access to the goods, services, and opportunities of society by race determines societal values and power hierarchies and underlies persistent health disparities in the United States" (p. e455) (30).

Also, previous literature has defined structural racism as systematic laws and processes used to distribute resources and opportunities to the advantage of white Americans over Black Americans in the U.S. (67), and macro-level conditions embedded in structural relations that restrict the opportunities, resources, and well-being of socially disadvantaged groups (68, 69). Finally, Bailey et al. defined structural racism as the "totality of ways in which societies foster racial discrimination through mutually reinforcing systems of housing, education, employment, earnings, benefits, credit, media, health care, and criminal justice" (p. 1453) (70).

In fact, compared to whites, Black Americans are twice as likely to be unemployed, three times more likely to be poor, more likely to earn substantially less than whites at comparable level of education or expertise (34), and experience insecurity in their job (3). Further, Black American adults who accessed public assistance programs (e.g supplemental nutrition assistance program) are more likely than white adults to report unfair treatment and not getting services they needed (66). These socioeconomic inequities can be barriers to CVD health care due to limited financial resources to pay for health care and restricted access to insurance coverage (3), and exposes Black Americans to psychosocial stress that drive CVD disparities (34, 71). Black Americans are also more likely than whites to live in socioeconomically disadvantaged neighborhoods that limit their access to green spaces, physical activity, healthy food, and transportation, and increase their exposure to violence, air pollution and other housing issues that can directly or indirectly increase CVD risk through toxic stress and inflammation (72-75).

Structural racism is a key driver for CVD disparities because it centralizes power and resources among privileged groups and dehumanizes Black Americans who are also subjected to anti-Black racism at other ecological levels (30). For example, significant disparities in CVD mortality persist for Black Americans in the U.S, regardless of individual factors such as socioeconomic status and behavior (3, 30). This is further highlighted by the recent report from the AHA that CVD adjusted death rates per 100,000 were 153.6 for Black American men and 85.9 for Black American women compared to 128.5 for white men and 63.8 for white women respectively in 2023 (76). Structural racism involves structural factors such as residential segregation, violence, educational attainment, insurance coverage, and job status, among others (3). Residential segregation, a fundamental cause of racial health disparities, can be used as a measurement of structural racism in the U.S. After slavery, Black Americans were forced to live separately from white people, they were less likely to own their homes (and thus build wealth), and their property was devalued due to unjust legislation and institutionalized practices (77).

Furthermore, Black Americans have historically faced structural discrimination concerning housing and the mortgage business. For example, the effects of discriminatory policies implemented by the Federal Housing Administration facilitated home ownership (and thus wealth building) for the white population, impeded ownership for Black Americans, and thus consequently condemned Black Americans to live in under-resourced and unsafe neighborhoods which can predispose them to increased CVD risks (3).

There is a growing body of research indicating that structural racism is associated with CVD risk and cardiovascular health care services utilization (3, 30). Inequities in CVD risk and outcomes between Black American adults and white adults persist even after controlling for exposure to individual-level factors such as smoking, diet, physical activity, education level, marital status, and socioeconomic status (3, 6, 20), For example, one novel study used data from the National Epidemiologic Survey on Alcohol and Related Conditions to examine the impact of structural racism on myocardial infarction risk in Black American adults compared to non-Hispanic white adults (69). The researchers identified four domains of state-level indicators of structural racism which included: (1) political participation, (2) employment and job status, (3) educational attainment, and (4) incarceration by the criminal legal system. Results from the study indicated that Black American adults who lived in states with higher levels of structural racism were more likely to report past-year myocardial infarction compared to Black Americans living in states with low structural racism (69). The impact of structural racism was not observed in the study to be significant for white adults (69), highlighting the role of structural racism in CVD disparities.

Institutionalized Racism and CVD

Jones identified institutionalized racism as one of the three levels of racism. Institutionalized racism is defined as a normative, structural, frequently legalized, and inherited disadvantage that allows for differential access to services, resources, and opportunities of society by race (65). The concept of institutionalized racism was first discussed in 1967 by Carmichael and Hamilton as the "systematic, more subtle forms of racism whereby historically mediated societal ideologies, practices, and policies concerning race are sustained in organizations and systems through customs, standards, and regulations" (p. 316) (34, 78). Research on institutionalized racism and CVD disparities among Black Americans is limited. However, one study conducted an exploratory review of the effects of the 3 levels of racism (institutionalized, perceived/personally mediated, and internalized racism) on cardiovascular health factors and outcomes in the U.S. The study found that institutionalized racism negatively impacted the cardiovascular health of Black Americans (34). Institutionalized racism impedes upward socioeconomic mobility for Black Americans and this may also restrict positive community engagement and the creation of supportive social networks thereby increasing the risk of cardiovascular diseases (3).

Also, the U.S. system of mass incarceration imprisons Black Americans at much higher rates than white Americans, with Black Americans about 6x more likely to be incarcerated compared with the white population (79). These results are concerning as findings of a prospective cohort study done in 2021 found that CVD incidence rates were 1.7x higher in participants with a history of incarceration, compared with those without (80). Previous research has also hypothesized that socioeconomic status and access to health care are two of the key mechanisms underlying the association between institutionalized racism and CVD disparities among Black Americans (34). Evidence from the literature highlights the importance of examining institutional racism and its impact on the cardiovascular disparities borne by Black Americans in the U.S.

Personally-Mediated Racism and CVD

Personally-mediated racism is one of Jones' three levels of racism (65). Personally-mediated racism is defined as "prejudice and discrimination, where prejudice means differential assumptions about the abilities, motives, and intentions of others according to their race, and discrimination means differential actions toward others according to their race" (p. 1212) (65). Jones (65) also emphasized that personally-mediated racism can be intentional or unintentional, and it involves acts of commission as well as acts of omission, manifesting as a lack of respect, suspicion, devaluation, scapegoating, and dehumanization.

Much of the body of research examining racism and CVD outcomes for Black Americans has assessed the impact of perceived/personally-mediated racism or discrimination. For example, Cardarelli et al. evaluated 510 adults using data from the North Texas Healthy Heart Study (81). The study found that Black American adults who reported experiences of racial discrimination and passively responded to unfair treatment were 3 times more likely to have coronary artery calcification (CAC) compared to those who did not report any experiences of racial discrimination (81). Similarly, Forde et al. conducted a longitudinal cohort study of 1,845 Black American adults ages 21 to 85 participating in the Jackson Heart Study (59). The findings from the study were that lifetime experiences with discrimination were associated with a higher incidence of hypertension, and higher stress from lifetime discrimination was associated with higher hypertension risk (59). In addition, Merritt et al. utilized a randomized controlled trial to examine cardiovascular responses to discriminatory versus neutral stimuli among a sample of Black American men ages 18 to 47 (82). Results of the study found significant cardiovascular reactivity in response to discrimination, suggesting an association between experiences of racism and CVD (82).

Notably, biomarkers of CVD risk have been studied extensively about their association with perceived/personally-mediated racism. Blood pressure and inflammatory biomarkers were the most frequently associated with cardiovascular diseases related to experiences of racial/ethnic discrimination, supporting the hypothesis that chronic stress from racial/ethnic discrimination increases inflammation and results in wear and tear of bodily systems (48, 83). Also, genetic and novel biomarkers, such as the SLC4A5 gene (84), plasma endothelin 1 gene (85), leukocyte telomere length (86), and RBC heme degradation (87), were demonstrated to be potential predictors of CVD risks among Black Americans who reported experiences of racism/racial discrimination.

Internalized Racism and CVD

Internalized racism is defined as the “acceptance by members of the stigmatized races of negative messages about their abilities and intrinsic worth” (p. 1212) (65). Jones (65) emphasized that internalized racism is characterized by members of a marginalized group not believing in themselves and other people who look like them, accepting limitations to their humanity including their right to self-expression and determination, and an acceptance of whiteness, resignation, and hopelessness (65). This form of racism is a consequence of the acceptance of cultural stereotypes of inferiority by a minoritized social population (34).

Experiences of racism and negative racial stereotypes cause and reinforce internalized racism. In the U.S, there is a normalization of the defamation of Black American culture and overt and subtle racist stereotypes, and this can result in internalization of trauma (65). Research examining internalized racism and its direct effects on CVD outcomes in Black Americans is sparse. However, existing research has shown links between internalized racism and factors that increase cardiovascular risks such as smoking, low physical activity, poor diet, increased alcohol consumption, depression, and psychological distress (34, 88-90). For example, a nutrition education study was conducted on 333 Black American adults ages 40 to 70 years to examine the relationship between cultural identity and healthy lifestyle. The study found that Black Americans who identified and expressed a positive cultural identity were more likely to practice healthy lifestyles (i.e., not smoking, low-fat diet, physical activity, and moderate alcohol consumption) (90).

Another study examining internalized racism among Black Americans found that race-based self-devaluation and poor self-esteem are linked to an increase in anxiety symptoms and psychological distress (88). Coping mechanisms for internalized racism such as anger in response to racial discrimination have also been shown in previous research to increase cardiovascular reactivity, which is a predictor of CVD risk (91). Finally, Tull et al. employed a case-control design to examine the association between internalized racism and glucose intolerance among Black Americans in the U.S. Virgin Islands (92). Results of the study found that internalized racism is associated with glucose intolerance, which increases the risk of CVD (92).

Racism in Medicine and Health Care

Historically, social and economic practices and policies have led to and exacerbated inequities across the U.S. health care system. These unjust practices in health care can be traced back to 1845 to 1849 when J. Marion Sims performed experimental surgeries on enslaved African women who were suffering from vesicovaginal fistulas without consent nor providing anesthesia for any of them (93, 94). This injustice was influenced by beliefs that African women had a higher pain tolerance compared to white women (93, 94). Some other examples of medical racial injustice include the Tuskegee syphilis experiment from 1932 to 1972 (95), and the use of Henrietta Lacks' cells in biology research (96).

Racial discrimination in health care is an important public health issue as it operates to the disadvantage of those who are already vulnerable to systemic oppression, and who are already at a disadvantage on other structural and policy levels. The relationship between a patient and their health care provider is meant to be unique, intimate, and transparent, with patients feeling comfortable sharing their concerns and vulnerability in a safe and empathetic space (97). However, racial bias in health care may disrupt the trust needed for this intricate relationship in many ways (28). For example, a health care provider who has an implicit/explicit bias towards a Black American woman will be more likely to disbelieve her accounts of CVD symptoms or their severity, which can lead to misdiagnoses and insufficient treatment of the disease (98, 99).

The failures of the health care system and health care professionals to appropriately provide cardiovascular health care for Black Americans are well documented in research (52-56), resulting in high death rates attributed to CVD. There is an overall significant disparity in access to health care, provision of quality treatment and preventive measures for Black Americans compared to whites (3). For example, one study done in 2014 using data from the Behavioral Risk Factor Surveillance System found that among adults with hypertension, Black American adults were more likely to lack a personal health care provider compared to their white counterparts (57). Another study was done among 32,353 adult heart recipients from 2011 to 2020 using the United Network for Organ Sharing (UNOS) database (52). Compared with white patients, Black Americans patients were 13% less likely to be provided and undergo emergency procedures such as heart transplantation, and had a 14% higher risk of posttransplant death despite the new allocation system amendments to UNOS (52).

Similarly, a study examining racial disparities in inpatient quality of cardiovascular care among 2,846 adults with CVD found that Black Americans received lower quality of care and had higher rates of cardiac readmissions than white adults (56). Furthermore, Black Americans are less likely to receive preventive services and acute treatment for CVD (53), anticoagulant treatment (55), and intervention therapies (54) that all show effectiveness in the management and treatment of CVD. Black Americans affected by cardiovascular diseases are also twice as likely to be uninsured compared to non-Hispanic whites despite the implementation of the Affordable Care Act (100), further highlighting the barriers to optimum cardiovascular health care that exists for this population.

Coping Responses to Racism and CVD

The concept of coping implies that individuals have differential capacity to adapt to similar environmental stressors and conditions (101). Coping may attenuate the impact of structural racism and health care discrimination on cardiovascular health (102). Active coping, such as seeking social support and ethnic belonging has been found to mitigate the deleterious effects of racism and perceived discrimination on the health of minority populations (102-105). One of the popular hypotheses related to psychosocial stress and the differential manifestation of CVD risk is that active coping strategies (e.g., seeking social support, ethnic belonging) positively influence an individual’s risk, while defensive and avoidance coping negatively impact CVD risk (71, 106, 107). Prior research indicates that active coping is associated with lower CVD biomarkers, such as tumor necrosis factor alpha (TNF-α) (108) and C-reactive protein (CRP) (109). The defensive coping response (e.g., acceptance of racism or discrimination as reality) is an established cardiovascular risk factor especially in Black men (106, 110), and the avoidance coping (e.g., denying or repressing experiences of racism or discrimination) has been found to be associated with poor cardiovascular health particularly among Black women (107). For example, one study found that compared to whites who displayed defensive coping, Blacks who displayed defensive coping had higher stress scores, higher inflammation, hypertension, and increased carotid intimal thickness (106).

Mistrust of the Health Care System and Health Care Providers

Medical mistrust, which refers to the lack of trust of health care professionals and health care systems, has been shown in previous research to be associated with negative health-related behaviors and outcomes (111). Medical mistrust among Black Americans is typically multifactorial and may be due to historical knowledge of the racist practices that have occurred in the U.S. health care system and medical research or from personal experiences with either. Further, medical mistrust has been discussed extensively as a potential social determinant of health, particularly when examining racial or ethnic disparities, and as a health barrier that is associated with negative health outcomes (111). Despite the research evidence on the negative impacts of medical mistrust on further widening health disparities and inequities, few studies have examined the relationship between medical mistrust and CVD disparities among Black American adults.

Some studies have examined the general prevalence rates of medical mistrust among Black Americans, with results suggesting that the majority of Black Americans still hold mistrust towards the health care system and health care professionals (111-114). This mistrust for the health care system and health care professionals is warranted. For example a study conducted in 2016 found that Black American patients are significantly less likely to be treated for physical pain compared to white patients (112). One reason for these disparities in receipt of pain medications and treatments is because of the negative stereotypes attached to Black Americans from health care providers consciously or subconsciously that they have "thick skin," are biologically stronger, and are resistant to significant amounts of pain (113).

One study conducted in 2019 used cross-sectional data from the Survey of California Adults on Serious Illness and End-of-Life. Results found that non-Hispanic Black adults had higher odds of reporting medical mistrust compared with non-Hispanic white adults, and that experiences of discrimination were also associated with higher odds of medical mistrust (114). Further, the experience of racial/ethnic discrimination was associated with a 25% increase in the odds of medical mistrust among non-Hispanic Black adults (114).

Previous research conducted in 2003 involved 118 participants (49 non-Hispanic Black and 69 non-Hispanic white) ages 18 to 75, and they were asked to rate their level of trust in physicians, health insurance plans, and hospitals (115). Black American adults were found to be less likely to trust their physicians and hospitals, and more likely to trust their health plan, report concerns about privacy and harmful experimentations than white adults (115).

In Espejo et al.'s study, a cross-sectional qualitative design was employed to Black American participants (sample size=21 participants) in South Bronx, NY with essential hypertension on antihypertensive regimens to study knowledge and perceptions (116). Results from the study found that Black Americans in South Bronx recognized trust as a determining factor that influenced their medication adherence, and that mistrust was reinforced by negative experiences with their health care providers and historic events (116).

Another study conducted in 2013 recruited Black women ($N = 80$, mean age= 48) who were prescribed antihypertensive medications from urban communities in North Carolina (117). Further, participants in the study were required to complete the Trust in Physician and Hill-Bone Compliance to High Blood Pressure Therapy questionnaires. Results found that Black women with hypertension who trusted their health care providers were more likely to be adherent with their prescribed antihypertensive medications than those who did not trust their health care providers (117).

LaVeist et al. examined determinants of satisfaction with medical care among 1,784 (781 Black American and 1,003 white) cardiac patients in the U.S. and found that Black American patients reported less satisfaction with care, were more likely to perceive racism and report mistrust of the medical care system (15). Hammond et al. used cross-sectional data from 610 Black American men aged 20 and older recruited primarily from barbershops in the U.S. between 2003 and 2009, and found that Black American men with higher medical mistrust were twice as likely to delay routine check-ups and cholesterol screenings, and three times more likely to delay blood pressure screenings compared to Black men with lower medical mistrust (118).

Reinforcing the fact that Black American adults mistrust the health care system due to experiences with racial discrimination and bias in health care, a recent study found that Black patients report receiving quality care and are more likely to utilize medical services when their health care provider is Black. The study randomly assigned 1,300 Black Americans to Black or non-Black primary care physicians, with Black American adults who saw a Black primary care physician 34% more likely to receive and use cardiovascular preventive services than those who saw a non-Black physician (119). To fully understand CVD inequities among Black Americans, it is important to examine the issue at the health care provider level (racial discrimination, poor quality of care), and individual patient level (mistrust of health care providers and health care systems). The proposed study will explore these issues.

Research Questions Addressing Gap in Literature

An understanding, examination, and inclusion of experiences of exposure to racial discrimination would inform interventions involving CVD risk assessment, treatment, and prognosis among Black Americans. This has utility not only in identifying the contribution of structural racism in medicine to CVD disparities, but also for adequately developing more targeted approaches to CVD prevention and control among Black American adults in the U.S. Meaningful reductions in CVD disparities for Black American adults remain unlikely without the understanding and inclusion of the experiences of health care provider racial discrimination and medical mistrust in clinical assessment, research, and medical education. Public health interventions and equitable policies aiming to address this critical issue must be grounded in the lived realities faced by the Black American community to reduce the disproportionate CVD burden borne by this community.

Addressing structural and interpersonal barriers to high quality health care affecting Black Americans—specifically racial discrimination in health care settings—is necessary to earn medical trust among the Black American population and consequently uptake of cardiovascular health services. Intentional and purposive engagement of Black American communities will be essential in increasing trust, value, and reciprocity between clinicians, researchers, and Black American adults.

Moreover, understanding what factors influence Black American adults to perceive cardiovascular care received from health care providers as poor in quality is useful in addressing individual-level risk factors. Despite the cardiovascular disparities faced by Black American adults and the impact of exposure to racial discrimination, research that examines mistrust of health care providers and health care systems, experiences with health care provider racial discrimination, consequent poor quality of care, and CVD development are limited in the U.S. This study aims to address this gap in the research, intervention process and cardiovascular health equity literature by answering the following research questions:

R1: What are the associations between perceived health care provider racial discrimination, quality of care received and CVD diagnosis among Black American adults?

R2: Does mistrust of the health care system influence CVD diagnosis for Black American adults?

R3: Does mistrust of health care providers influence CVD diagnosis for Black American adults?

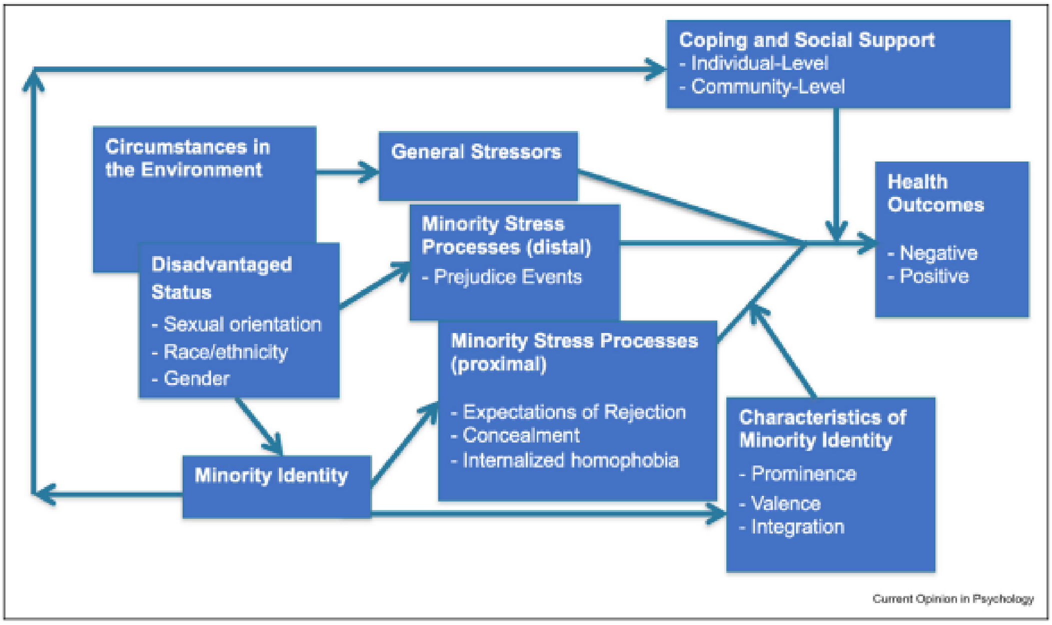
Theoretical Framework Guiding Study

Minority Stress Theory

The theoretical framework guiding this study is Minority Stress theory (47, 61). The proposed study uses insights from Minority Stress Theory to examine associations between exposure to racism in medicine, medical mistrust and CVD among Black American adults.

Figure 3:

Figure 1



Current Opinion in Psychology

The minority stress model (Meyer, 2003).

Minority Stress Theory posits that stress that is disproportionately related to minoritized status is linked to psychological distress, and that expectations of rejection and discrimination regardless of whether having had such actual experiences is stress inducing (47). The theory has been applied to research suggesting that sexual orientation stigma-related stress contributed to the health disparities borne by the sexual minority community (61). Further, the minority stress model describes both distal (i.e., stressors that originate from people or institutions that impact minoritized populations, e.g., discriminatory policies and law, everyday experiences of discrimination or microaggressions) and proximal stress processes (i.e., stressors that originate from internalized stigma, expectations of rejection, and identity concealment) that can influence health outcomes negatively for minoritized groups.

The minority stress model extends the Intergroup Relations Theory (120), Identity Management Theory (121), Identity Theory (122, 123), social (124) and psychological (125, 126) stress theories, and the biopsychosocial model of stress which posits racism as a stressor for Black Americans (127, 128). The minority stress model has extended Social Stress Theory in general and improved the understanding of minority stressors by distinguishing between status and identity and clarifying how social identities and related characteristics operate in relation to minority stressors (128).

The minority stress model has theoretical roots in psychology, public health, and sociology, and has been influential in guiding research on minority health and well-being in psychology and related social and health sciences, and interventions aimed at reducing stigma and exposure to minority stress (61). Despite the many applications and extensions previously discussed, the minority stress model has some limitations. First, a limitation of the minority stress model is the observation of multiple minority identities as categorical rather than intersectional (47). This is a limitation as prior literature established that identities are not mutually exclusive but overlap or are continuous due to the many people who identify and exists within the intersections of conventionally binary distinctions (129). Another limitation is that the theory operates from a "deficit-based" approach without providing enough emphasis on resilience and positive outcomes among racial/ethnic (130, 131), sexual and gender minority populations (61, 132).

These limitations are outweighed by the strengths of this model for our study, as this theoretical framework will allow us to explore the social (experiences and expectations of discrimination with health care systems), biological mechanisms (stress and allostatic load) and moderators/coping responses (e.g ethnic belonging) and their relationships to CVD diagnosis for Black Americans.

CHAPTER III

METHODS

The proposed quantitative, cross-sectional study was conducted using secondary survey data from a representative sample of U.S. adults. The rationale for using this dataset was three-fold: 1) It afforded us a large sample representative of Black American men and women living in the U.S.; 2) It included variables that align with the research questions of the study; and 3) the data were less than 12 months old or were the most current survey version. This chapter will describe the study design, provide information about the datasets, and detail the variables of interest and analysis plan in relation to the research hypotheses.

The Health Information National Trends Survey (HINTS)

Background on HINTS Survey

The Health Information National Trends Survey (HINTS) was initially designed to track changes in the health communication and information technology landscape and to evaluate the effects of these factors on health outcomes, health disparities, and health care quality (133). HINTS is a cross-sectional nationally representative survey of the U.S. civilian non-institutionalized adult population that collects data on health care access and health-related information, behaviors, perceptions, and knowledge (133). The HINTS data were developed for researchers and program planners to explore health information, attitudes, and perceptions of health-relevant topics (e.g., cancer screening, discrimination, chronic diseases), identify barriers to health information usage across populations, create more effective communication strategies, and to inform recommendations for theory-driven interventions aimed at improving population health (134).

History of HINTS 1 through HINTS 5

HINTS has fielded six national data collections. HINTS 1 was administered in 2002–2003 (HINTS 2003), using a probability-based sample, drawing on random digit dialing (RDD) landline telephone numbers as the sampling frame of highest penetration at that time. Data were collected from 6,369 respondents, with a 33% response rate (133, 134). The second cycle of HINTS, conducted in 2005 (HINTS 2), included embedded methodological experiments to compare response rates to surveys collected by landline telephone and the internet. Data were collected from 5,586 respondents, with a 24% response rate. HINTS 2007–2008 (HINTS 3), was conducted in 2008, and included the development of a mixed mode design using a telephone and self-administered survey (134). The mixed-mode data collection design utilized dual sampling frames, and the telephone survey and a mail questionnaire were implemented with telephone follow up of a subsample of the nonrespondents. Data were obtained from 4,092 respondents (24% response rate) via telephone interview and 3,582 respondents (31% response rate) via mail for a total of 7,674 respondents (134).

HINTS 4 (2011-2014) employed a single-mode mail survey as its data collection design. HINTS 4 was conducted between 2011 and 2014 and involved four separate data collection cycles over that 3-year field period. In addition, an online based tool called HINTS-GEM (Grid-Enabled Measures) portal was developed to allow for the collaboration of stakeholders virtually and providing input, suggestions, and comments on HINTS content (134, 135). Further details about the design, implementation, and outcomes of the HINTS-GEM tool are available elsewhere (135). Data were obtained from 14,000 respondents, nearly twice the sample size of previous rounds of HINTS data collections.

The HINTS 5 survey was administered via mailed questionnaire from February 27 – June 15, 2020, and a total of 3,865 adults participated. Respondents were randomly sampled using residential addresses from the U.S. postal service, and an adult was selected within a household based on the nearest upcoming birthday (136).

HINTS 6 Methods

The proposed study utilized data from HINTS 6, the most recent administration cycle conducted from March 7–November 8, 2022, with the aim of obtaining 7,000 completed questionnaires (137). Notably, the HINTS 6 questionnaire focused on topics such as issues with health information, health literacy, health care discrimination experiences, social determinants of health, social isolation, chronic diseases, utilization of and satisfaction with telehealth appointments, and genetic testing.

The HINTS 6 survey collection employed a two-stage sampling strategy with the first stage involving the selection of a stratified sample of addresses from a file of residential addresses. In the second stage, one adult was selected within each sampled household using the nearest birthday. The HINTS 6 sample design is unique in comparison with the previous HINTS data, as it expanded the two traditional sampling strata of high minority and low minority by establishing four rural and urban geographic areas (137). Further, a survey response experiment was embedded in the mixed mode design for data collection. Eligible respondents identified through Stages 1 and 2 were randomly assigned to the survey collection modality. One group was allowed access to both online and paper versions of the survey and asked to respond using the modality of their choice. This group received a cover letter with a link to the web/online version of the survey and their unique access code, as well as a paper survey with a return envelope. The second group was only provided the online survey modality. These respondents received only a cover letter with the link to the web survey and their unique access code with their first mailing. In subsequent mailings, they received the link to the web survey and their unique access code again, as well as the paper survey. Households that speak English only received contact materials in English and the English paper survey, while potential Spanish-speaking households received contact materials in English and Spanish and both English and Spanish survey instruments. However, respondents were allowed to request for an English or Spanish survey regardless and received a Spanish/English paper survey in subsequent mailings (137). All respondents received a $2 pre-paid incentive in the first mailing. Later in the data collection period, a follow-up mailing was sent to a subset of non-respondent households with a $30 incentive offering to complete the survey online or via paper. to increase the response rate.

In each mailing, two toll-free telephone numbers were provided (one for English speakers and one for Spanish speakers), and respondents were advised to call if they had any questions, concerns, or if they needed to request materials. The number for Spanish-speaking callers was staffed by a native Spanish speaker, and the number for English-speaking callers was staffed by a native English speaker. Each number had a voicemail message in its respective language that instructed callers to leave their contact information and the reason for the call, and then a study staff member would return their call (137). All voicemail messages from respondents were then logged into the Study Management System (SMS), and the request was processed, and respondents were called back to address the messages. Respondents that called staff or left voicemail messages stating that they did not want to participate in the study were coded as “refusal” and thus excluded from all future mailings in the current cycle (137).

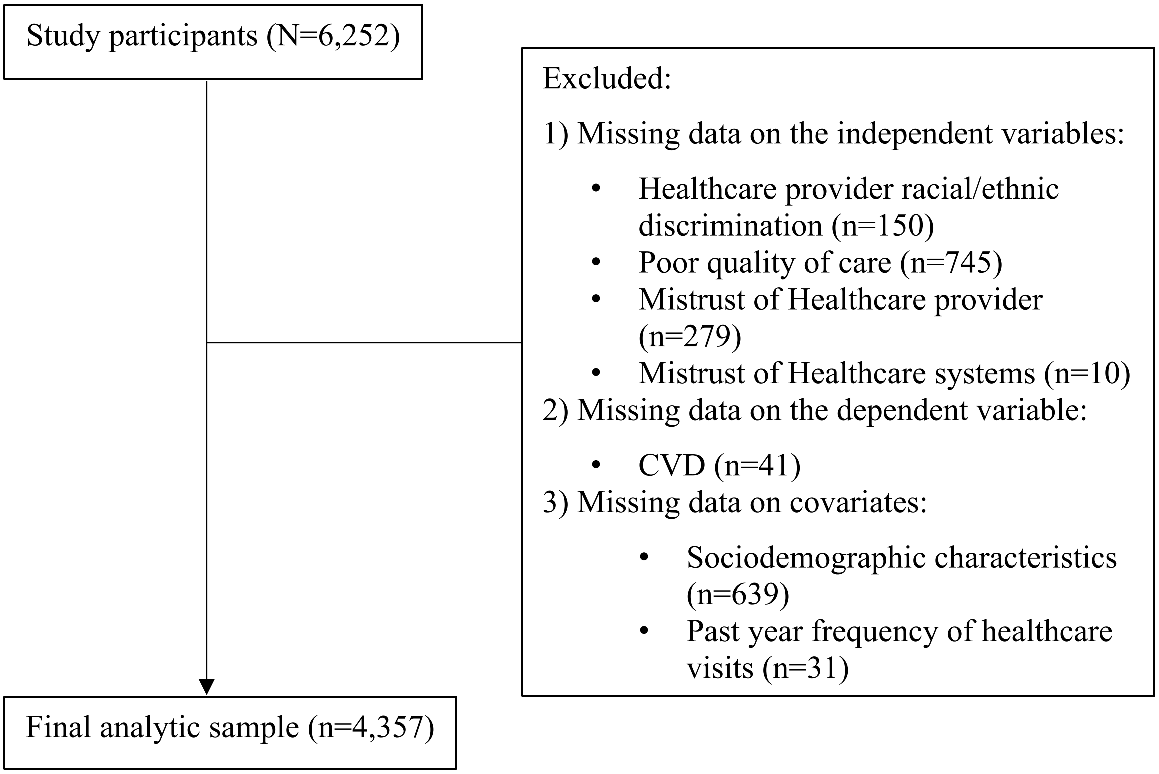
Respondents who used the online mode web survey were instructed to send electronic messages to HINTS staff if they had questions or concerns about the study using the email address provided on the survey website, or they could fill out a form on the website with their name, email address, and reason for contact. Both the emails and messages sent via the online form were received in the study’s email inbox, and staff responded to those messages via email (137).

Data management involved HINTS staff reviewing each form in preparation for scanning, scanning of all completed paper questionnaires using TeleForm (a data capture software to capture the survey data and images), cleaning and validating all survey data, and then storing all survey data in SharePoint. Further, to ensure the integrity of the data, nonresponse or indeterminant responses were identified and recoded; missing values were recoded for some responses to questions that featured a forced choice response format, and for filter questions where responses to later questions suggested a particular response was appropriate, a unique “missing data” value was added to account for online interview break-offs. Surveys that were returned were examined for duplication and completion to determine inclusion eligibility for the final dataset (137). A total of 6,505 questionnaires were received from respondents and of these 6,505 questionnaires, 27 were blank, 148 were incompletely filled out, and 78 were duplicates (i.e., the same household returned multiple surveys). The final dataset for the HINTS 6 data includes 6,252 eligible respondents.

Population of Interest

To maximize generalizability, the inclusion criteria for the proposed study included adults ages 18 and older that live in the U.S, that have survey data responses regarding CVD outcomes, racial/ethnic discrimination in the health care system, sociodemographic characteristics, and given written consent to HINTS during the data collection process that their data may be used for research other than the original study. Exclusion criteria were based on missing data on the above information, age 17 and younger, and missing data on health care visits and utilization. Flow chart detailing the study's analytic process is shown in Figure 4. A subset of this sample who self-identify as Black will also be examined.

Figure 4: Flow Chart of Study



Variables of Interest

Covariates

The following sociodemographic characteristics were included as covariates: age (continuous variable), sex assigned at birth (female, male), sexual orientation (heterosexual, gay or lesbian, bisexual, other), race/ethnicity (non-Hispanic white, non-Hispanic Black, Hispanic, and non-Hispanic other race), marital status (married, not married), educational attainment (< college level, some college, college graduate, postgraduate) ethnic group belonging (agree/strongly agree, neither agree or disagree, disagree/strongly disagree) , annual household income (<35,000, 35,000-<75,000, 75,000 or more), region (Northeast, Midwest, South, West), health insurance (yes or no), past year frequency of health care provider visits (1 time, 2-4 times, 5 or more).

Independent Variables

Racism in medicine included health care provider racial discrimination, medical mistrust, and poor quality of care. Health care provider racial discrimination was defined based on responses (yes or no) to the following question. "Have you ever been treated unfairly or been discriminated against when getting medical care because of your race or ethnicity?".

Medical mistrust (mistrust of the health care system and health care providers) was defined based on responses (not at all or a little, some or a lot), and (very or somewhat comfortable, somewhat or very uncomfortable) to the following two questions respectively. "How much do you trust the health care system?", and "In the past 12 months when you have had issues with affording or accessing healthy food, transportation that made it difficult to get to medical appointments, and housing, how comfortable were you sharing these with your health care provider for treatment purposes?”. We defined mistrust of health care system and health care providers each in two separate categories.

Poor quality of care was defined based on respondents’ responses (excellent/very good, good, poor) to the following question: “Overall how would you rate the quality of health care you received in the past 12 months?”.

Dependent Variable

CVD was defined based on binary responses (yes or no) to the following two questions. “Has a doctor ever told you that you had a heart condition such as a heart attack, angina or congestive heart failure?”, and “Has a doctor ever told you that you have high blood pressure or hypertension?”. We defined CVD diagnosis in two categories as our outcomes for the analysis: (1) CVD (i.e., yes in response to one or more of the questions), and (2) No CVD (i.e., no in response to both questions).

Statistical Analysis

Data was analyzed using Stata 17.0.(138). We accounted for the HINTS complex survey design and adjusted for the probability of non-response by using the *svy* command.

RQ1: What are the associations between perceived health care provider racial discrimination, quality of care received and CVD diagnosis among Black American adults?

Descriptive statistics including unweighted frequencies, weighted percentages and confidence intervals of sociodemographic characteristics, structural racism in medicine (i.e., health care provider racial discrimination, medical mistrust, and poor quality of care), and CVD outcomes among the overall sample were calculated. Differences in estimates of sociodemographic characteristics and health care provider racial discrimination by CVD outcomes were evaluated using independent t tests (for continuous variable), chi-square tests of independence or Fisher's exact tests when appropriate. Multivariate logistic regression (adjusted for covariates) was performed to examine the associations between health care provider racial discrimination, poor quality of care and CVD outcomes among the overall sample. The outcome referent group for the model was no CVD. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were reported. Results were considered statistically significant at α=0.05. Additionally, we conducted a subset analysis of adults who identified as Black Americans, comparing those with CVD and those without CVD to examine potential differences by sociodemographic characteristics and experiences with health care provider racial discrimination, and poor quality of care.

RQ2: Does mistrust of the health care system influence CVD diagnosis for Black American adults?

Differences in estimates of sociodemographic characteristics and mistrust of the health care system by CVD outcomes were evaluated using independent t tests (for continuous variable), chi-square tests of independence or Fisher's exact tests when appropriate. Multivariate logistic regression was performed to examine associations between sociodemographic characteristics, mistrust of the health care system, and CVD outcomes. The outcome referent group for the model was no CVD. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were reported. Results were considered statistically significant at α=0.05. Additionally, we conducted a subset analysis of adults who identified as Black Americans, comparing those with CVD and those without CVD to examine potential differences by sociodemographic characteristics and mistrust of the health care system.

<u>RQ3: Does mistrust of health care providers influence CVD diagnosis for Black American adults?</u>

Differences in estimates of sociodemographic characteristics and mistrust of health care providers by CVD outcomes were evaluated using independent t tests (for continuous variable), chi-square tests of independence or Fisher's exact tests when appropriate. Multivariate logistic regression was performed to examine associations between sociodemographic characteristics, mistrust of health care providers, and CVD outcomes among the overall sample. The outcome referent group for the model was no CVD. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were reported. Results were considered statistically significant at $\alpha=0.05$. Further, a subset analysis of adults who identified as Black Americans, comparing those with CVD and those without CVD to examine potential differences by sociodemographic characteristics and mistrust of health care providers was conducted.

Ethical Approval and Informed Consent

The 2022 HINTS data collection protocol was reviewed and approved by the Institutional Review Boards (IRBs) at Westat and the US National Institutes of Health (NIH) Office of Human Subjects Research. Informed consent was received from all respondents that completed the survey. The HINTS data are publicly available and, following data use guidance from the HINTS website, no attempts were made to 1) link or to allow others to link these data with individual records in other databases; 2) learn the identity of any participating households or individuals; or 3) combine these data with other datasets, whether NIH or non-NIH, to attempt to match records and gain insight into participating individuals. In the unlikely case that an individual or household identity was inadvertently discovered, that information was kept confidential (i.e., not discussed internally or disclosed in any presentations or publications). As data holders, the NCI took reasonable steps to mitigate the potential for triangulation, including explicit instructions to data users regarding not attempting to triangulate information and regarding procedures to follow if an identify is inadvertently triangulated. The proposed study was reviewed and approved by the University of Louisville IRB. Because the HINTS data are publicly available, the study was deemed exempt from review.

Data Security

All research personnel involved in this study completed all required CITI and HIPAA training before being allowed access to the data. IRB amendments were required for any personnel added to this study who will also be CITI and HIPAA trained.

Data was stored on an access-restricted secure server at the University of Louisville, and on encrypted devices. Electronic files were password protected and saved in a secure format.

Consumer Assessment of Healthcare Providers and Systems (CAHPS) Survey

Background on CAHPS Survey

The Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey was initially designed by the Agency for Healthcare Research and Quality (AHRQ) to assess patient experiences with health care services provided in a variety of contexts (e.g. home health care, hospital, in-center hemodialysis, and clinician and group) and for specific health conditions (139, 140). CAHPS is acknowledged as the standard for understanding and examining patient experiences in primary care and is the most extensively studied, validated, reliable patient experience survey in the U.S. (140, 141). CAHPS is a national survey of the U.S. adult and child population that collects data on patient health care experiences, rating of the provider, communication skills of providers, helpfulness of staff, access to care, health care utilization, and health-related information. The CAHPS data were developed for health care decision makers and researchers to explore patient experience with health care, patient-centeredness, engagement, improve health care outcome, and help in making informed choices of health care providers (140, 141). The CAHPS Clinician and Group Survey (CG-CAHPS) was specifically designed to assess patient experiences with health care providers and staff in primary care and specialty settings (142), and has been shown to have validity and reliability (143).

CAHPS Clinician and Group Adult Survey Version 3.0

The proposed study utilized data from CAHPS Clinician and Group Adult Survey version 3.0, the most recent administration cycle conducted in 2019. Notably, the CAHPS questionnaire focused on topics such as access to care, coordination of care, rating of the provider, helpfulness of staff, health care utilization, and patient-centered medical home items. The CAHPS survey collection employed a two-stage sampling strategy, with the final sample for the CAHPS 2019 data including 68,761 eligible respondents.

Population of Interest

To maximize generalizability, the inclusion criteria for the proposed study included Black American adults ages 18 and older that live in the U.S, that have survey data responses regarding ratings of health care provider (i.e. quality of care), sociodemographic characteristics, health care utilization, patient-centered medical care, and given written consent to CAHPS during the data collection process that their data may be used for research other than the original study. Exclusion criteria were based on missing data on the above information, age 17 and younger, and self-identify as a race that is not Black American only.

Variables of Interest

Covariates

Patient-centered care included health care provider showing respect, listening carefully, and giving clear explanations. Patient-centered care was defined based on responses (never, sometimes, usually, always) to the following three questions. “In the last 6 months, how often did your provider show respect for what you had to say?”, “In the last 6 months, how often did your provider listen carefully to you?”, and “In the past 6 months, how often did this provider explain things in a way that was easy to understand?”. We defined patient-centered care as never or yes.

Health care visits and utilization was defined based on responses (1 time, 2-4 times, 5 or more times), (< 6 months, 6 months to < a year, 1 year to < 3 years, 3 years to < 5 years, 5 years or more), and (no, yes) to the following three questions respectively. “In the last 6 months, how many times did you visit your provider to get care for yourself?”, “How long have you been going to this provider?”, and “In the last 6 months did this provider order a blood test, x-ray, or other test for you?” We defined frequency of health care visits, and health care utilization each in two separate categories.

Independent Variables/Main Exposures

The following sociodemographic characteristics were included: age (continuous variable), sex assigned at birth (female, male), race/ethnicity (non-Hispanic Black), educational attainment (< college level, some college, college graduate, postgraduate), and region (Northeast, Midwest, South, West).

Dependent Variable

Quality of care was defined based on respondents' ratings to the following question: "How would you rate your health care provider using any number from 0 to 10, where 0 is the worst possible and 10 best possible?".

Statistical Analysis

Data were analyzed using Stata 17.0 (138). We accounted for the CAHPS complex survey design and adjusted for the probability of non-response by using the *svy* command.

H1: Black American patient ratings of health care providers (quality of care) would differ by age, gender, education, patient-centered care, and health care utilization.

Descriptive statistics including unweighted frequencies, weighted percentages of sociodemographic characteristics, frequency of health care visits, health care utilization, patient-centered care, and quality of care among a sample of Black American adults were calculated. Differences in estimates of sociodemographic characteristics and health care utilization by quality of care were evaluated using independent t tests (for continuous variable), chi-square tests of independence or Fisher's exact tests when appropriate. Ordinal logistic regression (adjusted for covariates) was performed to examine the associations between sociodemographic characteristics and quality of care among a Black

American adult sample. The outcome referent group for the model was health care provider rating of 0 (i.e. poor quality of care). Adjusted odds ratios (OR) and 95% confidence intervals (CI) were reported. Results were considered statistically significant at $\alpha=0.05$.

Ethical Approval and Informed Consent

The 2019 CAHPS data collection protocol was reviewed and approved by the Institutional Review Boards (IRBs) at the Agency for Healthcare Research and Quality (AHRQ). Informed consent was received from all respondents that completed the survey. The CAHPS data are publicly available and, following data use guidance from AHRQ, no attempts were made to 1) link or to allow others to link these data with individual records in other databases; 2) learn the identity of any participating households or individuals; or 3) combine these data with other datasets, whether AHRQ or non-AHRQ, to attempt to match records and gain insight into participating individuals. In the unlikely case that an individual or household identity is inadvertently discovered, that information was kept confidential (i.e., not discussed internally or disclosed in any presentations or publications). Because the CAHPS data are publicly available, the study was deemed exempt from University of Louisville IRB review.

CHAPTER IV

RESULTS

HINTS 2022 Descriptive Analysis

Descriptive results of the current study are shown in Table 1. The study's analytic sample includes 4,347 U.S. adults ages 18 and older, with ages ranging from 18 to 99, with an average age of 48 years (mean=48.89). The overall sample is primarily adults ages 50 to 64 (28.5%) and 35 to 49 (26.6%); female (53.3%); non-Hispanic white (64.9%), Hispanic (14.3%), and non-Hispanic Black (10.9%); heterosexual (91.8%) and bisexual (3.6); married (57.2%); adults who have a household income of 75,000 or more (36.8%); have health insurance (93.1%); educational attainment of *less than college* (33.9%) and *some college but did not graduate* (30.4%); reported ethnic belonging (57.7%); and lived in the South region (38.1%). Further, 6.9% of adults reported health care provider racial/ethnic discrimination, 14.6% reported mistrust of health care system, 32.9% reported mistrust of health care providers, 8.1% reported poor quality of care, and 56.2% reported visiting a health care provider 2 to 4 times in the past year. Among the overall sample, 39.8% had a diagnosis of one or more CVD, 1.4% had a diagnosis of a heart condition such as a heart attack, angina, or congestive heart failure, 32.4% had a diagnosis of hypertension only, and 6.2% had a diagnosis of both.

Table 1: Descriptive Characteristics of U.S. Adults from the Health Information National Trends Survey (HINTS), 2022 (N=4,347)

Variables	N (%)	CI
Age		
18-34	648 (24.2)	21.6, 26.9
35-49	907 (26.6)	24.4, 28.9
50-64	1293 (28.5)	26.4, 30.7
65-74	952 (13.0)	11.8, 14.3
75+	547 (7.7)	6.8, 8.7
Sex Assigned at Birth		
Male	1681 (46.7)	44.1, 49.3
Female	2666 (53.3)	50.7, 55.9
Race/Ethnicity		
Non-Hispanic White	2593 (64.9)	62.6, 67.3
Non-Hispanic Black	687 (10.9)	9.7, 12.3
Hispanic	711 (14.3)	12.8, 15.9
Non-Hispanic Other	356 (9.9)	8.2, 11.9
Sexual Orientation		
Heterosexual	4000 (91.8)	90.3, 93.0
Gay/Lesbian	132 (3.1)	2.4, 4.1
Bisexual	156 (3.6)	2.8, 4.6
Other	59 (1.5)	1.0, 2.2
Educational Attainment		
Less than College	1250 (33.9)	31.4, 36.4
Some College	924 (30.4)	27.9, 33.1
College graduate	1261 (20.3)	18.7, 22.0
Postgraduate	912 (15.4)	14.0, 17.0
Annual Household Income		
<35,000	1190 (23.0)	20.9, 25.2
35,000- <75,000	1309 (29.7)	27.3, 32.1
75,000- <200,000	1459 (36.8)	34.4, 39.3
200,000 or more	389 (10.5)	9.0, 12.2
Ethnic Belonging		
Strongly agree/agree	2671 (57.7)	55.1, 60.3
Neither agree/disagree	1333 (32.7)	30.3, 35.3
Strongly disagree/disagree	343 (9.6)	8.2, 11.2
Insurance		
No	265 (6.9)	5.7, 8.3
Yes	4082 (93.1)	91.7, 94.3
Region		
Northeast	638 (18.1)	16.2, 20.2
Midwest	769 (21.9)	19.8, 24.0
South	1951 (38.1)	35.7, 40.6
West	989 (21.9)	19.8, 24.2

Variables	N (%)	CI
Past year frequency of health care visits		
1 time	684 (18.1)	16.1, 20.2
2-4 times	2403 (56.2)	53.7, 58.7
5 or more times	1260 (25.7)	23.7, 27.8
HCP Racial/Ethnic Discrimination		
No	4014 (93.1)	91.7, 94.2
Yes	333 (6.9)	5.8, 8.2
Mistrust of HCP		
Very or somewhat comfortable	3037 (67.1)	64.6, 69.6
Somewhat or very uncomfortable	1310 (32.9)	30.4, 35.4
Health Care System Trust		
Very or somewhat	3788 (85.4)	83.3, 87.2
Not at all or a little	559 (14.6)	12.8, 16.7
Quality of Care		
Poor/fair	361 (8.1)	6.9, 9.5
Excellent/Very good	3019 (69.7)	67.3, 71.9
Good	967 (22.2)	20.1, 24.4
Cardiovascular Disease		
No	2251 (60.2)	57.8, 62.6
Yes	2096 (39.8)	37.4, 42.2

Unweighted Frequencies. Weighted percentages and P values, CI= Confidence Interval, HCP= Health care provider

Bivariate Analysis

Results of the bivariate analysis are displayed in Table 2. Adults were divided into two groups (with CVD (n=2096) and without CVD (n=2251)). Of the adults diagnosed with CVD, 10.4% reported experiencing health care provider racial/ethnic discrimination (p=0.014), 35.9% reported mistrust of health care providers (p=0.047), 17.9% reported mistrust of health care systems (p=0.032), 11.0% reported poor quality of care (p=0.007), and 14.2% self-identified as NH Black Americans (p=0.002). In addition, more males than females (52.5% vs 47.5%, $p=\leq 0.001$), adults ages 50 to 64 than 18 to 34 (35.1% vs 9.0%, $p= \leq 0.001$), adults who attained less than college compared to postgraduate educational level (39.4% vs 12.7%, $p=\leq 0.001$), and those with an annual household income of <$35,000 compared to $200,000 or more (28.9% vs 6.2%, p=≤0.001) reported diagnosis of CVD. More adults who lived in the South region than Northeast (42.7% vs 15.8%, p=0.024) had insurance than no insurance (95.1% vs 4.9%, p=0.004), and those that visited their health care provider 2 to 4 times in the past year compared to only 1 time (54.0% vs 12.9%, p=≤0.001) reported CVD diagnosis.

Table 2: Bivariate Analysis Examining Racism in Medicine, Medical Mistrust, Sociodemographic Characteristics by CVD among U.S. Adults (N=4,347)

Variables	**Cardiovascular Disease Diagnosis**		
	No (N=2251), 60.2%	**Yes (N=2096), 39.8%**	**P Value**
Age			**< 0.001**
18-34 (%)	560 (34.2)	88 (9.0)	
35-49 (%)	618 (30.6)	289 (20.5)	
50-64 (%)	642 (25.5)	651 (35.1)	
65-74 (%)	308 (6.9)	644 (22.2)	
75 + (%)	123 (2.8)	424 (15.2)	
Sex assigned at birth			**< 0.001**
Male (%)	779 (42.9)	902 (52.5)	
Female (%)	1472 (57.1)	1194 (47.5)	
Race and Ethnicity			**0.002**
NH White (%)	1352 (65.0)	1241 (64.9)	
NH Black (%)	256 (8.7)	431 (14.2)	
Hispanic (%)	435 (16.3)	276 (11.2)	
NH Other (%)	208 (10.0)	148 (9.7)	
Sexual Orientation			0.161
Heterosexual (%)	2032 (90.7)	1968 (93.4)	
Gay/Lesbian (%)	80 (3.4)	52 (2.6)	
Bisexual (%)	107 (4.3)	49 (2.7)	
Other (%)	32 (1.6)	37 (1.3)	
Educational Attainment			**< 0.001**
Less than college (%)	538 (30.2)	712 (39.4)	
Some college (%)	437 (29.1)	487 (32.4)	
College graduate (%)	738 (23.5)	523 (15.5)	
Postgraduate (%)	538 (17.2)	374 (12.7)	
Annual Household Income			**< 0.001**
< $35,000 (%)	504 (19.1)	686 (28.9)	
$35,000- <$75,000 (%)	649 (29.2)	660 (30.4)	
$75,000- <$200,000 (%)	822 (38.3)	637 (34.5)	
$200,000 or more (%)	276 (13.4)	113 (6.2)	
Ethnic Belonging			0.896
Strongly agree/agree (%)	1309 (57.3)	1362 (58.5)	

Variables	Cardiovascular Disease Diagnosis		
	No (N=2251), 60.2%	Yes (N=2096), 39.8%	P Value
Neither agree/disagree (%)	749 (33.1)	584 (32.0)	
Strongly disagree/disagree (%)	193 (9.6)	150 (9.5)	
Insurance			**0.004**
No (%)	177 (8.2)	88 (4.9)	
Yes (%)	2074 (91.8)	2008 (95.1)	
Region			**0.024**
Northeast (%)	361 (19.6)	277 (15.8)	
Midwest (%)	410 (22.4)	359 (21.0)	
South (%)	928 (35.1)	1023 (42.7)	
West (%)	552 (22.9)	437 (20.5)	
Health Care Visits Frequency			**< 0.001**
1 time (%)	458 (21.5)	226 (12.9)	
2-4 times (%)	1257 (57.7)	1146 (54.0)	
5 or more times (%)	536 (20.8)	724 (33.1)	
HCP Racial Discrimination			**0.014**
No (%)	2102 (93.8)	1912 (89.6)	
Yes (%)	149 (6.2)	184 (10.4)	
Mistrust of HCP			**0.047**
Very/somewhat comfortable (%)	1544 (66.7)	1493 (64.1)	
Very/somewhat uncomfortable (%)	707 (33.3)	603 (35.9)	
Health Care System Trust			**0.032**
Very or somewhat (%)	1912 (87.0)	1876 (82.1)	
Not at all or a little (%)	339 (13.0)	220 (17.9)	
Quality of Care			**0.007**
Poor or fair (%)	109 (6.2)	171 (11.0)	
Excellent or very good (%)	1651 (72.8)	1449 (66.0)	
Good (%)	491 (21.0)	476 (23.0)	

Unweighted Frequencies. Weighted percentages and P values. NH= Non-Hispanic, HCP= Health care Provider
Chi square tests and Fischer’s Exact tests.

Regarding racial and ethnic differences in experiences with racism in medicine and medical mistrust (see supplemental table 1), more adults who self-identified as NH Black than NH white (33.0% vs 18.0%, p=≤0.001) reported health care provider discrimination. More adults who self-identified as NH white than NH Other (62.7% vs 10.0%, p=0.029) reported mistrust of health care providers, and more adults who self-identified as NH Black than NH Other reported poor quality of care (17.6% vs 12.5%, p=≤0.001). There was no statistically significant difference when comparing race and ethnicity with mistrust of health care system (p=0.081).

Univariable Logistic Regression

Results of the univariable logistic regression (unadjusted analysis) are shown in Table 3. Adults who experienced health care provider racial/ethnic discrimination (compared to those with no experience of discrimination) had higher odds of CVD (OR: 1.32; 95% CI: 1.09-1.92). Adults who reported mistrust of health care providers (OR: 1.09; 95% CI: 1.07-1.19), and mistrust of the health care system (OR: 1.12; 95% CI: 1.04-1.28) had higher odds of CVD compared to those who trusted their health care providers and the health care system respectively. Adults who reported receiving *excellent/very good* quality of care had lower odds of CVD (OR: 0.88; 95% CI: 0.62-0.94). Adults who are female (compared to male), household income of $75,000-<$200,000 (compared to <$35,000) or attained *postgraduate* educational level (compared to *less than college*) had lower odds of CVD respectively (OR: 0.68; 95% CI: 0.55-0.84, OR: 0.59; 95% CI: 0.46-0.78, OR: 0.57; 95% CI: 0.43-0.74). Adults who self-identify as NH Black had higher odds of CVD (OR: 1.65; 95% CI: 1.24-2.19), while adults who self-identify as Hispanic had lower odds of CVD (OR: 0.69; 95% CI: 0.53-0.89) compared to NH white adults.

Table 3: Univariable Logistic Regression (n=4,347)

Regression Model Variables	Cardiovascular Disease		
	OR	95% CI	P-value
HCP racial/ethnic discrimination (ref: no)			
Yes	1.32	1.09-1.92	**0.041**
HCP mistrust (ref: very/somewhat comfortable)			
Very/somewhat uncomfortable	1.09	1.07-1.19	**0.047**
Health care system trust (ref: very/somewhat)			
Not at all/a little	1.12	1.04-1.28	**0.035**
Quality of care (ref: poor/fair)			
Excellent/very good	0.88	0.62-0.94	**0.004**
Good	0.86	0.58-1.28	0.449
Age (ref: 18-34)			
35-49	2.55	1.52-4.27	**< 0.001**
50-64	4.96	3.01-8.15	**< 0.001**
65-74	12.33	7.42-20.49	**< 0.001**
75+	20.54	11.77-35.83	**< 0.001**
Sex assigned at birth (ref: male)			
Female	0.68	0.55-0.84	**< 0.001**
Race and ethnicity (ref: NH White)			
NH Black	1.65	1.24-2.19	**0.001**
Hispanic	0.69	0.53-0.89	**0.005**
NH Other	0.98	0.61-1.55	**0.919**
Sexual orientation (ref: heterosexual)			
Gay/lesbian	0.74	0.43-1.27	0.274
Bisexual	0.60	0.36-1.00	0.052
Other	0.81	0.39-1.70	0.580
Educational attainment (ref: less than college)			
Some college	0.85	0.64-1.14	0.282
College graduate	0.51	0.39-0.65	**< 0.001**
Postgraduate	0.57	0.43-0.74	**< 0.001**
Annual household income (ref: < $35,000)			
$35,000- <$75,000	0.69	0.52-0.92	**0.011**
$75,000- <$200,000	0.59	0.46-0.78	**< 0.001**
$200,000 or more	0.31	0.20-0.46	**< 0.001**
Ethnic belonging (ref: strongly agree/agree)			
Neither agree/disagree	0.95	0.75-1.19	0.648
Strongly disagree/disagree	0.97	0.68-1.39	0.866
Insurance (ref: no)			
Yes	1.75	1.19-2.57	**0.005**
Region (ref: Northeast)			
Midwest	1.15	0.83-1.60	0.389
South	1.50	1.12-2.01	**0.006**
West	1.10	0.78-1.56	0.575

Regression Model Variables	Cardiovascular Disease		
	OR	95% CI	P-value
Past year health care visits frequency (ref:1 time)			
2-4 times	1.56	1.16-2.08	**0.003**
5 or more times	2.64	1.94-3.60	<**0.001**
OR= Odds ratios, CI= Confidence Intervals, NH=Non-Hispanic, HCP= Health care provider Outcome referent group= No CVD diagnosis			

Adults who are ages 35 to 49 (compared to 18 to 34), ages 50 to 64 (compared to 18 to 34), have insurance (compared to no insurance), live in the South region (compared to Northeast), visited their health care provider 2 to 4 times in the past year (compared to 1 time) or visited their health care provider 5 or more times in the past year (compared to 1 time) had higher odds of CVD respectively (OR: 2.55; 95% CI: 1.52-4.27, OR: 4.96; 95% CI: 3.01-8.15, OR: 1.75; 95% CI: 1.19-2.57, OR: 1.50; 95% CI: 1.12-2.01, OR: 1.56; 95% CI: 1.16-2.08, OR: 2.64; 95% CI: 1.94-3.60).

Multivariable Logistic Regression

Results of the multivariable logistic regression (adjusted for covariates) are shown in Table 4. Adults who experienced health care provider racial/ethnic discrimination (compared to those with no experience of discrimination) had higher odds of CVD (OR: 1.31; 95% CI: 1.08-2.14). Adults who reported mistrust of health care providers (OR: 1.07; 95% CI: 1.03-1.30), and mistrust of the health care system (OR: 1.09; 95% CI: 1.05-1.46) had higher odds of CVD compared to those who trusted their health care providers and the health care system respectively. Adults who reported receiving *excellent/very good* quality of care had lower odds of CVD (OR: 0.69; 95% CI: 0.65-0.97).

Table 4: Multivariable Logistic Regression Estimating the Associations between Racism in Medicine, Medical Mistrust and CVD among U.S. Adults (n=4,347)

Regression Model Variables	**Cardiovascular Disease**		
	OR	**95% CI**	**P-value**
HCP racial/ethnic discrimination (ref: no)			
Yes	1.31	1.08-2.14	**0.026**
HCP mistrust (ref: very/somewhat comfortable)			
Very/somewhat uncomfortable	1.07	1.03-1.30	**0.047**
Health care system trust (ref: very/somewhat)			
Not at all/a little	1.09	1.05-1.46	**0.045**
Quality of care (ref: poor/fair)			
Excellent/very good	0.69	0.65-0.97	**0.040**
Good	0.80	0.51-1.29	0.365
Age (ref: 18-34)			
35-49	2.80	1.75-4.47	**< 0.001**
50-64	6.05	3.89-9.42	**< 0.001**
65-74	14.28	8.97-22.76	**< 0.001**
75+	24.25	14.22-41.38	**< 0.001**
Sex assigned at birth (ref: male)			
Female	0.53	0.42-0.67	**< 0.001**
Race and ethnicity (ref: NH White)			
NH Black	1.65	1.17-2.31	**0.004**
Hispanic	0.92	0.67-1.26	0.591
NH Other	1.76	0.99-3.11	**0.053**
Sexual orientation (ref: heterosexual)			
Gay/lesbian	0.83	0.46-1.47	0.515
Bisexual	1.79	0.96-3.33	0.066
Other	1.19	0.50-2.87	0.684
Educational attainment (ref: less than college)			
Some college	0.95	0.70-1.30	0.770
College graduate	0.70	0.53-0.92	**0.010**
Postgraduate	0.74	0.55-1.01	0.061
Annual household income (ref: < $35,000)			
$35,000- <$75,000	0.69	0.49-0.97	**0.032**
$75,000- <$200,000	0.65	0.48-0.89	**0.007**
$200,000 or more	0.39	0.24-0.62	**< 0.001**
Ethnic belonging (ref: strongly agree/agree)			
Neither agree/disagree	1.01	0.77-1.32	0.951
Strongly disagree/disagree	1.06	0.69-1.63	0.789
Insurance (ref: no)			
Yes	1.20	0.77-1.87	0.417
Region (ref: Northeast)			
Midwest	1.19	0.83-1.70	0.345
South	1.53	1.13-2.07	**0.006**
West	1.33	0.91-1.93	0.139
Past year health care visits frequency (ref: 1 time)			
2-4 times	1.42	1.03-1.95	**0.030**
5 or more times	2.24	1.59-3.16	**<0.001**

Adults who are female (compared to male), have household income of $35,000-<$75,000 (compared to <$35,000), $75,000-<$200,000 (compared to <$35,000), $200,000 or more (compared to <$35,000), or attained college graduate educational level (compared to less than college) had lower odds of CVD respectively (OR: 0.53; 95% CI: 0.42-0.67, OR: 0.69; 95% CI: 0.49-0.97, OR: 0.65; 95% CI: 0.48-0.89, OR: 0.39; 95% CI: 0.24-0.62, OR: 0.70; 95% CI: 0.53-0.92). Adults who are ages 35 to 49 (compared to 18-34), ages 50 to 64 (compared to 18-34), live in the South region (compared to Northeast), visited their health care provider 2 to 4 times in the past year (compared to 1 time) or visited their health care provider 5 or more times in the past year (compared to 1 time) had higher odds of CVD respectively (OR: 2.80; 95% CI: 1.75-4.47, OR: 6.05; 95% CI: 3.89-9.42, OR: 1.53; 95% CI: 1.13-2.07, OR: 1.42; 95% CI: 1.03-1.95, OR: 2.24; 95% CI: 1.59-3.16). Adults who self-identify as NH Black had higher odds of CVD (OR: 1.65; 95% CI: 1.17-2.31) compared to NH white adults.

Multivariate Logistic Regression (Subset Analysis)

Results of the multivariable logistic regression examining a subset sample of Black American adults only (n=687) are displayed in Table 5. Black Americans who experienced health care provider racial/ethnic discrimination (vs. no discrimination) had higher odds of CVD (OR: 1.07; 95% CI: 1.05-2.09). Black Americans who reported mistrust of health care providers (vs. trust) had higher odds of CVD (OR: 1.22; 95% CI: 1.06-2.21), while those that reported mistrust of the health care system (vs. trust) had lower odds of CVD (OR: 0.38; 95% CI: 0.18-0.84).

Table 5: Multivariable Logistic Regression Estimating the Associations between Racism in Medicine and CVD among a Subset of Black American Adults (n=687)

Regression Model Variables	Cardiovascular Disease		
	OR	95% CI	P-value
HCP racial/ethnic discrimination (ref: no)			
Yes	1.07	1.05-2.09	**0.039**
HCP mistrust (ref: very/somewhat comfortable)	1.22	1.06-2.21	**0.045**
Very/somewhat uncomfortable			
Health care system trust (ref: very/somewhat)			
Not at all/a little	0.38	0.18-0.84	**0.017**
Quality of care (ref: poor/fair)			
Excellent/very good	0.42	0.17-0.98	**0.049**
Good	0.78	0.31-1.97	0.603
Age (ref: 18-34)			
35-49	3.60	1.45-8.99	**0.006**
50-64	13.44	5.41-33.45	**< 0.001**
65-74	30.96	10.59-90.54	**< 0.001**
75+	22.63	7.70-66.49	**< 0.001**
Sex assigned at birth (ref: male)			
Female	0.82	0.47-1.45	0.501
Sexual orientation (ref: heterosexual)			
Gay/lesbian	1.53	0.02-10.67	0.845
Bisexual	1.61	0.22-11.69	0.636
Other	5.13	0.76-34.78	0.094
Educational attainment (ref: less than college)			
Some college	0.47	0.25-0.89	**0.020**
College graduate	0.40	0.19-0.81	**0.011**
Postgraduate	0.90	0.37-2.23	0.828
Annual household income (ref: < $35,000)			
$35,000- <$75,000	0.60	0.30-1.20	0.150
$75,000- <$200,000	0.45	0.21-0.95	**0.037**
$200,000 or more	0.34	0.06-1.75	0.195
Ethnic belonging (ref: strongly agree/agree)			
Neither agree/disagree	0.77	0.31-1.92	0.574
Strongly disagree/disagree	0.64	0.15-2.78	0.553
Insurance (ref: no)			
Yes	0.73	0.28-1.86	0.506
Region (ref: Northeast)			
Midwest	1.47	0.59-3.69	0.406
South	1.08	0.55-2.12	0.825
West	0.57	0.18-1.80	0.335
Past year health care visits frequency (ref: 1 time)	1.27	0.56-2.86	0.571
2-4 times	1.99	0.77-5.18	0.155
5 or more times			

Regression Model Variables	Cardiovascular Disease		
	OR	95% CI	P-value
OR= adjusted odds ratios, CI= Confidence Intervals, NH=Non-Hispanic, HCP= Health care provider Outcome referent group= No CVD diagnosis Racism in medicine= HCP racial/ethnic discrimination, poor quality of care, and medical mistrust (i.e. mistrust of health care systems and health care providers)			

In addition, Black American adults who reported receiving *excellent/very good* quality of care had lower odds of CVD (OR: 0.42; 95% CI: 0.17-0.98). Furthermore, Black American adults who have household income of $75,000<$200,000 compared to those with household income of <$35,000 had lower odds of CVD (OR: 0.45; 95% CI: 0.21-0.95). Black American adults who attained *some college* (compared to *less than college*), or *college graduate* educational level (compared to *less than college*) had lower odds of CVD respectively (OR: 0.47; 95% CI: 0.25-0.89, OR: 0.40; 95% CI: 0.19-0.81). Black American adults who are ages 35-49 (compared to 18-34), ages 50-64 (compared to 18-34), 65-74 (compared to 18-34), ages 75+ (compared to 18-34) had higher odds of CVD respectively (OR: 3.60; 95% CI: 1.45-8.99, OR: 13.44; 95% CI: 5.41-33.45, OR: 30.96; 95% CI: 10.59-90.54, OR: 22.63; 95% CI: 7.70-66.49).

CAHPS 2019: Descriptive Analysis

Descriptive results of the current study are shown in Table 6. The study's analytic sample includes 2,465 Black American adults ages 18 and older. The overall sample is primarily Black American adults who are ages 55 to 74 (52.7%) and 35 to 54 (29.1%); female (64.1%); who have educational attainment of *some college but did not graduate* (38.9%), *college graduate* (21.7%), and *postgraduate* (23.8%). Further, 57.5% of Black American adults rated their health care provider as 10 (i.e. best possible provider); 13.0% reported that their health care provider did not always show respect; 16.6% reported that their health care provider did not always listen carefully; and 16.6% reported that their health care provider did not always explain clearly. In addition, 13.3% of Black American adults reported that their health care provider ordered tests such as blood tests, x-rays, or other tests when they visited, 53.0% had visited their health care provider 2 to 4 times during the past 6 months, and 27.4% of Black American adults have been going to their health care provider for 5 years or more.

Table 6: Descriptive Characteristics of Black American Adults from the Consumer Assessment of Healthcare Providers and Systems Survey (CAHPS), 2019 (N=2,465)

Variables	Frequency	Percentage
Age		
18-34	264	10.7
35-54	718	29.1
55-74	1229	52.7
75+	184	7.5
Sex assigned at birth		
Male	885	35.9
Female	1580	64.1
Educational attainment		
Less than college	384	15.6
Some college	960	38.9
College graduate	535	21.7
Postgraduate	586	23.8
Past 6-month frequency of health care visit	792	32.1
1 time	1305	53.0
2-4 times	368	14.9
5 or more times		
Duration of health care visits	466	18.9
< 6 months	378	15.3
6 months-< 1 year	603	24.5
1 year-< 3 years	343	13.9
3 years-< 5 years	675	27.4
5 years or more		
HCP ordered tests or x-ray		
No	573	23.3
Yes	1892	76.7
HCP showed respect		
Never	33	1.3
Sometimes	87	3.5
Usually	202	8.2
Always	2143	87.0

Variables	Frequency	Percentage
HCP listened carefully		
Never	32	1.3
Sometimes	100	4.1
Usually	275	11.2
Always	2058	83.4
HCP explained clearly		
Never	29	1.2
Sometimes	89	3.6
Usually	287	11.6
Always	2060	83.6
HCP rating		
0: worst provider possible	15	0.6
1	10	0.4
2	17	0.7
3	13	0.5
4	24	1.0
5	71	2.9
6	45	1.8
7	116	4.7
8	295	12.0
9	441	17.9
10: best provider possible	1,418	57.5

Ordinal Logistic Regression

Results of the ordinal logistic regression are shown in Table 7. In the unadjusted analysis, Black American adults who were older (vs. younger) had higher odds of rating their health care provider favorably (OR: 1.45; 95% CI: 1.33-2.69). Black American adults who reported that their health care providers ordered tests (OR: 5.02; 95% CI: 1.78-14.15), showed respect (OR: 23.07; 95% CI: 7.70-69.11), listened carefully (OR: 20.10; 95% CI: 7.66-52.71), or explained clearly (OR: 14.59; 95% CI: 6.78-31.41) had higher odds of rating their health care provider favorably compared to those that did not. Black American adults who had been going to their health care provider for a longer period (vs. less than 6 months) had higher odds of rating their health care provider favorably (OR: 1.76; 95% CI: 1.17-2.66).

In the adjusted analysis, Black American adults who were older (vs. younger) had higher odds of rating their health care provider favorably (OR: 1.21; 95% CI: 1.05-1.39). Black American adults who reported that their health care providers showed respect (OR: 11.28; 95% CI: 9.74-13.05), listened carefully (OR: 12.90; 95% CI: 10.94-15.22), or explained clearly (OR: 8.68; 95% CI: 7.66-9.83) had higher odds of rating their health care provider favorably compared to those that did not. Black American adults who had visited their health care provider multiple times in the past 6 months (vs. 1 time) had lower odds of rating their health care provider favorably (OR: 0.81; 95% CI: 0.68-0.98).

Table 7: Ordinal Logistic Regression Analysis of Black American Adults from the Consumer Assessment of Healthcare Providers and Systems Survey (CAHPS), 2019 (n=2,465)

Regression Model Variables	**Health care Provider Rating (Quality of Care)**					
	OR	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age	1.45	1.33-2.69	**0.024**	1.21	1.05-1.39	**0.007**
Sex assigned at birth	1.19	0.42-3.36	0.740	1.01	0.78-1.28	0.975
Educational attainment	0.88	0.54-1.45	0.620	0.92	0.83-1.02	0.118
Past 6-month frequency health care visits	1.25	0.57-2.72	0.580	0.81	0.68-0.98	**0.027**
Duration of health care visits	1.76	1.17-2.66	**0.007**	1.25	1.14-1.37	**< 0.001**
HCP ordered tests or x-ray	5.02	1.78-14.15	**0.002**	1.18	0.92-1.52	0.188
HCP showed respect	23.07	7.70-69.11	**< 0.001**	11.28	9.74-13.05	**< 0.001**
HCP listened carefully	20.10	7.66-52.71	**< 0.001**	12.90	10.94-15.22	**< 0.001**
HCP explained clearly	14.59	6.78-31.41	**< 0.001**	8.68	7.66-9.83	**< 0.001**

OR= Odds ratios, AOR= Adjusted odds ratios, CI= Confidence intervals, NH=Non-Hispanic, HCP= Health care provider
Outcome referent group= 0 (i.e. worst possible provider)

CHAPTER V

DISCUSSION AND IMPLICATIONS FOR POLICY & PRACTICE

The current study aimed to examine the associations between racism in medicine, medical mistrust (i.e. mistrust of health care providers and health care systems), and CVD among Black American adults in the U.S. Utilization of the Minority Stress Theory (47, 61) as a theoretical framework and reviewing the existing evidence-based literature examining this population, health care provider racial/ethnic discrimination, poor quality of care and medical mistrust were hypothesized to be associated with CVD diagnosis among Black Americans. This chapter offers interpretation of the results presented in Chapter 4 by summarizing and discussing the study findings, strengths and limitations of the study, public health implications, and recommendations for future research and health care.

Summary of Findings

This study is unique as it is the first to our knowledge to assess the relationship between racism in medicine, medical mistrust, and CVD among Black American adults. Prior research has established that stress and inflammatory biomarker levels are increased in adults who experience racism or racial/ethnic discrimination, and thus we hypothesized that racism in medicine would be associated with higher odds of CVD diagnosis among Black Americans.

The findings that Black American adults who had experienced health care provider racial/ethnic discrimination, poor quality of care, and medical mistrust had higher odds of CVD support an overall negative effect of racism in medicine on cardiovascular health and well-being among Black Americans. Further, the analysis of 3,152 Black American adults from two different studies found that a significant percentage of Black Americans report receiving poor quality of care from their health care providers, although the majority report quality care overall. This observation was more pronounced when comparing Black Americans to other racial/ethnic groups, particularly NH white adults in the overall sample analysis of U.S. adults. Similarly, observations regarding experiences with racial/ethnic discrimination and mistrust of health care providers were more pronounced among Black Americans compared to NH white adults.

Notably, mistrust of the health care system seems to have a protective effect for Black American adults with regards to CVD diagnosis, which does not support the study's hypothesis. Furthermore, older age, educational attainment of less than college level, annual household income of less than \$35,000 predicted higher odds of CVD compared to Black Americans who were younger, educational attainment at the college graduate level, and income of \$75,000-<\$200,000 respectively. However, this study did not find significant differences in gender, ethnic belonging, region, insurance status, or health care utilization with regards to odds of CVD for Black American adults.

Racism in Medicine and Cardiovascular Disease

Historically and presently, Black Americans face systemic and structural injustices in the forms of explicit or overt racism that is prevalent in all public sectors including the health care system (144). Exposure to racism and experiences with racial/ethnic discrimination predisposes Black American men and women to increased risks of cardiovascular diseases as well as other chronic conditions such as diabetes, obesity, chronic kidney disease, metabolic syndrome, alcoholic fatty liver disease compared to white men and women (58).

In the current study, we found that Black American adults who reported experiencing racism in medicine (i.e. health care provider discrimination and poor quality of care) were found to have higher odds of CVD than white adults. Our findings align with previous research that found links between experiences of discrimination in health care settings and CVD (145, 146). One study examined 12,695 U.S. adults ages 50 and older using a nationally representative data from the 2008-2014 Health and Retirement study and found that health care discrimination was associated with higher odds of CVD (145).

Similar to prior studies (147, 148), Black Americans in this study reported significantly more HCP discrimination and poorer quality of care than white adults, and these associations predicted the odds of CVD independent of age, educational attainment, income, sex assigned at birth, region, and health care utilization. Notably, when comparing sociodemographic differences within group among Black American adults, differences in CVD diagnosis occur across socioeconomic gradients.

Lee et al. used cross-sectional data of 5,642 U.S. adults from the Survey on Disparities in Quality of Health Care found that health care provider discrimination contributed to cardiovascular health disparities among Black Americans (149). Moreover, in this study odds of CVD were observed among Black American adults who were older, those who reported poor quality of care compared to younger aged adults and those who reported excellent quality of care respectively. Results of this study further emphasize that racism in medicine is a significant contributor to CVD disparities among Black Americans (3, 30).

There are several potential mechanisms for the associations between health care provider discrimination, poor quality of care, and higher odds of CVD among Black American adults compared to white adults. Black Americans are prone to experience racism in medicine, and chronic stress from racism is known to activate the autonomic nervous system triggering the release of cortisol and catecholamines, resulting in increased blood pressure and cardiovascular reactivity (35). Additionally, stress-induced allostatic load is significantly higher in Black American adults than white adults (49), and this combination may have contributed to the evident CVD disparities observed in this study. Notably, nutrition may be a confounder of this association as other evidence indicate that Black Americans significantly consume meat at a higher rate compared to other racial/ethnic groups (150), and that animal consumption is linked to metabolic stress and inflammation (151) that can increase CVD risks.

Previous research has found that active coping methods such as seeking social support and ethnic belonging had protective effects on the impact of racism on the health of Black American adults (102-105), further reinforcing the finding that chronic stress induced by racism increases CVD risk among Black Americans (20, 21). However, in this study we did not find any significant association between ethnic belonging and CVD diagnosis among Black American adults, suggesting that coping may not mitigate the deleterious effects of racism in medicine on CVD. It is important to take one consideration into account when interpreting the null association between ethnic belonging and CVD in this study. The current sample size was larger and focused on an overall population sample and a subset of Black American adults only using self-reported data as opposed to a scale for coping. It is plausible that the results may be different if a coping scale was used in examining the associations.

In the current study, after adjusting for sociodemographic characteristics and health care utilization, Black Americans with experiences of health care provider discrimination or poor quality of care had higher odds of CVD compared to Black Americans with no experience of health care provider discrimination or poor quality of care. Taken together, these findings confirm the first hypothesis for this study, suggesting that health care provider discrimination and poor quality of care predicts the odds of CVD among Black American adults, and thus highlights these two factors as potential key contributors to CVD disparities in Black Americans.

Also, the study's finding that a significant percentage of Black Americans report that their health care providers did not always show them respect, listen carefully, or explain clearly is a cause for concern. Health care providers play a critical role in providing advice that can aid in the adoption of positive health behaviors that can improve cardiovascular health and overall health (152). Also, the positive impact of patient-centered care on CVD has been discussed extensively in research (153, 154), and this result suggests that some Black Americans are still not receiving quality care and facing health care provider bias and discrimination.

Systematic reviews have examined the relationship between experiences of racial/ethnic discrimination and increased level of CVD biomarkers among African Americans, including c-reactive protein (CRP), coronary artery calcifications (CAC), blood pressure, interleukins (IL-6, IL-10), SLC4A5 gene (84), plasma endothelin 1 gene

(85), leukocyte telomere length (86), and RBC heme degradation (87), demonstrated to be sensitive predictors of CVD risks among Black Americans who have experienced racism/racial discrimination. However, the mechanism driving the association between racism in medicine and CVD among Black Americans is not fully understood. Furthermore, although some studies have investigated CVD in U.S. adults and racism as the root cause, research on health care provider discrimination, poor quality of care, and CVD among Black American adults specifically is scarce.

Racism in medicine is a form of racism that has typically been understudied compared to the other forms of racism such as personally-mediated, institutional, and internalized racism with regards to CVD. The results of the current study highlight detrimental effects of racism in medicine, specifically for Black Americans as they are members of oppressed population groups that have been historically and structurally disadvantaged in the U.S. (13).

Medical Mistrust and Cardiovascular Disease

As hypothesized, we found mistrust of health care providers to be associated with higher odds of CVD among Black Americans in the overall population sample and subset analysis. The study findings are consistent with previous research findings indicating that mistrust of health care providers is associated with worse cardiovascular health outcomes for Black American adults in the U.S. (155, 156).

Powell et al. conducted a study using cross-sectional data from 610 African American men aged 20 years and older to assess the relationship between medical mistrust and preventive cardiovascular health screenings. They found that adults who report mistrust of health care providers have higher odds of delaying blood pressure and cholesterol screenings (29). Similarly, another study found that mistrust of the health care system was linked to negative health behaviors among Black American adults (157). The finding of the current study supports the hypothesis and corroborates the existing findings in the literature, indicating that mistrust of health care providers is associated with CVD among Black Americans.

Furthermore, the study findings add to the literature suggesting that mistrust of the health care systems influences risk of CVD. However, in this study we found that although mistrust of the health care system was positively associated with CVD in the overall population sample, for Black Americans specifically, mistrust of the health care system was associated with lower odds of CVD (subset analysis of Black Americans only). This finding suggests that mistrust of the health care system may be protective for Black Americans, and it is important for future research to explore these concepts further. It is also possible that mistrust of the health care system can lead to fewer Black Americans seeking care and thus not being diagnosed with CVD. Interestingly, the differences in direction of association seen in mistrust of health care providers (positive association) and mistrust of health care system (negative association) with regards to cardiovascular diseases highlight the complexities of structural racism and how its downstream effects in the form of medical mistrust shape CVD disparities among Black American adults.

One of the few studies that have examined health care provider racial concordance and discordance and its impact on CVD for Black Americans found that Black patients report receiving quality care and are more likely to utilize medical services when their health care provider is Black (119). This further reinforces the finding that Black American adults' mistrust of health care providers is linked to CVD.

Notably, the odds of CVD use were 9% higher in adults with report of medical mistrust compared to adults who trust the health care system. This may have been driven by the increased prevalence of mistrust of the health care system observed for Hispanic adults and non-Hispanic white adults. Also, women had lower odds of being diagnosed with CVD, although the non-statistically significant reduced odds of CVD among Black women may contrast with previous research (20, 158).

The current study results add to the literature as few previous studies have specifically examined mistrust of health care system and its association with CVD among Black Americans. Consistent with the Minority Stress Theory (47, 61), the current study indicates that Black American adults face unique and hostile psychosocial stressors such as racism and racial/ethnic discrimination due to their racial identity and/or skin color, leading to higher odds of CVD and worse health outcomes. Another study also found that adherence to hypertension medications in Black Americans is influenced by mistrust for physicians and health care systems (159), indicating that medical mistrust is an important contributor to health disparities among Black Americans compared to white adults.

Although the majority of studies have examined the impact of medical mistrust on medication adherence and cardiovascular prevention health services (29, 159) and not specifically cardiovascular diseases among Black Americans, their findings provide an evidence base of the association and potential mechanisms between mistrust of health care providers, mistrust of the health care system, and CVD.

Strengths and Limitations

The current study has several strengths. One strength is the use of data from two different samples and study designs to examine the associations between racism in medicine, medical mistrust, and CVD among Black American adults. This is a strength as it improves the efficiency and validity of our study. Another strength is the use of large nationally representative datasets to examine the associations, which improves the generalizability, power, and precision of the findings. In addition, we used recent databases and as such our results are expected to be relevant and timely to the current literature landscape. Finally, complex survey designs were employed in the studies from which the data were generated, and the weighting of samples are strengths of the study methodology.

Despite the strengths of the study, the current study is not without limitations. The cross-sectional design of the HINTS and CAHPS prohibits causal inferences between racism in medicine, medical mistrust, and CVD. The study also relies on self-reported data and thus the findings are subject to recall and social desirability bias. Therefore, for example, the number of Black American adults with CVD who experienced health care provider racial discrimination may have been underestimated since information was obtained by self-report of ever physician diagnosis as opposed to clinical measurements. It is important to note, that it is possible that adults with subclinical CVD may not be fully represented in this study. Importantly, a significant association was found with regards to CVD among Black American adults.

Furthermore, the study did not use racial discrimination measure scales or coping scales, and results may differ if they were used. However, despite the fact that racial/ethnic discrimination measure scales have shown utility and reliability in previous research (160), these scales assess typically personally-mediated racism and not racism in medicine specifically. Another limitation is that the current study aggregated data across different racial/ethnic groups that identified as Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple races. This may have led to loss of statistical power when comparing within group racial/ethnic differences in CVD diagnosis.

Finally, there is also the potential for underreporting or overreporting of health care frequency visits and utilization due to imprecise recall of events. If misclassification of health care frequency visits and utilization was present, it is possible that the findings of this study are biased towards the null. However, since significant associations were identified in both studies, the probability of such misclassification occurring may be small.

Implications and Recommendations for Future Research

The findings of the current study contribute to the understanding of the associations between racism in medicine, medical mistrust, and CVD diagnosis among Black American adults in the U.S. The study findings provide evidence-based information for health care providers to consider when working with individuals who identify as Black Americans in the U.S. Although previous studies have examined the impact of racism and/or racial/ethnic discrimination on cardiovascular health, the research on racism in medicine, medical mistrust, and CVD specifically among Black Americans is sparse.

Addressing structural and interpersonal barriers to equitable cardiovascular health care for Black Americans is necessary to earn medical trust among the Black American population and consequently improve cardiovascular health outcomes. Health care providers should receive racial bias/discrimination education, and training on culturally sensitive and humanizing approaches to delivering cardiovascular care for Black American adults. These policies and practices are critical for addressing the CVD disparities faced by Black American adults in the U.S. Furthermore, purposive and intentional engagement of Black American communities in the co-creation of health care interventions targeting both Black Americans and health care providers to facilitate patient-centered care will be essential in increasing trust, value, and reciprocity between health care providers, researchers, and Black American adults.

Further, it is important for health care providers who work with Black American adults to provide culturally sensitive and culturally appropriate care by considering cultural and environmental factors that can facilitate or inhibit optimum cardiovascular health. To improve trust and quality of care, it is also important for health care providers to engage in open discussion and reflections with patients in a humane way that respects their dignity and includes them in the decision-making process of their care.

Addressing compositional diversity in health care is also essential for addressing the systemic factors that influence implicit and explicit biases, stereotypes, and discrimination that perpetuate health care disparities (161). Black Americans are underrepresented in medical students, residents, physician workforce, and health professions faculty (161). Having more Black American physicians in the health care system may serve to increase trust in the health care system and of health care providers Black Americans, and consequently the racism-driven CVD disparities will reduce.

Conceptualizing racism in medicine and medical mistrust as downstream effects of structural racism and at the interpersonal level using the Minority Stress Theory as a framework is also an important contribution to the literature. Future studies should expand on these by the conceptualization and direct measurement of structural racism and CVD among Black American adults. Furthermore, future research should employ longitudinal or randomized controlled trial study designs to examine causality between racism in medicine, medical mistrust, and CVD.

Moreover, there are a lack of validated and reliable scales that measure structural racism and discrimination in health care specifically; future research should consider developing and testing the validity of these scales. Finally, future research that utilizes coping scales to mediate the relationship between structural racism and CVD among Black Americans are needed.

Conclusion

Cardiovascular disease remains the major cause of morbidity and mortality for Black American adults, despite recent advancements in prevention and therapeutics (152). The multifactorial nature of CVD means that typically more traditional risk factors such as genetics, lifestyle behaviors, and environment have been studied extensively (11, 12), but unfortunately the role of interpersonal and structural factors are not fully known (11, 12). The current study identified higher odds of CVD in Black Americans with exposure to racism in medicine than Black Americans with no exposure to racism in medicine but did not find a statistically significant association for ethnic belonging. It is important to note that our findings do not disregard the role that coping may play in cardiovascular health among Black American adults. Additionally, a protective effect of mistrust of health care systems was observed, while mistrust of health care providers was linked to CVD. More work is needed to further examine the complexities of structural racism in medicine and its effects on CVD disparities among Black Americans. Prevention strategies tailored to address CVD disparities as well as health care policies, and health care provider culturally sensitive training interventions to mitigate the deleterious effects of racism on CVD among Black Americans must be prioritized.

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APPENDIX

Supplemental Table 1: Differences in Race/ethnicity by Racism in Medicine and Medical Mistrust (N=4,347)

	HCP racial/ethnic discrimination		**Mistrust of HCP**		**Mistrust of Health care system**		**Quality of care**		
Variables	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Excellent/ very good**	**Good**	**Poor**
Race and Ethnicity									
NH White (%)	2538 (68.5)	55 (18.0)	1773 (69.5)	820 (62.7)	2303 (66.1)	290 (58.2)	1953 (69.2)	494 (59.6)	146 (35.4)
NH Black (%)	535 (9.3)	152 (33.0)	503 (10.0)	184 (11.4)	599 (11.0)	88 (10.6)	435 (10.4)	183 (11.9)	69 (17.6)
Hispanic (%)	627 (13.5)	84 (24.6)	517 (11.0)	194 (15.9)	588 (14.0)	123 (15.9)	431 (12.3)	182 (15.9)	98 (26.5)
NH Other (%)	314 (8.7)	42 (24.4)	244 (9.5)	112 (10.0)	298 (8.9)	58 (15.3)	200 (8.1)	108 (12.6)	48 (12.5)
P Value		**<0.001**		**0.029**		0.081			**<0.001**

Unweighted Frequencies. Weighted percentages and P values. NH= Non-Hispanic, HCP= Healthcare Provider

Chi square tests and Fischer's Exact tests.

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Sciences, School of Medicine

Drs. Joy Hart and Kandi Walker

Grant: Hamburg, N., Wu, J., Blaha, M. (PIs), et al. Rapidly Advancing Discovery to Arrest the Outbreak of Youth Vaping (VAPERACE). (Hart and Walker, PIs, Community Engagement and Research Translation Core; Hart and Walker, Co-Is, Project 3—Cessation of Nicotine Vaping in Youth). American Heart Association; $6,650,000 for 2020-2022.

VAPERACE Description: A research center aiming to better understand the youth perspective on anti-vaping campaigns with a long-term goal of implementing anti-vaping initiatives led by the Youth Advisory Council (YAC).

Participated in YAC engagement and research translation of the vaping epidemic among youth. Led discussions with the YAC and translated the youth perspective to leading researchers. Assisted the YAC in building anti-vaping campaigns targeted towards youth. Managed and created content for all VAPERACE social media accounts. Authored and coauthored research (submitted and published in peer-reviewed journals) that examined vaping and tobacco use disparities among youth and the harmful impacts vaping and tobacco has on youth health including cardiovascular health. Attended and participated in American Heart Association scientific meetings.

Graduate Research Assistant August 2020-Present

University of Louisville, Green Heart Louisville

University of Louisville Department of Communication, Public Health and Information

Sciences, School of Medicine

Drs. Joy Hart and Kandi Walker

Grant: Bhatnagar, A. (PI), Keith, R. (Co-I), DeFilippis, A. (Co-I), O'Toole, T. (Co-I), Hart, J. L. (Co-I), Walker, K. L. (Co-I), et al. Green Heart Louisville (Urban Greenness and Cardiovascular Health). National Institute of Environmental Health Sciences; $2,614,648 for 2018-2023.

Green Heart Louisville Description: An environmental community health study examining the relationships between community greenness, air quality and other environmental factors, and many facets of human health. Participated in all phases of community engagement, collaborated with project partners and research team leads, facilitated relationships with community members and organizations, built ongoing relationships for multiyear project, led community meetings and presentations, assisted in primary health data collection of participants in person at several study visits, and recruited and retained study participants through several novel methods.

Graduate Research Assistant August 2017–Dec 2019

Department of Public Health

Central Michigan University, Twin Study Research

Student Leader of the Twin Study Research: Assisted with data analysis, recruitment and mentoring of peers and new recruits, presenting research at conferences, writing publishable papers.

SCHOLARLY ACTIVITY

Peer-Reviewed Journal Publications

1) Agbonlahor O, Rai J, Mattingly DT, Walker KL, Hart JL. Cardiovascular Disease Risk Perceptions and Tobacco Use among Appalachian Youth. Population Medicine **2021;** 3(November):32. https://doi.org/10.18332/popmed/143749

2) Mattingly DT, Rai J, Agbonlahor O, Walker KL, Hart JL. Tobacco Use Status and Temptation to Try E-Cigarettes among a Sample of Appalachian Youth. Int. J. Environ. Res. Public Health **2021**, 18, 6755. https://doi.org/10.3390/ijerph18136755

3) Agbonlahor, Ameh and Inungu (**2021**). Chapter 21: Program Planning Models and Theories. In J.Inungu and M.Minelli (Eds). Foundations of Rural Public Health in America (1st Ed., pp 397-422). Jones and Bartlett Learning, Burlington, MA, U.S.A

4) Agbonlahor O, Osasuyi O. Gender and Racial Differences in Post-Traumatic Stress Disorder and Chronic Fatigue Syndrome: A Twin Study. Journal of Health, Medicine, and Nursing **2021;** 91(1):1-10. https://doi.org/10.7176/JHMN/91-01

5) Wood LA, Agbonlahor O, Tomlinson MM, Kerstiens S, Vincent K, McLeish AC, Walker KL, Hart JL. Readability of Online E-cigarette Cessation Information. Tobacco Induced Diseases **2022;** 20(June):53. https://doi.org/10.18332/tid/149906

6) Agbonlahor O, Vincent K, Wood LA, Tomlinson MM, Kerstiens S, Clarke J, McLeish AC, Walker KL, Hart JL. Readability of Online Information on Nature and Mental Health. Population Medicine **2022;** 4(November):30. https://doi.org/10.18332/popmed/156429

7) Mattingly DT, Agbonlahor O, Rai J, McLeish AC, Walker KL, Hart JL. Harm Perceptions of Secondhand E-Cigarette Aerosol among Youth in the United States. Addictive Behaviors **2023;** 137:107535**.** https://doi.org/10.1016/j.addbeh.2022.107535

8) Agbonlahor O, Osasuyi O, Mustapha T. Health Care Provider Lifestyle Modification Advice for Adults with Hypertension in the United States. European Journal of Environment and Public Health **2023;**7(3): em0133. https://doi.org/10.29333/ejeph/12780

9) Agbonlahor O, DeJarnett N, Hart JL, Bhatnagar A, McLeish AC, Walker KL. Racial/Ethnic Discrimination and Cardiometabolic Diseases: A Systematic Review. Journal of Racial and Ethnic Health Disparities **2023;** 28:1-25. https://doi.org/10.1007/s40615-023-01561-1

10) Agbonlahor O, Mattingly DT, Hart JL, Rai J, McLeish AC, Walker KL. Differences in Health Care Provider Advice on Abstaining from Tobacco Product Use: Findings from the 2020 National Youth Tobacco Survey. Addictive Behaviors **2023;** 144:107726**.** https://doi.org/10.1016/j.addbeh.2023.107726

11) Agbonlahor O, Mattingly DT, Rai J, Hart JL, McLeish AC, Walker KL. Differences in Health Care Provider Screening for Tobacco Use among Youth in the United States: The National Youth Tobacco Survey, 2021. Preventive Medicine **2023;** 2:107718. https://doi.org/10.1016/j.ypmed.2023.107718

12) Mattingly DT, Agbonlahor O, Hart JL, McLeish AC, Walker KL. Psychological Distress and Cannabis Vaping among U.S Adolescents. American Journal of Preventive Medicine **2023.** https://doi.org/10.1016/j.amepre.2023.10.013

Journal Articles in Progress/Under Review

13) Agbonlahor O, Mattingly DT, Hart JL, McLeish AC, Walker KL. Health Care Provider E-Cigarette-Related Advice and E-cigarette Harm Perceptions among Youth. Preventive Medicine (Under review)

14) Tomlinson MM, Kerstiens S, Smith C, Agbonlahor O, Clarke J, Vincent K, Walker KL, McLeish AC, Keith RJ, Smith T, Yeager RA, Wood LA, Bhatnagar A, Hart JL. The Association between Perceived Neighborhood Safety and Cardiovascular Disease Risk Factors. Psychology, Health and Medicine (Under review)

15) Mattingly DT, Agbonlahor O, Richardson, M.K, Rose SW, Hart JL. Factors Associated with Disposable Electronic Cigarette Use among Youth. Addiction (Under review)

16) Richardson, M.K, Agbonlahor O, Hart JL, Mattingly DT. Extensive social media use and frequency of current e-cigarette use among U.S Youth. Drug and Alcohol Dependence (Under review)

17) Richardson, M.K, Mattingly DT, Agbonlahor O, Hart JL, McLeish AC, Walker KL. Daily Anxiety and Dual Cigarette and Electronic Cigarette Use among U.S Adults: The National Health Interview Survey, 2020-2022.

18) Agbonlahor O, Mattingly DT, Hart JL, Richardson, M.K, McLeish AC, Walker KL. Substance Use and Cardiovascular Diseases among U.S. Adults: Findings from the National Health and Nutrition Examination Survey, 2017-2018.

19) Smith C, Tomlinson MM, Kerstiens S, Agbonlahor O, Walker KL, McLeish AC, Hart JL. Prevalence of Combustible and Non-Combustible Tobacco and Marijuana Products in Hip-Hop Music Videos, 2018-2022.

20) Hart J.L, Walker K.L, McLeish A.C, Vincent K, Agbonlahor O, Wood L.A, Kersteins S, Tomlinson M.M, Clarke J.E, & Garfinkle Plymesser E. Youth Engagement to Confront the Vaping Epidemic and Discourage Electronic Cigarette Use**.**

21) Agbonlahor O, Osasuyi O. Cardiometabolic Health Literacy: Examining the Readability of Online Information on Cardiometabolic Diseases.

Book Chapter

22) Agbonlahor, Ameh and Inungu (**2021**). Chapter 21: Program Planning Models and Theories. In J.Inungu and M.Minelli (Eds). Foundations of Rural Public Health in America (1st Ed., pp 397-422). Jones and Bartlett Learning, Burlington, MA, U.S.A

Presentations

1) Kandi L. Walker, Alison C. McLeish, Osayande Agbonlahor, and Madeline Tomlinson (2021, April). **Youth engagement to stop vaping: Hope in action.** Paper presented at the annual meeting of the Southern States Communication Association, virtual due to pandemic.

2) Kolbie Vincent, Arabella Werner, Osayande Agbonlahor, Lindsey A Wood, Madeline M. Tomlinson, Savanna Kerstiens, Andrew Kramer, Jewels Clarke, Alison C. McLeish, Kandi L Walker, and Joy Hart (2021, September). **Youth Vaping: Seeing through the Clouds**

Paper presented at the annual meeting of the Kentucky Communication Association. Spotlight presentation

3) Lindsey A. Wood, Madeline M. Tomlinson, Savanna Kersteins, Osayande Agbonlahor, Kolbie Vincent, Jewels Clarke, Alison C. McLeish, Kandi L Walker, and Joy Hart (2021, September). **Communication and Community Engagement: Green Heart Louisville's Youth Art and Literature Showcase**

Paper presented at the annual meeting of the Kentucky Communication Association. Spotlight presentation

4) Lindsey A. Wood, Osayande Agbonlahor, Madeline Tomlinson, Savanna Kerstiens, Alison C. McLeish, Kandi L Walker, and Joy L. Hart (2021, November). **Readability of Online Vaping Information: Gobbledygook or Great?**

Paper presented at the annual meeting of the Tobacco Regulatory Science. virtual presentation

5) Wood, L.A., Agbonlahor, O., Tomlinson, M.M., Kerstiens, S., Vincent, K., Mcleish, A.C., Walker, K.L., & Hart, Joy L. (2021, November). **Readability of vaping information on the web**. Poster presented at the 28th annual meeting of the Society for Research on Nicotine and Tobacco, Baltimore, MD.

6) Walker, K.L., Mcleish, A.C., Wood, L.A., Agbonlahor, O., Tomlinson, M.M., Vincent, K. A., Kerstiens, S., & Hart, Joy L. (2021, November). **An end to ENDS: Youth-led initiatives**. Poster presented at the 28th annual meeting of the Society for Research on Nicotine and Tobacco, Baltimore, MD.

7) Walker, K. L., Hart, J. L., McLeish, A. C., Wood, L. A., Vincent, K., Tomlinson, M. M., Garfinkle Plymesser, E., Agbonlahor, O., Kerstiens, S., Clarke, J. E., Julian, K. A., Julian, K. S., Petiprin, Z., Kastman, O., & Coughlin, L. E. (2022, April). **Community engagement and research translation: VapeRace Youth Advisory Council.** Presentation at the annual meeting of the American Heart Association Tobacco Center for Regulatory Science (virtual due to pandemic).

8) Walker K.L, Hart J.L, McLeish A.C, DeJarnett N, Shuck B, Agbonlahor O, Tomlinson M.M, Vincent K, Wood L.A, Kersteins S, Clarke J.E, Garfinkle Plymesser E, & Keith R.J (2022, September). **The race to embrace: Engaging youth, employees, and community members.** Paper presented at the annual meeting of the Kentucky Communication Association, Louisville, Kentucky.

9) Hart J.L, Walker K.L, McLeish A.C, Vincent K, Wood L.A, Kersteins S, Tomlinson M.M, Clarke J.E, Garfinkle Plymesser E, Agbonlahor O, & Hamburg N.M (2022, September). **Citizen science and youth vaping.** Paper presented at the annual meeting of the Kentucky Communication Association, Louisville, Kentucky.

10) Hart J.L, Walker K.L, McLeish A.C, Vincent K, Wood L.A, Kersteins S, Tomlinson M.M, Clarke J.E, Garfinkle Plymesser E, & Agbonlahor O (2022, November). **Vaping realities: Views from youth.** Poster presented at the annual scientific sessions of the American Heart Association, Chicago, Illinois.

11) Walker K.L, McLeish A.C, Agbonlahor O., Tomlinson M.M., Wood L.A., Vincent K., Kerstiens S., Clarke J., Garfinkle Plymesser E., & Hart J.L. Vaping realities: Views from youth. Circulation **2022;** 146: A13408. https://www.ahajournals.org/doi/10.1161/circ.146.suppl_1.13408

12) Heberle, L., DeJarnett, N., Walker, K. L., Hart, J. L., Metcalf-Wade, H., McLeish, A. C., Vincent, K., Agbonlahor, O., Tomlinson, M., Satterly, S., Wood, L. A., Kerstiens, S.,

Clarke, J., Smith, T., & Bhatnagar, A. (2022, December). **Community engagement and research translation at the ULSRC**. Poster presented at the Superfund Research Program 35th anniversary annual meeting, Raleigh, North Carolina.

13) Walker, K. L., Tomlinson, M.M., McLeish, A. C., Agbonlahor, O., Vincent, K. A., Clarke, J, Kerstiens, S., Smith, C., & Hart, J. L. (2023, January). **Green Heart Louisville Community Engagement**. Presentation to the University of Louisville Community Engagement Academy, Louisville, Kentucky.

14) Heberle, L., DeJarnett, N., Walker, K. L., Hart, J. L., Metcalf-Wade, H., McLeish, A. C., Vincent, K., Agbonlahor, O., Tomlinson, M., Satterly, S., Wood, L. A., Kerstiens, S., Clarke, J., Smith, T., & Bhatnagar, A. (2023, September). **Community engagement and research translation at the ULSRC**. Poster was presented at the 7th Annual Environmental Justice Conference, West Jefferson County Community Task Force/NAACP, Louisville, Kentucky

15) Agbonlahor, O., Vincent, K., Tomlinson, M., Walker, K. L., McLeish, A. C., Hart, J. L. (2023, October). **Youth engagement to confront the vaping epidemic and discourage electronic cigarette use**. Poster was presented at the Research! Louisville annual conference, Louisville, Kentucky

16) Agbonlahor, O., Jahanfar, S. (2018). **Post-traumatic stress disorder and risks of chronic fatigue syndrome, A twin study.** Poster presented at the annual research symposium of the Herbert H. and Grace A. Dow College of Health Professions, Central Michigan University, MI

17) Agbonlahor, O., Jahanfar, S. (2020). **Sex discordance and risks of attention deficit hyperactivity disorder in adults, A twin study.** Poster presented at the annual research symposium of the Herbert H. and Grace A. Dow College of Health Professions, Central Michigan University, MI

18) Agbonlahor, O., Jahanfar, S. (2020). **An exploratory investigation of fibromyalgia diagnosis among adults with depression, A twin study.** Poster presented at the annual research symposium of the Herbert H. and Grace A. Dow College of Health Professions, Central Michigan University, MI

19) Agbonlahor, O., Jahanfar, S. (2020). **Infectious mononucleosis and risks of multiple sclerosis, A twin study.** Poster presented at the annual research symposium of the Herbert H. and Grace A. Dow College of Health Professions, Central Michigan University, MI

20) Mattingly, D.T., Agbonlahor, O., Hart, J. L. (2023, November). **Sex and racial/ethnic disparities in associations between daily depression and daily cigarette use among US adults**. Poster presented at the Annual American Public Health Association Meeting and Expo, Atlanta, Georgia

21) Agbonlahor, O., Mattingly, D.T., Hart, J. L., McLeish, A.C., Walker, K.L. (2024, March). **Associations between health care provider advice to abstain from using e-cigarettes and e-cigarette harm perceptions among youth in the United States**. Poster presented at the annual meeting of the Society for Research on Nicotine and Tobacco, Edinburgh, Scotland.

22) Agbonlahor, O., Mattingly, D.T., Hart, J. L., McLeish, A.C., Walker, K.L. (2024, March). **Substance use and cardiovascular disease among U.S adults: Findings from the National Health and Nutrition Examination Survey, 2017-2018.** Poster presented at the annual meeting of the Society for Research on Nicotine and Tobacco, Edinburgh, Scotland.

23) Mattingly, D.T., Agbonlahor, O., Hart, J. L., McLeish, A.C., Walker, K.L. (2024, March). **Racial/ethnic disparities in daily anxiety and daily ENDS use among US adults: The National Health Interview Survey, 2020-2022.** Poster presented at the annual meeting of the Society for Research on Nicotine and Tobacco, Edinburgh, Scotland.

TEACHING EXPERIENCE

University of Louisville, Louisville, 2024
Instructor
PHPB 305: Public Health Intervention Principles and Strategies Spring 2024

Central Michigan University, Mount Pleasant, 2017-2019
Graduate Teaching Assistant
HSC 235: Psychoactive drugs Fall 2017-Spring 2018
MPH 650: Biological basis of Public Health Spring 2019
MPH 646: Epidemiology Spring 2019-Fall 2019

Guest Speaker
Epigenetics in Human Health and Disease Fall 2019

HONORS AND AWARDS

- Graduate Research Assistantship from Christina Lee Brown Envirome Institute, University of Louisville- Kentucky (2020-2024)
- Graduate Research Assistantship from the American Heart Association's VAPERACE Center, University of Louisville- Kentucky (2020-2024)

PROFESSIONAL ORGANIZATIONS AND ASSOCIATIONS

- American Public Health Association (APHA)
- Royal Society for Public Health (RSPH)

COMMUNITY ORGANIZATIONS AND ASSOCIATIONS

- Cloverleaf Neighborhood Association, Louisville, KY
- Taylor-Berry Neighborhood Association, Louisville, KY

MENTORING

Undergraduate Students
Jadyn Rowe
Romith Paily
Jaydon Michalczyk

Graduate Students
Toheeb Mustapha
Governor Ameh

ADDITIONAL TRAINING AND CERTIFICATION

March 2018 **Geographic Information Systems Spring Training Program – Central Michigan University, Mount Pleasant**
Geographic information systems (GIS) training- (Certificate awarded)

January 2018 **Cochrane Systematic Review Workshop Training Program – Central Michigan University, Mount Pleasant**
Cochrane systematic review workshop training- (Certificate awarded)

August 2017 **CITI Human Subjects Research Training**
Research training at Central Michigan University

August 2020 **CITI Human Subjects Research Training**
Research training at University of Louisville

PROFESSIONAL EXPERIENCE AND VOLUNTEER EFFORTS

Clinical Rotations (Swedish Covenant Hospital, Chicago). Oct 2016-Dec 2016

- Performed initial history and physical exam on patients as assigned by the Physician each week.
- Submitted patient write-ups per week to the physician in charge.
- Participated fully in the daily care of patients and completed follow-up assessments each day.
- Identified learning issues for each patient.

¨ **Medical Student Rotations Jackson Park Hospital, Chicago Feb 2015 – May 2017**

Clinical Rotations

- Family Medicine (Core and elective)
- Psychiatry (Core and elective)
- Surgery (Core and elective)
- Nephrology
- Cardiology

¨ **Volunteer** **Ponders End Rural Clinic, Nigeria** **Sept 2016 – Sept 2016**

☐ Blood pressure readings
☐Assisted with multiple deliveries.

- Mid-Michigan Community Action Agency: **Clare, Michigan** **Nov 2018**

- Community service with food packaging and distribution to underserved.

- South Louisville Community Ministries: **Louisville, Kentucky** **July 2022- June 2023**

- Community service with food packaging and distribution to underserved.

REFEREES

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