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ABSTRACT

Examining the Association Between Perceptions of Racial Discrimination and Depressive Symptoms Among African Americans in Georgia

By

Obioesio Edet Bassey

11/28/2017

INTRODUCTION: Depression in the United States is a persistent but relatively understudied public health issue, especially among particularly burdened populations that suffer from comorbidities and additional conditions that may trigger or exacerbate the presence of depressive symptoms. Stress is a leading cause of many health defects and many recent theories concerning health disparities center around the differences in stress between different subpopulations contribute to health. Perceived discrimination is a unique stressor that has been linked to the observed wellness gap between races. Discrimination in the United States is often targeted towards African Americans and the effect that this unique stressor has on mental health illnesses such as depression is relatively unknown.

AIM: The goal of this study is to explore the effects of perceived discrimination on the presence and severity of depressive symptoms among African Americans in the state of Georgia using the Behavioral Risk Factors Surveillance Survey administered by the Center for Disease Control

METHODS: The sample of participants consisted of 609 African American residents of Georgia, all whom are at least 18 years of age. Each participant completed a telephone survey where they were inquired about both their experiences with perceived discrimination and questions from the PHQ-8 days which gauged their level of depressive symptoms. A bivariate analysis was utilized between reported discrimination in the workplace and depressive symptoms, then a similar analysis was conducted using discrimination while seeking healthcare. An adjusted model for the risk of depressive symptoms was then created at a 95% statistical significance level. All statistical methods were conducted using SAS 9.4.

RESULTS: Depressive symptoms were most prevalent among those in the 25-34 age group (20.8%; 12.2 – 29.4), those who graduated college or technical school (19.1%; 12.7 – 25.4), and those who reported some form of chronic disease (19.2%; 12.1 – 26.4). The odds ratio of perceived discrimination and depressive symptoms were lowest among those who reported being treated better than other races at work (0.123; CI: 0.038 to 0.407). Odds of depressive symptoms among those who reported being treated better than other races when seeing healthcare were insignificant.

DISCUSSION: The results of this study demonstrate that African Americans in Georgia who reported equal or better racial based treatment in the workplace had lower odds of reporting depressive symptoms

Examining the Association Between Perceptions of Racial Discrimination and Depressive
Symptoms Among African Americans in Georgia

by

Obioesio Bassey

B.S., Georgia Institute of Technology

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Examining the Association Between Perceptions of Racial Discrimination and Depressive
Symptoms Among African Americans in Georgia

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Author's Statement Page

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Examining the Association Between Perceptions of Racial Discrimination with Depressive Symptoms Among African Americans in Georgia

Introduction

Burden of Depression

Research on mental health in epidemiology has taken a backseat to the study of chronic diseases and infectious diseases for years, and thus, the prevalence of mental disorders has increased. Arguably, the change in prevalence of these disorders may be explained by the constant changes in criteria for healthy mental functioning and constant controversy on what abnormalities qualify as ‘mental disorders’. *The Diagnostic and Statistical Manual of Mental Disorders* (DSM), developed by the American Psychiatric Association is widely used as the primary tool for diagnosing and treating mental disorders but it has been revised several times over the past 100 years to reflect the shifts in medical paradigms concerning mental disorders (American Psychological Association 2017). These changes illustrate the difficult nature of identifying mental disorders though ever-changing context of clinical evaluation. Classifications of mental disorders has varied over the years but categories such as neurodevelopmental, anxiety, and depressive disorders remain consistent. Many of the diagnoses found in this manual can only be diagnosed when determined to be debilitating to daily function, but the determination varies between individuals.

Depression is one of the more common mental disorders discussed in the DSM-V presenting a range of exhibition and varying outcomes. While no mental disorder is completely understood, the rising prevalence of depression in the United States underscores a growing need to understand the interaction between biological and environmental factors that lead to depression. In a society that is responding to a growing integration of technology and mixing of

cultures, it is important to understand how the environmental stressors vary depending on the unique factors within the individual's surroundings. These differences may exhibit themselves in various ways, ranging from personality differences to mental disorders.

The African American Experience

In terms of environmental stressors, African Americans are uniquely exposed to many stressors that are not necessarily prevalent for other races. The history of The United States of America is infused with discrimination, prejudice, and racism against African Americans and black citizens even to this day. From the early days of slavery to the Jim Crow laws of the 1960s, stressors from generations of institutionalized racism and legal discriminatory practices may play a large detrimental role in the health of African Americans (Mays, Cochran, and Barns 2007). Vast health disparities exist along racial lines in the United States with African Americans exhibiting higher mortality rates and lower life expectancy than those who identify as white (Levine et al., 2001). Many of these health disparities run parallel to differences in socioeconomic status, but there is still a considerable difference between whites and other racial groups when controlling for education and income.

Perceived discrimination in this context is the perception of differential treatment by individuals or institutions based on membership of a racial or ethnic group. African Americans tend to report high amount of perceived discrimination in various settings, a factor shown to be detrimental to mental and physical health (Clark, Anderson, Clark, and Williams 1999). Increased environmental stress has been shown to increase allostatic load, and perceived discrimination is shown to have a considerable effect on the allostatic load of African Americans (Fujishiro 2009). African Americans report experiencing a large amount of discrimination ranging from individual to an institutional level that affect stress levels in their workplace, in

health care settings, and their communities (Williams, Yu, Jackson, and Anderson 1997). Many mental disorders, including depression, are more prevalent among African Americans in comparison to other races. The relationship between perceived discrimination and mental health outcomes serves as a possible explanation for the previously observed racial disparity.

Purpose of Thesis

The purpose of this thesis is to study the association between perceived discrimination and symptoms of depression among African Americans in Georgia. This study was conducted utilizing secondary data through the Behavioral Risk Factor Surveillance System (BRFSS). The Behavioral Risk Factor Surveillance System is an extensive survey conducted by the Center for Disease Control to analyze trends of health behaviors, chronic disease indicators, and receipt of preventive healthcare. The “Reaction to Race” optional module was developed to assess population level estimates of perceived discrimination. The module has been utilized in various states for several years. The BRFSS also administers an optional module, Mental Illness and Stigma, which measures depressive symptoms. This module was designed based on the Patient Health Questionnaire-8 Days, a questionnaire used to measure depressive symptoms exhibited in the 2 weeks prior to survey completion. Utilizing the 2010 BRFSS, which included both modules, the present study assesses whether there is an association between perceived discrimination and mental health of African Americans. Further understanding the relationship between perceived discrimination and depressive symptoms will help identify a cause of the growing rates of depression among African Americans.

Chapter II - Literature Review

2.1 - Perceived Discrimination

To understand the effects of perceived discrimination, it is important to operationalize the term and the theorized pathways through which it affects people. Dr. Camara Jones, Research Director on Social Determinants of Health and Equity at the Centers for Disease Control and Prevention, defined discrimination as “differential actions towards others according to their race” (Jones 2000). Discrimination occurs in various ways, from avoidance to dehumanization, and it transpires through social hierarchy, from institutional structures to individual practices and attitudes (Jones 2000). The culmination of discrimination against minority races such as African Americans has come to fruition in the form of many health disparities between those who are socially assigned as white versus other races. One’s race is a construct created by social environment, with the biological differences between individuals not necessarily distinct among racial lines (American Anthropological Association 1998).

Regardless of the murky biological distinctions, the health differences between African Americans and white Americans are stark; being socially assigned as ‘white’ in the United States is associated with large advantages in health status (Jones et al. 2008). Social institutions and government policies contribute to the burgeoning health gap between certain ethnicities and races, through a combination of problems stemming from through of socioeconomic disparities, lack of educational access, poor diet, and access to health care (Braveman & Gottlieb 2014). Discrimination plays a role in these inequalities which can only partially be explained by stigmatization of races and ethnicities that triggers descent into lower tax brackets, whose constituents characteristically lack resources necessary for health maintenance (Massey 1990; Levine et al. 2001). When controlling for variance in socioeconomic status and education, past

research shows that racial discrimination is a social determinant of health that has its own detrimental effects to subpopulations.

2.2 – African Americans and the South

The unique environmental stressors that African Americans face are often exacerbated in southern states, an effect largely attributed to the history of slavery and unequal treatment in the country with rural southern states as the epicenter. In 1861, Alexander Stephens described the cornerstone of the Confederacy as the idea that “the negro is not equal to the white man”, to justify years of slavery and the founding of an independent nation dedicated to maintaining the institution of slavery (Cleveland 2015). Georgia, being one of the first states to join the confederacy, was an area where government-approved racism and discrimination ran rampant. Even after the conclusion of the Civil War and the emancipation of slaves, the integration of African Americans into society was slow to occur. The ‘Jim Crow’ Era occurred from 1890 to the 1960s and served as an oppressive practice in southern states designed to segregate African Americans from white American (Gavins 2004). A large contribution to the change in social status of African Americans in the south was the mass movement from rural to urban locations. This allowed for the deconstruction of legal barriers of segregation, but the progress was slow and economically damaging to African Americans due to the small middle-class and larger lower-class among these communities (Goldfield 1997).

As economic improvement occurred in the south after the Civil War, the distribution of wealth and socioeconomic growth was limited to white communities due to legal discriminatory practices and restriction from voter registration for many African Americans. Southern states were slow to improve relative to the rest of the state due to the resistant of the south to provide proper education to black youth, reallocating funds meant for black schools to white schools

(Pritchett 1987). The gap in education funding took form in lower teacher salaries in black schools, lower education levels of teachers, and higher student to teacher ratios (Donohue, Heckman, & Todd 2002). The lower individual income levels of African Americans in southern states was largely due to these educational disparities, which were not fully addressed until the *Brown v. Board of Education* ruling in 1954 (Connolly 2004; Donohue, Heckman, & Todd 2002). While integration and voting rights have generally been restored, there is still a lasting socioeconomic gap between African Americans and white races, especially in these states due to the lasting damages that slavery and Jim Crow practices did to African American communities.

2.3 - Discrimination and Health

The causal mechanism between racial discrimination and poor health often portrays discrimination as an environmental stressor provoking lasting visceral effects (Brody et al. 2014). Stress is a social determinant of health that comes from the outside influences on the body. Disruption of homeostasis by environmental stress prompts physiological responses as both an adaptive and maintenance measure (McEwen & Stellar 1993). Physical stressors such as heat, physical exertion, and diseases often display observable physiological pathways for response, whereas psychologic stressors like anxiety, humiliation, and sadness affect the body through complex pathways exerting pathophysiological consequences (Sterling & Eyer 1988). The hormonal release that occurs during exposure to high stress serves to restore the body to homeostasis; through allostasis, which is the complex effort of the brain to adapt to its changing environment (Sterling & Eyer 1988). Linking stress to diseases becomes difficult due to the variation in of stress exposure and response among individuals. Allostatic load is a physical and mental state under which constant physiological adaptations to the body lead to gradual wear and

tear of organs and tissue (McEwen & Stellar, 1993). Several studies attribute increased allostatic load to an abundance of stress exposure, as the body is constantly working against the environment to maintain homeostasis (Juster, McEwen, Lupien 2010). The nervous system reaction is determined by a combination of genetics, biological development, past learning, and social history, after which the stimulus is perceived as either a threat or not a threat. The allostatic model illustrates that the specific effects of constant allostatic load can be measured using biomarkers such as stress hormones and blood pressure (Juster, McEwen, & Lupien 2009). The mechanism of allostatic load has several responses that are harmful to the human body. Firstly, frequent stress causes an activation of the sympathetic nervous system, then prolonged exposure to stress hormones lead to overextended activation of sympathetic nervous system. Eventually, the body has trouble shutting down high-stress responses which causes a gradual weakening of these responses. The weakening of the response eventually ends in an imbalance in stress-related responses by other systems in the body (McEwen 1998). The lasting strain and damage that occur from these responses lead to diseases such as asthma, diabetes, gastrointestinal disorders, and cardiovascular issues (Chen & Miller 2007; Mayer 2000; Matthews 1987). Beyond the biological diseases that can occur from stressful environments, a person's perception of their environment can also trigger responses strong enough to affect allostasis.

Stemming from the social environment, perceived discrimination can be identified as a medium through which outside influences can cause psychological stress on individuals that have real negative health consequences. A study using data from the Strong African American Families Healthy Adolescent Project illustrated that allostatic load, when measured using resting blood pressure, cortisol measurements, and stress hormone biomarkers has a strong positive

association with perceived racial discrimination among African American adolescents (Sims, Diez-Roux, Dudley, Gebreab, Wyatt et al. 2012). Another study utilized the Massachusetts Using the Behavioral Risk Factor Surveillance System to determine the presence of a significant relationship between perceived racial bias and overall health and found that those who reported perceived discriminatory treatment were estimated to being 3 times more likely to report poor health compared to those who claim to be treated the same or better than other races (Zuckerman, Tinsley, Hawk, Cohen 2012). Researchers utilizing the California Health Interview Survey found that self-reported discrimination is strongly associated with psychological distress, illustrating the detrimental effects perceived discrimination has on mental health as well as physical health of individuals (Byrd 2005). Research using the CARDIA study, a 15- year longitudinal study of the evolution of cardiovascular risk among young adults, reflected consistent findings regarding the relationship between physical health and perceived discrimination. High levels of perceived racial discrimination is associated with worse mental and physical health, but in this study, the relationship was shown to be significantly stronger among women than men (Borrell, Kiefe, Diez-Roux, Williams, and Gordon-Larsen 2013). The detrimental effects of perceived discrimination on health are mitigated by the presence of supportive parenting, high income, and emotional support (Borrell, Kiefe, Williams, Diez-Roux, Gordon-Larsen 2006). The general trend of the evidence points to strong association between perceived discrimination and poor health, but more research needs to be conducted to determine the extent that this association exists in mental health; a connection that this study is designed to explore in greater detail.

2.4 - Prevalence of Depression

Depression is one of the most prevalent mental disorders, internationally affecting more than 300 million people (WHO 2017). Not to be confused with regular mood fluctuation, depressive disorders are characterized by “sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration”. The presence of depression leads to a mood deflation so pervasive that it can greatly impair one’s daily function. A major depressive episode is identified by the duration and severity of symptoms. One of the grimmest aspects of severe depression is the risk of suicide, a result that can occur when depression is left untreated. Per the World Health Organization’s global estimates of depression, approximately 4.4% of the global population is affected by depression, this condition up 18.4% from the past 10 years to 322 million currently (WHO 2017).

Depression is more prevalent in women than men, and occurs primarily in adults, but has been expressed in children and adolescents at a lower rate (WHO 2017). In the United States, the burden of depression is greatly felt with Major Depressive Disorder accounting for 3.73% of all disability-adjusted life years (DALYs) and 8.3% of all United States years lived with disability (YLDs) (NIMH 2015). As of 2015, there were an estimated 16.1 million adults that reported at least one major depressive episode in the past year (US Burden of Disease Collaborators 2013). In 2015, suicide became the tenth highest leading cause of death in the United States with more than 44,000 people taking their own lives that year. The age-adjusted suicide rates in the United States have been increasing over the past 15 years, with a growth of 24% since 1999 (Curtin, Warner, Hedegaard 2016; US HHS 2015). Depression takes a large emotional toll on the victims and their families, but despite the commonness of the disorder there is still much that is not understood about the disorder.

Among African Americans, the prevalence of depression has been a growing concern due to the shifting focus towards addressing disparities in mental health. The Center for Disease Control reported that between the years 2006 to 2008, Non-Hispanic blacks were significantly more likely to report major depression disorder than non-Hispanic whites (CDC 2010). The United States Department of Health and Human Services Office of Minority Health report that African Americans over the age of 18 are 20 percent more likely to report serious psychological distress than white people (US HHS 2015), and while suicide rates among African Americans is lower than those in whites, rates of depressive symptoms such as feelings of sadness, hopelessness, and worthlessness are higher among African Americans than whites (CDC 2016). Suicide rates among adolescents declined from 2001 to 2007 but among African American adolescents, the rate remained the same (CDC 2010). Access to mental health care for depression is very different among racial groups: 58% of African Americans with any 12-month depressive disorder did not have access to any mental health care treatment per a study done in 2008 (Alegria et al. 2008). In this same study, it was found that the quality of depression care between African Americans was considerably lower than the quality of care for whites (Alegria et al. 2008). With the disparity in treatment for mental health care among African Americans, it is important to determine what unique factors contribute to depression among African Americans so measures can be taken to accurately ascribe causes to physical symptoms expressed by populations subject to unique environmental stressors.

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**Chapter III –Journal Article to be submitted to Journal of Racial and Ethnic Health
Disparities**

Examining the Association Between Perceptions of Racial Discrimination and Depressive
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AIM: The goal of this study is to explore the effects of perceived discrimination on the presence and severity of depressive symptoms among African Americans in the state of Georgia using the Behavioral Risk Factors Surveillance Survey administered by the Center for Disease Control

METHODS: The sample of participants consisted of 609 African American residents of Georgia, all whom are at least 18 years of age. Participants completed a telephone survey which inquired about both their experiences with perceived discrimination and questions which gauged their level of depressive symptoms. A bivariate analysis was utilized between reported discrimination in the workplace and depressive symptoms, then a similar analysis was conducted using discrimination while seeking healthcare. An adjusted model for the risk of depressive symptoms was then created at a 95% statistical significance level. All statistical methods were conducted using SAS 9.4.

RESULTS: Depressive symptoms were most prevalent among those in the 25-34 age group (20.8%; 12.2 – 29.4), those who graduated college or technical school (19.1%; 12.7 – 25.4), and those who reported some form of chronic disease (19.2%; 12.1 – 26.4). The odds ratio of perceived discrimination and depressive symptoms were lowest among those who reported being treated better than other races at work (0.123; CI: 0.038 to 0.407). Odds of depressive symptoms among those who reported being treated better than other races when seeing healthcare were insignificant.

DISCUSSION: The results of this study demonstrate that African Americans in Georgia who reported equal or better racial based treatment in the workplace had lower odds of reporting depressive symptoms

Introduction

While health disparities in the US have a long and substantial history, their origins have long created a spring of contention in the public health community. When looking at racial and ethnic trends of health, African Americans have historically been unfortunate in health outcomes with higher rates of chronic diseases and mortality among than other racial groups (Levine et al., 2001). While not as readily addressed, this disparity also prevails in mental health. Between the years 2006 to 2008, African Americans were more likely to report major depression disorder than whites, and suicide rates among adolescent African Americans did not decline between 2001 to 2007 diverging from trends among other racial groups (CDC 2010).

Perceived discrimination is one theorized contributor to the observed wellness gap between races. Discrimination, defined as differential action towards certain people due to their race, can exist in the forms of institutional structural favoritism to individual practice and attitude (Jones 2000). Despite the fact that race is biologically arbitrary to the health and survival of an individual, social differences in racial perception and treatment have contributed to observable differences in the health of various racial groups (American Anthropological Association 1998). Individuals socially assigned to the 'white' racial group in the United States are predisposed to large advantages in health, including lower mortality rates, higher life expectancy, and less exposure to environmental risk factors (Jones et al 2008; Williams & Jackson 2000; Pickett & Pearl 2001). Perceived discrimination itself has been identified as an environmental stressor that contributes to various health discrepancies (Brody et al. 2014).

With environments consisting of various factors that affect the human body, the process of the body maintaining a steady state of function is known as allostasis (Sterling & Eyer 1988). The wear and tear of constant allostasis leads to eventual wear and tear of bodily functions,

making the body more prone to diseases in a state known as allostatic load (McEwen & Stellar 1993). Perceived discrimination is a stressor, uniquely prominent among African Americans compared to other races, and has been shown to increased allostatic load which is detrimental to mental and physical health (Sims, Diez-Roux, Dudley, Gebreab, Wyatt et al. 2012; Zuckerman, Tinsley, Hawk, Cohen 2012; Borrell, Kiefe, Diez-Roux, Williams, and Gordon-Larsen 2013). The effect of stress on allostasis has been linked to accelerated aging, asthma, diabetes, gastrointestinal diseases, and other various health issues pertinent to early mortality and morbidity (Sterlink & Eyer 1988; Chen & Miller 2007; Meyer 2000; Matthews 1987). While the multifaceted effects of perceived discrimination have been characterized through various proposed pathways, its consequential expression in terms of mental health -- particularly depression -- has not been studied on a large-scale level.

To explore the effects of perceived discrimination on the presence and severity of depressive symptoms among African Americans, this study uses data from the Reactions to Race Module and the Anxiety and Depression Section of the Georgia Behavioral Risk Factor Surveillance System (BRFSS). The Reactions to Race module of the BRFSS gauges the individual's perceived experience of racially-motivated treatment and determines the presence of physical or emotional response due to this treatment. Depressive symptoms were analyzed using the Patient Health Questionnaire 8 Days, a questionnaire last revised in 2006 to assess depression and anxiety on the BRFSS (Dhingra et al 2011; Strine et al. 2008). We hypothesized that those who report being treated better than other races would have lower odds of showing depressive symptoms on the Patient Health Questionnaire 8 Days.

Methods

Data Source

The Behavioral Risk Factor Surveillance System is an annual telephone survey conducted by the Center for Disease Control (CDC) with the intention of collecting state-based data regarding health-related risk behaviors, infectious disease indicators, preventive healthcare, and quality of life of United States residents. The BRFSS consist of a core section, several optional modules, and additional state-specific questions. The core module yielded demographic sections and information concerning the weights and stratification of the population. From the optional modules, we used the Anxiety and Depression Module and the Reactions to Race Module, which were both administered in Georgia in 2010.

Sample Population

The sample population included Georgia residents 18 years and older who reported their race as on the BRFSS (n = 1214). The sample is probability-based obtained through random digit dial. The population of interest for this study is African Americans in the state of Georgia, which consisted of 1214 people. The final sample size was 609 people. Those who reported as 'multi-racial' were excluded from the analysis due to ambiguity in the survey response format.

Outcome – Days of Reported Depression

The Anxiety and Depression Module consists of eight questions scrutinizing specific symptoms of depression. The questions, modeled after the PHQ-8 Days, inquired after emotional symptoms expressed in the 2 weeks prior to the survey and asked for a reported number of days for each emotional feeling. The questions gauged when the participant:

1. “Had little interest or pleasure in doing things”
2. “Felt depressed or hopeless”
3. “Had trouble falling asleep or staying asleep or sleeping too much”

4. “Felt tired or had little energy”
5. “Had poor appetite or eaten too much”
6. “Felt bad about yourself or that you were a failure or had let yourself or your family down”
7. “Had trouble concentrating on things”
8. “moved or spoken so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you were moving around a lot more than usual”

For this analysis, participants were only included if they answered all the questions on the module. When the CDC employed the reformatted PHQ-8 in 2006, the results exhibited more precision in tracking depressive symptoms than the traditional coding of responses (Dhingra, Kroenke, Zack et al. 2011). The sum of the scores for each question were tallied to create variable reported a ‘depression score’ that ranged from 0 – 112. The reported duration of depressive symptoms was then coded into traditional PHQ-8 format per the structure utilized by Dhingra, Kroenke, Zack et al. (2011). An answer of 0 to 1 days was coded as ‘not at all’, 2 to 6 days was coded as ‘several days’, 7 to 11 was coded as ‘more than half the days’, and 11 to 14 was coded as ‘nearly every day’. Once this conversion was establish, the sum of all the questions in this BRFSS section was utilized as a cumulative depression score with a score of 10 set as the threshold for exhibition of depressive symptoms.

Exposure – Reactions to Race

The Reactions to Race Module of the BRFSS was administered in Georgia in 2010. It consists of six questions gauging individual experiences of racially-motivated differential treatment. The questions used for this study were those that examined how “other people usually

classify [the respondent] in this country” given the choices White, Black or African-American, Hispanic or Latino, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, or some other group. The responses was used to determine which participants were African American or Black. Other questions selected from this module were ones that delved into race-based treatment at work, race based treatment while seeking health care, physical symptoms from race based treatment, and emotional symptoms from race based treatment. Responses signifying uncertainty or only encountering people of the same race were not utilized in the study.

Potential Confounders

Past research on prevalence and distribution of depression has shown that depressive symptoms are more likely to occur among women than men. A subject’s age also plays into incidence of depressive symptoms as adults aged 55 and older have been shown to be less likely to have depressive symptoms than those aged 18 to 24 (Strine, Mokdad, Balluz et al. 2008). Chronic diseases reported in the BRFSS were also a point of concern considering past research delineates co-morbidities between depressive disorders and certain chronic diseases such as cardiovascular disease and diabetes (Vogelzangs, Seldenrijk, Beekman et al. 2010; Pan, Lucas, Sun, et al 2010; Holt, de Groot, Golden 2014). Age, sex, and certain chronic diseases were all reported on the BRFSS survey. The sex variable was recorded as male or female, as recorded in the survey. Age was stratified into 6 groups: 18-24,25-34, 35-44, 45-54, 55-64, and 65 and older. Education was separated into four levels: Did Not Graduate High School, Graduated High School, Attended College or Technical School, and Graduated College or Technical School. Chronic disease was coded as the participant’s reporting a history inclusive of cardiovascular

disease or diabetes. Those who reported at least one chronic disease were coded as a “1” while those who did not have a chronic disease on record were recorded as a “0”.

Statistical Analysis

The goal of the analysis was to examine the association between perceived discrimination in various settings versus depressive symptoms and mental health as measured on the BRFSS. First, we calculated the prevalence of reported discrimination in the workplace with respect to sex, age, education level, and presence of chronic disease. Subsequently, we conducted the same analysis for the prevalence of reported discrimination while seeking healthcare across the same covariates. We then performed a bivariate analysis between reported discrimination in the workplace and depressive symptoms using an unadjusted model, followed by a similar analysis using discrimination when seeking healthcare. We followed up by creating a model to conduct bivariate analysis of each logistic regression model between reported symptoms of depression and each demographic variable in order to determine the risk ratio of depressive symptoms across each covariate. Using logistical regression, we then created an adjusted model of the risk of depressive symptoms. Covariate inclusion into the adjusted model required a statistical significance at a 95% level. The analysis was conducted using a multivariate logistic regression to calculate the odds ratios and 95% confidence intervals of each significant characteristic. All analyses were conducted using SAS 9.4 using SAS procedures PROC SURVEY LOGISTIC, PROC SURVEYFREQ, and PROC SURVEYMEANS to account for the complex survey design of the BRFSS.

Results

Descriptive characteristics of the respondents to the Race reactions module are shown in Tables 1-8. Of the 609 participants who responded to the Reactions to Race Module, 67% of the participants were female, while most of the participants were between the ages of 45 – 54 (29%). As for education, the largest proportion of participants are college or technical school graduates (37%). When considering the presence of chronic diseases, only 15% reported having either diabetes, heart attack, angina, coronary heart disease, or a stroke. The number of females reported feeling treated worse at work due to their race was 18.4% (C.I. 13.2 – 23.6%), while adults between the age of 25 – 34 had the highest prevalence of worse treatment at work due to their race (23.7%; 14.0 - 33.4). Concerning chronic disease, the prevalence of worse treatment due to race was highest among those with no chronic disease (17%; 12.8 – 21.2). When asked about race-based treatment when seeking health care, men who answered reported a higher prevalence of being treated worse due to their race (8.6%; 4.6 – 12.2). Across age groups, the 55-64 year-old age group had the highest prevalence of people who reported being treated worse due to race when seeking healthcare (11.8%; 7.3 – 16.3). Educationally, the prevalence of people who reported worse race-based treatment when seeking health care was greater among those who had attended college or technical school (12.4%; 7.0 – 17.7).

The prevalence of depressive symptoms among different sociodemographic groups varied between men and women, but the difference in depression prevalence was not significant at a 95% significance level. Among various age groups, the highest prevalence of depressive symptoms occurred among the 25-34 year-old age group (20.8%; 12.2 – 29.4). Depressive symptoms were expressed more frequently among those with college or technical education

(19.1% ; 12.7 – 25.4) and higher among those who reported some form of chronic disease (19.2% ; 12.1 – 26.4).

To determine the association between perceived discrimination and depressive symptoms, we used responses to the Reactions to Race module questions concerning treatment at work and when seeking healthcare to determine the odds of reporting significant depressive symptoms for those who reported being treated worse, being treated the same, and being treated better based on race. A bivariate analysis of the relationship between racial discrimination at work and depressive symptoms revealed that those who reported being treated better than other races at work (OR = 0.123; CI: 0.038 to 0.407) and those who reported being treated the same as other races at work (OR = 0.446; CI: 0.242 to 0.820) are significantly less likely to experience depressive symptoms than those who reported being treated better due to their race. When adjusting the analysis for gender, education, and chronic disease, the likelihood of reporting depressive symptoms was still lower among those who reported being treated better than other races (OR = 0.105; CI: 0.032 to 0.346) or the same as other races (OR = 0.410; CI: 0.224 to 0.751).

The results of the analysis show that racial treatment when seeking healthcare was not associated with depressive symptoms (OR = 0.751; CI: 0.304 to 1.858). The odds of reporting depressive symptoms were insignificantly greater among those who reported being treated the same as other races (OR = 1.060; CI: 0.523 to 2.149). When adjusting for gender, education, and chronic disease, the resulting odds of reporting depressive symptoms among those who report being treated better than other races (OR = 0.777; CI: 0.310 to 1.944) and among those who report being treated the same as other races (OR = 1.044; CI: 0.512 to 2.128) is still insignificant.

Discussion

The results of this study support the portion of the hypothesis that predicts that preferential or equal race-based treatment at work are associated with decreased odds of depressive symptoms among African Americans in the state of Georgia. We also hypothesized that preferential or equal race-based treatment while seeking health care were associated with increased decreased odds of depressive symptoms among African Americans in the state of Georgia, but the results did not support this part of our hypothesis. The results indicate that while perceived discrimination is associated with the depressive symptoms of African Americans, the connection may not be present in all contexts. What the results do reveal is that differences in age, education, and presence of chronic disease do not make a large predictive difference on the relationship between perceived discrimination and depressive symptoms among African Americans.

Past research on the effects of perceived discrimination and health have shown that perceived discrimination has a detrimental effect on the health of individuals. As distinct as they are, the distinct racial disparities in health in the United States have been long overlooked as an area of research until the early 2000s. For years, black people often die prematurely due to health disparities, and those who do not suffer high levels of morbidity from a multitude of diseases (Levine et al. 2001; Kochanek, Murphy, Xu, & Tejada-Vera et al. 2016). We chose to focus on people who identify as black for research on perceived discrimination because black people have a higher likelihood of reporting perceived racial discrimination in workplace or healthcare, as well as a growing concern of the mental health of black people due to the lack of access to mental health (Zuckerman, Tinsley, Hawk, & Cohen 2012). Measuring perceived discrimination accurately is difficult because there are a multitude of means to record perceived discrimination,

whether by measuring reported treatment as done by the BRFSS or using event-based measurements. The difficulty in capturing the element of perceived discrimination varies based on the context, breadth, and operationalization which has varied over the years (Williams & Mohammed 2008). The results of this study expose an effect of perceived discrimination in the workplace on depressive symptoms, but it is possible that using another measurement of perceived discrimination could demonstrate a wider or lessened effect of perceived discrimination on various health factors.

The correlations between environmental factors and mental health outcomes are never the same for different person, as many theories and proposed health links may have differences in mechanisms that could explain a combination of social and psychological differences between different people. The differential effect theory proposes that mechanisms behind health and illness differ based on gender, race, ethnicity as well as context, stressing the significant health outcomes that may occur due to differences in subpopulations (Assari 2017). Other studies focusing on the relationship between perceived sense of control and depressive symptoms found differences not only between blacks and whites, but also differences among ethnic groups within the racial group “black” (Assari & Caldwell 2017). In our study, the extent in which we could separate different ethnicities of “black” was limited as the BRFSS survey racial category was “Black/African-American”. The results of the analysis we conducted may have been altered if there was a way of ensuring ethnic homogeneity within the sample. Past research regarding the relationship between health and perceived racial discrimination illustrates the detrimental effects of racial discrimination, while highlighting the health effects of perceived racial privilege which were shown to be detrimental to health among whites but had no effect on the mental or physical health of black people (Fujishiro 2009). While racial privilege was not the focus of our study, the

results from our experiment support the claim that better treatment due to race was associated with better health as far as depressive symptoms as opposed to being treated the same or worse among black people.

Stressful experiences occur regularly, but the lasting effects of stress can lead to long term detriment and disease, depending on the nature of the stress and the capacity of the body to handle the stress. A vital part of stress management is the structural remodeling of neural wiring to adapt to the environment, which occurs through various changes in gene expression using histone modifications and various reduction of coding via repression of DNA in the hippocampus (McEwen, Bowles, Gray, Hill, Hunter, Karatsoreos et al. 2015) In terms of mood and anxiety disorders, acute and chronic stress are understood to have great effects on the neural circuitry and functional plasticity of the brain, which in turn negatively affect emotional and mental capabilities (McEwen, Eiland, Hunter, and Miller 2012). This decreased capability of the plasticity of the brain increases susceptibility to disorders such as depression and with African Americans uniquely exposed to discrimination, it is possible that the results of this study are a result of chronic stress from discriminatory treatment in the workplace.

There are several limitations of this study which may affect the breadth of conclusion able to be made from our results. Firstly, the Behavioral Risk Factors Surveillance System, -did not include cell phone data until 2012 thus the data used in this study does not include the cell phone data. Secondly, the data collected does not allow us to make any claims of temporality, as the collection method does not account for the chronological order of discrimination and depressive symptoms. Another issue with the study is the organization of the response choices for the questions in the Reactions to Race module. The question responses “better than some, worse than others” for perceived discrimination variables is similar to the “Same as Others”

response. As a result, we grouped the responses together to help collapse the analysis. Another limitation was the small sample size of the data. While there was a large population of Black/African-American participants in the BRFSS survey in Georgia, many of them did not complete all the modules utilized in this study. Due to this decrease in sample size, many categorical groups such as age and education needed to be collapsed in order to increase the statistical relevance of the demographic groups. An additional limitation of the study is the small scope of chronic disease that was used in the adjusted model of analysis. When you

Despite the several limitations, our study has the advantage of being one of the only studies that attempts to link perceived discrimination and depression among Black/African-American people in the state of Georgia. The study is the first to utilize a large-scale dataset for this investigation and it provides a strong foundation for studies on unique factors that influence depression among African Americans in Georgia.

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Appendices

Treatment Compared to Other Races	Male			Female		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	33	14.6	8.8 - 20.3	69	18.4	13.2 - 23.6
Same	154	78.0	70.5 - 85.2	323	77.5	71.8 - 83.1
Better	11	7.6	2.4 - 12.8	19	4.1	1.1 - 7.1

Treatment Compared to Other Races	18 - 24			25 - 34			35 - 44		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	4	20.58	0 - 41.9	24	23.7	14.0 - 33.4	23	11.1	5.4 - 16.9
Same	14	79.42	58.1 - 100	90	76.1	66.4 - 85.8	115	80	71.5 - 88.4
Better	0	0	.	1	0.2	0.6	8	8.9	2.3 - 15.5

Treatment Compared to Other Races	45 - 54			55 - 64			65 +		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	33	21.4	13.9 - 28.9	15	9.1	3.8 - 14.4	3	17.4	0 - 36.6
Same	132	71.4	62.7 - 80.1	101	83.8	76.0 - 91.7	20	75.7	55.3 - 96.1
Better	10	7.2	1.0 - 13.3	9	7	0.8 - 13.2	2	6.9	0 - 16.4

Treatment Compared to Other Races	Did Not Graduate High School			Graduated High School			Attended College or Technical School			Graduated College or Technical School		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	5	16.2	0 - 34.2	27	19	10.8 - 27.2	35	20.8	12.9 - 28.8	35	11.9	7.2 - 16.6
Same	32	80.7	62.3 - 99.1	121	74.6	65.5 - 83.6	140	70.7	61.0 - 80.3	181	83.4	77.5 - 89.3
Better	2	3.1	0 - 8.2	10	4.8	0.4 - 9.2	8	8.4	1.2 - 15.6	10	4.7	0.8 - 8.7

Treatment Compared to Other Races	Chronic Disease			No Chronic Disease		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	12	13	4.9 - 21.1	90	17	12.8 - 21.2
Same	71	80	68.5 - 89.5	403	77	72.0 - 82.1
Better	8	8	0.5 - 15.6	22	5.5	2.3 - 8.6

Table 5. Self-Reported Treatment at When Seeking Healthcare Compared to Other Races by Gender

Treatment Compared to Other Races	Male			Female		
	n	Weighted %	(95% CI)	n	Weighted %	(95% CI)
Worse	38	8.6	4.6 - 12.2	75	5.9	5.9 - 11.3
Same	262	81	75.8 - 86.2	630	84.9	81.6 - 88.1
Better	40	8.6	5.2 - 12.0	58	5.2	3.5 - 6.9

Table 6A. Self-Reported Treatment at When Seeking Healthcare Compared to Other Races by Age Group

Treatment Compared to Other Races	18 - 24			25 - 34			35 - 44		
	n	Weighted %	(95% CI)	n	Weighted %	(95% CI)	n	Weighted %	(95% CI)
Worse	2	6	0 - 14.4	13	13.1	0 - 3.3	16	5.8	2.1 - 9.4
Same	26	81.3	67.1 - 95.4	122	83.2	5.3 - 20.9	167	91.1	86.4 - 95.8
Better	4	11.6	0.1 - 23.2	4	2.6	75.0 - 91.3	4	1.8	0.0 - 3.5

Table 6B. Self-Reported Treatment When Seeking Healthcare Compared to Other Races by Age Group

Treatment Compared to Other Races	45 - 54			55 - 64			65 +		
	n	Weighted %	(95% CI)	n	Weighted %	(95% CI)	n	Weighted %	(95% CI)
Worse	29	8.1	4 - 11.9		11.8	7.3 - 16.3	16	6.1	2.7 - 9.5
Same	206	77.7	5 - 83.9		76.5	70.4 - 82.6	73	77.8	1.3 - 84.4
Better	30	12.9	5 - 18.2		7.7	4.3 - 11.2	31	14.7	9.0 - 20.5

Treatment Compared to Other Races	Did Not Graduate High School			Graduated High School			Attended College or Technical School			Graduated College or Technical School		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	5	16.2	0 - 34.2	27	19	10.8 - 27.2	35	20.8	12.9 - 28.8	35	11.9	7.2 - 16.6
Same	32	80.7	62.3 - 99.1	121	74.6	65.5 - 83.6	140	70.7	61.0 - 80.3	181	83.4	77.5 - 89.3
Better	2	3.1	0 - 8.2	10	4.8	0.4 - 9.2	8	8.4	1.2 - 15.6	10	4.7	0.8 - 8.7

Treatment Compared to Other Races	Chronic Disease			No Chronic Disease		
	<i>n</i>	Weighted %	(95% CI)	<i>n</i>	Weighted %	(95% CI)
Worse	12	13	4.9 - 21.1	90	17	12.8 - 21.2
Same	71	80	68.5 - 89.5	403	77	72.0 - 82.1
Better	8	8	0.5 - 15.6	22	5.5	2.3 - 8.6

Table 9. Unadjusted odds ratios of depression for persons being treated worse than other races at work		
	OR	95% CI
<i>Better than vs Worse Than</i>	0.123	0.038 – 0.407
<i>Same as vs Worse Than</i>	0.446	0.242 – 0.820

Table 10. Odds ratios of depression for persons being treated worse than other races at work adjusted for sex, education level, and chronic disease		
	OR	95% CI
<i>Better than vs Worse Than</i>	0.105	0.032 – 0.346
<i>Same as vs Worse Than</i>	0.446	0.224 – 0.751

Table 11. Unadjusted odds ratios of depression for persons being treated worse than other races when seeking healthcare		
	OR	95% CI
<i>Better than vs Worse Than</i>	0.751	0.304 – 1.858
<i>Same as vs Worse Than</i>	1.060	0.523 – 2.149

Table 12. Odds ratios of depression for persons being treated worse than other races when seeking healthcare adjusted for sex, education level, and chronic disease		
	OR	95% CI
<i>Better than vs Worse Than</i>	0.777	0.310 – 1.944
<i>Same as vs Worse Than</i>	1.044	0.512 – 2.128