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## The Association Between Mental Health and Fibromyalgia in African Americans

Shalika J. Tisinger  
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# Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral study by

Shalika J. Tisinger

has been found to be complete and satisfactory in all respects,  
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the review committee have been made.

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Walden University  
2024

Abstract

The Association Between Mental Health and Fibromyalgia in African Americans

by

Shalika J. Tisinger

MPH, Benedictine University, 2020

BS, Southern New Hampshire University, 2017

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

June 2024

## Abstract

Depression and fibromyalgia can often exacerbate each other and are known to be bidirectional disorders. Chronic pain from fibromyalgia often leads to depression, and depression can cause pain to become worse and affect the nervous system, causing pain. The purpose of this quantitative, binary logistic regression study is to determine if there is an association between mental health and fibromyalgia in African Americans while controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age. The socio-ecological model included in this cross-sectional study implemented a secondary data set from 2011 - 2018 maintained by the National Health Interview Survey. Descriptive statistics and logistic regression tests were used to analyze the data. The findings of this study revealed that the association of depression with was not statistically significant ( $OR = 1.82$  95%,  $CI [0.64 - 5.18]$ ,  $p = .26$ ). The association between depression with medication concurrently with fibromyalgia was not statistically significant ( $OR .77$ ; 95% $CI [0.54 - 1.65]$   $p = .38$ ). The association of depression with medication concurrently with fibromyalgia were not statistically significant ( $OR 1.34$ , 95% $CI [0.42 - 4.28]$   $p = .63$ ). The finding requires further investigation and consideration of factors such as low numbers of African Americans enrolled in national studies possibly affecting the outcome. Considering social determinants of health is an opportunity for positive social change and the ability to evaluate the association between mental health and fibromyalgia in African Americans.

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## Dedication

I dedicate this research study to my Lord and Savior, Jesus Christ. I am so thankful for the strength and endurance you gave me throughout this journey. I accept your word to be true in Psalms 90:17: the favor of the Lord will rest upon me and establish the works of my hands. To my children, Malique and Kailah, thank you for your patience, understanding, and support when I missed family time, events, and holidays as I worked toward this degree. You all are my drive; I did this for you! To my mother, Yolanda Green, we did it! As a kid, I promised never to disappoint you and prove to everyone what a product a single, selfless parent can be. Look at what your hard work and sacrifice produced. To my Great Grandmother, Eunice Harp, although you are not here with me, I often felt your presence pushing me to finish. Thank you for your prayers and for paving the way for me. You passed me your mantle, and as I stand on your shoulders, I promise I will not drop it. I will honor it before God and continue this marathon. Lastly, fellow researchers, please accept this research as a token to press forward, keep going, and be the best researcher you can be. The world is our blank canvas, so let's continue to paint it as we like. The sky is the limit!

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Dr. Sri Banerjee, thank you for your encouragement throughout this process. Thank you for always being present and available throughout the day, weekends, and holidays. I am truly blessed to have you as a professor and a mentor.

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## Table of Contents

List of Tables .....	v
List of Figures .....	vi
Section 1: Foundation of the Study and Literature Review .....	1
Introduction.....	1
Background of Study .....	6
Affect 6	
Gap in Knowledge .....	7
Problem Statement .....	8
Purpose of Study.....	8
Research Questions and Hypotheses .....	8
Theoretical Framework.....	11
Nature of Study.....	12
Literature Search Strategy.....	12
Theoretical Framework .....	15
Social Determinants of Health.....	15
Literature Review Related to Key Variables and Concepts.....	17
Age 18	
Arthritis.....	19
Chronic Kidney Disease.....	20
Diet 20	



Education Access and Quality - Economic Stability - Poverty Income	
Ratio PIR.....	23
Pre-Existing Conditions - Health Care Access and Quality .....	25
Length of Time at Residence - Social and Community Context .....	25
Societal Factors .....	25
Definitions.....	29
Alexithymia.....	29
Allodynia.....	29
Cardiovascular Disease .....	30
Depression.....	32
Dysautonomia .....	32
Dysthymia .....	34
Fibromyalgia .....	35
Hyperalgesia.....	35
Hypertension .....	36
Assumptions.....	36
Scope of Delimitations.....	37
Limitations .....	37
Significance.....	38
Summary and Conclusions .....	40
Section 2: Research Design and Data Collection .....	41
Introduction.....	41

Research Design and Rationale.....	42
Methodology.....	45
Study Population.....	45
Sampling .....	46
Power Analysis .....	47
Data Analysis Plan .....	49
Instrumentation and Operation of Constructs.....	54
Instrumentation .....	54
Operationalization and Instrumentation of Variables .....	55
Confounding Variables .....	55
Threats to Validity and Reliability .....	56
Validity.....	56
Reliability .....	57
Ethical Procedures.....	58
Limitations .....	58
Summary .....	59
Section 3: Presentation of Results and Findings.....	61
Introduction.....	61
Accessing the Data Set for Secondary Analysis .....	61
Results	62
Summary .....	75

Section 4: Application to Professional Practice and Implications for Social

Change .....	77
Introduction.....	77
Interpretation of the Findings.....	79
Limitations .....	83
Recommendations.....	85
Implications for Professional Practice and Social Change .....	86
Positive Social Change .....	88
Conclusion .....	90
References.....	92
Appendix.....	104

List of Tables

Table 1. Variables Names and Descriptions ..... 56

Table 2. African American Sample for Fibromyalgia and Depression with Medication . 62

Table 3. African American Probability Value for Fibromyalgia and Depression With  
Medication ..... 63

Table 4. African American Sample for Fibromyalgia and Anxiety With Medication ..... 66

Table 5. African American Probability Value for Fibromyalgia and Anxiety With  
Medication ..... 68

Table 6. African American Sample for Fibromyalgia and Access to Healthcare ..... 70

Table 7. African American Probability Value for Fibromyalgia and Access to Healthcare  
..... 72

## List of Figures

Figure 1. Social Determinants of Health, SDoH.....	17
Figure 2. Social Determinants of Health, SDoH Cardiovascular Disease .....	27
Figure 3. Power Analysis Logistic Regression .....	48

## Section 1: Foundation of the Study and Literature Review

### Introduction

African Americans have a higher rate of fibromyalgia and poor mental health than any other racial group within the United States (Booker, 2020). Fibromyalgia is a rheumatological chronic condition that is characterized by chronic pain, hyperalgesia, and allodynia. A systematic review regarding a global burden showed a 2.4% prevalence (Obreja et al., 2022). Globally, it was reported there are variations with higher prevalence rates in tropical countries such as African and Asian. Rheumatological arthritis in developed countries remained at 0.5 to 1%. 0.6 in the United States versus Canada, which also has a prevalence of 0.6% (Obreja et al., 2022). Some of its symptoms include mood disorders, paresthesia, and fatigue that causes widespread musculoskeletal pain throughout the body (Marr et al., 2020). Fibromyalgia and depression have been linked to socioeconomic disparities in poverty-stricken communities (Tian et al., 2023). The chronic pain of fibromyalgia, and comorbidity issues negatively affect African Americans in low-income communities at an alarming rate.

Many pain conditions tend to co-occur with other conditions which causes comorbid concerns in individuals (Affaitati et al., 2019). Over the past generations, studies have shown that the prevalence of diseases disproportionately impacts the African American community at an alarming rate (Janevic et al., 2017).

Nearly one-third of Americans experience chronic pain (Bailey et al. 2019). Data show fibromyalgia is more prevalent amongst White women; however, researchers argue that medical doctors are more likely to diagnose White women with the condition than

ethnic minorities (Marr et al. 2020). Within the United States, the Black population encompasses both African Americans and other African and Caribbean immigrants. Approximately 42 million people in the United States, or 13.2% of the population, identify as Black, and another 1% self-identify as multiracial (Gordon-Achebe et al., 2018). There are significant differences in access to healthcare, diagnosis, and treatment for African Americans that negatively impact their health. Historical adversity such as slavery, sharecropping, and segregation, along with other means of race-based exclusion from health, educational, social, and economic resources, has led to socioeconomic disparities in the Black community (Gordon-Achebe et al., 2018). Additionally, institutional racism extends beyond the realm of social injustice and the struggle for civil rights which has been presented. It also permeated American medical education, medical practice, medical misdiagnosis, and scientific research that remains to negatively impact the Black communities today. Research shows that African American or Black individuals are more likely to receive treatment for mental health during circumstances that become urgent in the emergency room and hospital settings. African Americans are misdiagnosed at an alarming higher rate with mental health concerns such as schizophrenia spectrum disorders; however, they are less likely to be offered antidepressant therapy, even when the individuals have access to insurance or financial resources (Gordon-Achebe et al., 2018). All are contributing factors, in addition to low rates of access to health and mental health care for Black individuals, that can negatively impact their mental health and dampen their trust with the mental health community.

Similar to underdiagnosis of fibromyalgia, depression often goes undiagnosed and untreated in the United States (Bailey et al. 2019). Living with fibromyalgia can be stressful (Levine & Horesh, 2020). Individuals living with this condition often are fatigued leading to exhaustion and emotional and mental health issues. Moreover, adding to the frustration is the unknown origin and no cure (Levine & Horesh, 2020). Data have shown that African Americans living in low socioeconomic environments are less likely to seek medical attention and report psychological symptoms or continue to receive treatment and remain compliant with the initiated treatment. Less than 10% of African Americans seek medical attention for mental health issues (Bailey et al., 2019b) partially due to distrust of medical professions. There is an ongoing history with African Americans and distrust of medical professional and hesitancy to accept medications or vaccinations from any medical classification because of the long-standing levels of distrust and racism (Cronin, 2020). Racism manifested in instances of physicians executing unethical experiments using African Americans. Two of the most well-known examples of such experimentation were done by J. Marion Sims and the Tuskegee experiments.

In order to understand how mistrust influences healthcare today, it is important to look at some of the historical research which promoted distrust among African Americans. For instance, in 1835, J. Marion Sims was a physician in South Carolina who moved to Alabama. A few years after he arrived, Sims set-out to discover a cure for vesico-vaginal fistula, which is a condition that causes complications at childbirth and cause women to leak urine and stool uncontrollably (Cronin, 2020). His goal was to find



a cure for this condition, so he operated on African American women who were slaves. It has been documented that Sims purchased 10 slaves, and some were given to him by their owners. Only three names were located, Lucy, Betsey, and Anarcha (Cronin, 2020). One motivation to find a cure was simply economic; if the fistulae from which these women suffered were repaired, they would have much more value for their owners.

Almost a century later, other experiments raised more ethical issues concerning the treatment of African Americans. A 1920s survey showed a high incidence of syphilis in and around Tuskegee, Alabama. In 1932, the United States Public Health Service (PHS), a precursor to the Centers for Disease Control and Prevention (CDC), decided to conduct a study and named it “study in nature” to determine untreated syphilis in African American men in a natural state (Alsan & Wanamaker, 2017).

From 1932 to 1972 the PHS systematically examined hundreds of poor, Black men in Tuskegee, Alabama, men with syphilis and more men served as controls (Alsan & Wanamaker, 2017). The PHS physicians lied to the men about the nature of the study; however, one of the men became suspicious and sought treatment on his own but the PHS prevented him from being treated.

The physicians were well aware of the serious consequences of syphilis, if left untreated; however, they did not stop the experiments even when penicillin became a safe, easy, and effective treatment for syphilis in the mid-1940s (Alsan & Wanamaker, 2017). When new ethical codes were promulgated and the Civil Rights Movement led to a nationwide soul searching about racial issues, they still chose to continue the treatment.

A whistle-blower leaked information about the experiments to the news media, and after 40 years of the experiments, it finally ended in 1972. The system of Institutional Review Boards (IRBs) was created as a result to prevent future ethical improprieties (Alsan & Wanamaker, 2017). Additionally, fibromyalgia has been linked to contributing to the increased risk of suicide (Levine & Horesh, 2020). Statistics prove between 27% and 58% of individuals diagnosed with fibromyalgia reported having feelings of hopelessness, depression, and thoughts of suicide (Levine & Horesh, 2020).

There is insufficient evidence to determine if fibromyalgia causes depression in African Americans considering the socioeconomic factors and determinants of health. There is little to no research exploring the issue on a public health level to understand if the social and economic disparities and social determinants of health (SDoH) concerning African Americans are considered. According to Diab et al. (2021), gender differences have been mainly studied from a biomedical approach, not considering the SDoH. In the literature, there is a paucity of research regarding depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, (PIR), diabetes, gender, and age in no nationally representative study, especially in African Americans.

Although researchers have investigated this issue, there is very little or no literature on fibromyalgia in African Americans who have experienced (Assari, 2018). Previous studies suggest that Vitamin D deficiency and Vitamin B deficiency also contribute to fibromyalgia and neuropathy (Shipton & Shipton, 2015). There has not been any therapeutic intervention that helps eliminate the preexisting conditions or protect the

patients from worsening. Researching on a public health level provides more data regarding the explored concerns to make me more exasperated. This research addresses depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age in no nationally representative study, especially in African Americans contribute to depression and fibromyalgia pain symptoms in African Americans.

### **Background of Study**

#### **Affect**

Fibromyalgia, depression, and fatigue are common and debilitating syndromes classified as a chronic widespread disease associated with physical and emotional trauma in adults. Past studies have linked fibromyalgia and ischemic heart disease (IHD) with depression (Sheffler et al., 2020). Although the etiology of fibromyalgia is unclear, it affects approximately about 4.9% of the general population. Fibromyalgia is linked to different types of infectious diseases, emotional trauma, and genetic factors.

Fibromyalgia is multidirectional and appears to overlap with depression. Often, individuals carry both diagnoses and medications prescribed to treat depression and pain management of fibromyalgia with individuals diagnosed with heart failure as well (Sheffler et al., 2020). These researchers found a significant association between fibromyalgia and IHD. The World Health Association (WHO) reported that fibromyalgia remains controversial because it is diagnosed through assessment and self-reported information. Many factors include ethnicity, age, social background, stress, gender, and

underlying conditions and comorbidities. Sheffler et al.'s (2020) statistics showed that baseline depressive symptoms were significantly associated with new onset of pain symptoms ( $b=.062$ ,  $SE=.029$ ,  $p=0.26.$ ), which was inconsistent with their hypothesis; pain was not associated with new onset of depressive symptoms ( $b=.054$ ,  $SE=.108$ ,  $p=.614$ ).

### **Gap in Knowledge**

Depression and chronic morbid pain affect the quality of life and are often multidirectional and co-exist. Comorbid symptoms are often common in individuals with heart failure. Sheffler et al.'s (2020) literature review demonstrated that 65% of individuals diagnosed with depression were about the same as those diagnosed with depression living with pain. Moreover, no other researcher has investigated the SDoH-related to fibromyalgia and depression, in African Americans alone; moreover, this topic has not been explored with a nationally represented dataset, especially among African Americans in low socioeconomic populations, as it relates to diet and social and economic disparities (Lowry et al., 2020). Stubbs et al. (2022) suggested that fibromyalgia prevalence is higher among racial/ethnic minority individuals due to circumstantial socioeconomic disparities. Stubbs et al. also suggested that physicians are less likely to diagnose racial/ethnic minorities with fibromyalgia than White individuals are, a contributing factor. Other factors limit or affect health-seeking behaviors, such as education level, socioeconomic status, and racial/ethnic minority class (Stubbs et al., 2022). Researchers have not investigated this regarding the ethnic differences in pain, and no nationally representative study creates a knowledge gap.

### **Problem Statement**

What prompted this research study is there is insufficient evidence to determine if there is an association between mental health and fibromyalgia in African Americans. There is little to no research exploring the issue on a public health level to understand if the social and economic disparities and SDoH concerning African Americans are considered. Specifically, according to Diab et al. (2021), gender differences have been mainly studied from a biomedical approach, not considering the SDoH. There is no current research on how mental health and medical access is connected among Black Americans. The literature has a paucity of research regarding mental health, physical activity, depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age in no nationally representative study, especially in African Americans. It is essential to understand how social and racial disparities affects in Black Americans living with fibromyalgia.

### **Purpose of Study**

The purpose of this cross-sectional quantitative study is to determine if there is a relationship between mental health and fibromyalgia in African Americans. Economic stability is considered as a component of SDoH after controlling for, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

### **Research Questions and Hypotheses**

Research Question 1 (RQ1): Is there an association between depression with medication, “DEP\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age?

$H_01$ : There is no association between depression with medication, “DEP\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, , PIR, diabetes, gender, and age.

$H_11$ : There is an association between depression and fibromyalgia among African Americans after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

Research Question 2 (RQ2): Is there an association between anxiety with medication “WOR\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans in the National Health Interview Survey (NHIS) 2011 - 2018 after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age?

$H_02$ : There is no association between anxiety with medication “WOR\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans in the National Health

Interview Survey (NHIS) 2011 - 2018 after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

$H_{12}$ : There is an association between anxiety with medication “WOR\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans in the National Health Interview Survey (NHIS) 2011 - 2018 after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

Research Question 3 (RQ3): Is there an association between fibromyalgia “ARTHGLUPEV” and poor access to access to healthcare “USUALPL-NEW 2” among African Americans after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age?

$H_{03}$ : There is no association between fibromyalgia “ARTHGLUPEV” and poor access to access to healthcare “USUALPL-NEW 2” among African Americans after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

$H_{13}$ : There is an association between fibromyalgia “ARTHGLUPEV” and poor access to access to healthcare “USUALPL-NEW 2” among African Americans after

controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

### **Theoretical Framework**

This is a classic public health framework. The social ecological model (SEM) informs this study. The SEM is used to understand the complex interaction between depression, fibromyalgia, and social and health conditions. The logical connections between the framework presented and the nature of this study includes a framework for prevention between individual, relationships, community, and societal factors. The SEM schematic framework is more comprehensive because improves an overall understanding of fibromyalgia on multiple levels and the characteristics that influence health behaviors such as age, gender. Interpersonal; includes the social and emotional support from spouses, family, friends, and marital status to support healthy living. Organizational includes structures such as ministries and/private organizations. Community includes the relationships between organizations. Public policy enforces national, state, local laws, and regulations (Scarneo et al., 2019). In addition, the SEM is a multilevel conceptualization that is sorted by biological and individual factors of fibromyalgia and stress at the intrapersonal (isolation), organizational level (sedentary lifestyle), community level (community involvement and social capital), and policy levels (knowledge about the disease, disability, income, education, and access to health food/meals; Scarneo et al., 2019). The SEM variables influence behaviors associated with fibromyalgia and societal factors, that aims to improve understanding of risks and



interactive approaches. Since this is a study focusing on the individual level, this equates to intrapersonal variables. The interpersonal level has to do with fibromyalgia and how this affects the population of African Americans.

### **Nature of Study**

To address the research questions in this quantitative study, the specific research design includes a cross-sectional approach to stress and anxiety outcomes that may be associated with depression and fibromyalgia among African American controlling for, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

The SEM provides insight to better understand the theory of health and the causative factors the environment plays in promoting good health. The model offers an understanding of the phenomenon of chronic pain throughout the body and the different strategies to reduce the burden on society (Dahlberg et al., 2021).

### **Literature Search Strategy**

The purpose of this literature search strategy is to review the literature to determine if fibromyalgia causes depression in African Americans. Alslman et al. (2020) measured relationships between alexithymia, fibromyalgia, and psychological distress among adolescents and found psychological distress contributes to the relationship among adolescents are lacking. However, based on previous studies on adult samples and theoretical background, found there are possible relationship between alexithymia and fibromyalgia as well as possible mediating effect of psychological distress on this

relationship in adolescents (Puşuroğlu, 2023). Therefore, further studies are recommended to examine the relationships between alexithymia, fibromyalgia, and psychological distress among individuals. Surendran et al. (2021) conducted a retrospective case-control study in India. In 2016, the female patients diagnosed with meeting the American College of Rheumatology 2010/2011 diagnostic criteria were enrolled. Age and gender-matched controls were obtained from non-communicable disease Initiatives and Research at AMrita (NIRAM) study database. The controls were stratified into three groups: 18-39 years, 40-59 years, and  $\geq 60$  years. They found that risk factors regarding age, obesity, diabetes mellitus, hypertension, and dyslipidemia are contributing factors of CVD risk. Furthermore, Booker (2020) implemented a convenience sample of 110 African American adults aging between 50 and 94 years and older who completed surveys and individual qualitative interviews. Once data was collected, they were analyzed using descriptive statistics and content analysis. Booker's evidence suggested multimorbidity in the sample and chronic osteoarthritis pain and hypertension are two highly comorbid conditions, suggesting a possible syndemic. The limitation there was a lack of knowledge African Americans possess as it relates to safe use of analgesic medications relating to their cardiovascular disease. Therefore, risk factors such as age, obesity, diabetes mellitus, hypertension, and dyslipidemia are contributing factors of CVD risk causing comorbid conditions.

De Hert & Vancampfort, (2018) statistics shows the association between depression (defined here as either MDD or significant depressive symptoms with substantial functional impairment) and CHD has been best studied in patients with

existing CHD,17, a bidirectional relationship between both is now well established. Moreover, this association may not only involve bidirectional causation but also common pathophysiology (see below). According to a meta-analysis of 30 prospective cohort studies ( $N=893\ 850$ ), individuals with depression, compared with nondepressed persons, experience a significant increased risk of 30% ( $RR=1.30$ , 95% CI:1.22-1.40) for CHD.<sup>35</sup> Another meta-analysis of prospective cohort studies ( $N=323\ 709$ ) has found that depression was associated with a 31% increase in the risk of myocardial infarction ( $adjHR=1.31$ , 95% CI:1.09-1.57) and a 36% increase in the risk of coronary death ( $adjHR=1.36$ , 95% CI:1.14-1.63), compared with nondepressed persons.

Conducting the literature search for my research articles and related materials was within the last 5 years. Data collected are from the NHIS 2011 - 2018 data set to determine depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age are measured in African Americans diagnosed with Fibromyalgia. Several databases are used to gather data: APA PsycINFO, Google Scholar, Walden Dissertation and Thesis, Public Health Journals, Nature, JAMA, PLOS-ONE, AMA, and NEJM. The following terms are used to find research articles related to my topic: *social class, racial disparities, diet, stigma, African American, social determinants of health, depression, mental health, mental wellness, depression, stiffness, rheumatological arthritis, pain, sleep, medication, autoimmune disease osteoarthritis, exercise, heart attack, high blood pressure, and diabetes.*

The terms researched and used throughout the research process are documented on a separate sheet of paper until my literature review is complete. I used the terms that would support my topic and the SEM to the best of my ability. There were several overlapping articles because of the lack of research surrounds Black Americans (Awidi & Hadidi, 2021). The lack of research was a limitation throughout the duration of my study. Due to the lack of research, I used online and in-person library resources to gather as much information as possible within the scope of this research.

### **Theoretical Framework**

The SEM addresses the SDoH and the variables associated and the variables associated. The conditions of the environment where individuals are born, grow, live, work, and age have been linked to impacting their lives and health. Past literature suggested that there is a strong predictor for health inequities linked to unfair and avoidable differences in health status between communities. Among many factors, socioeconomic status, education, physical environment, employment, and social support networks, as well as access to health care, are main impacting variables.

### **Social Determinants of Health**

In order to properly address fibromyalgia and its burdens, SDoH must be addressed (Teshale et al., 2023). Although the role SDoH contributes to fibromyalgia has been researched, evidence is still lacking. SDoH are the conditions in which individuals are born, live, work, play, worship, and age that affects a wide range of health that affects the quality-of-life risks and outcomes (Teshale et al., 2023). SDoH can be grouped into five categories: economic stability, education access and quality, health care access and

quality, neighborhood and built environment, and social community context. Forty percent of individuals live in poverty in the United States of America (Beech et al., 2021). Moreover, there are many others who cannot afford healthy meals, health care, and housing. Beech et al (2021). statistics prove individuals who have a steady income are less likely to live in poverty and more likely to live a healthy lifestyle. On the other hand, individuals with disabilities, injuries, or conditions like fibromyalgia or mental illness may have complications obtaining and keeping a job or limited to work. In addition, there are individuals who have steady employment and still do not earn enough to afford the necessities to live a healthy lifestyle (*Economic Stability - Healthy People 2030 | Health.gov*, n.d.).

**Figure 1***Social Determinants of Health, SDoH*

<https://health.gov/healthypeople/priority-areas/social-determinants-health>

There are five SDoH. Education access and quality increases educational opportunities and individuals do well in school. Healthcare access increases access to comprehensive, high-quality health care services. Economic stability helps individuals earn a steady income to meet their health and financial needs. Social and community context increases social and community support. Finally, neighborhood and built environment creates neighborhoods and environments that are safe and promote active healthy lifestyles.

### **Literature Review Related to Key Variables and Concepts**

In this section, I examine the variables associated with fibromyalgia, depression, and the confounding factors of fibromyalgia (little pain levels, middle pain, chronic pain), income lever, (very poor, poor, middle income, rich, very rich), education level (none,

primary, lower, secondary, upper secondary, and above), and residence (urban or rural). poor, very poor, middle income, rich, and very rich).

### **Age**

Sociodemographic variables consider age, gender, educational level, marital status, employment situation. Anthropometric variables measure weight, height, BM. Individuals with a family history of fibromyalgia have a higher chance of developing it themselves; suggesting that genetic factors may play a role. However, it remains unclear which genes are involved. López-Muñoz et al. (2023) conducted an observational study was designed following The Strengthening the Reporting of Observational Studies in Epidemiology STROBE guidelines. The participants were recruited from December 2022 to February 2023 investigating how fibromyalgia affects foot function that provokes pain and disability and significantly impairing the activities of daily living. The main factors associated with reduced foot function are age, BMI, insufficient physical activity, the presence of rheumatological arthritis, and employment status. A greater awareness of the importance of these factors could help physicians and patients establish preventive measures to improve foot health and alleviate the impact of fibromyalgia.

Janevic et al. (2017) investigated the prevalence of high-impact chronic pain in adults over age 50 overall and within population subgroups in the United States. They also explored sociodemographic variation in pain-related disability within specific activity domains. Data are from a subsample of HRS respondents (n=1,925). Janevic et al.'s outcome was operationalized as pain duration of  $\geq 7$  months and a disability rating of  $\geq 7$  on a (0 to 10 scale). The variables were family/home, leisure, social activities, work, or

basic activities. Overall, adults over 50 years of age met criteria for high-impact chronic pain, 8.2% (95% C.I. = 6.7 to 10.1%). The proportion rose to 17.1% (95% C.I. = 12.3 to 23.4%) among individuals in the in low economic environments; however, prevalence differences by education, race/ethnicity and age were not significant (Janevic et al., 2017). Arthritis and depression were significantly associated with high-impact pain in multivariable analysis. They reported African Americans along with other individuals in the lowest wealth quartile reported more pain-related disability across activity domains (Janevic et al., 2017).

### **Arthritis**

Anxiety is often perceived as normal because individuals doesn't always seek mental health services for the condition. While left untreated, anxiety often leads to more problems. Moreover, chronic anxiety can increase someone's risk of developing depression. Approximately one in five adults living in the United States living with arthritis has symptoms of anxiety and/or depression (*The Arthritis-Mental Health Connection*, 2021). Statistics show that symptoms are more common in younger women who identify as LGBT+ and have chronic pain or other co-occurring chronic conditions, disabled, unemployed, or unable to work. Lastly, arthritis, anxiety, and depression can individually have a negative effect on individuals overall health and quality of life. Because of that, feelings of sadness or worry tend to interfere with a individuals' ability and motivation to properly care for themselves and manage their day-to-day activities. Hence, according to *The Arthritis-Mental Health Connection* (2021), it is essential for an



individual to take care of their mental health symptoms as well as their arthritis symptoms.

### **Chronic Kidney Disease**

Chronic kidney disease (CKD) is a chronic health problem globally causing heavy burden on individuals living with the condition and their families with an estimated overall prevalence of 8-16% (Khan & Naqvi, 2021). There are some similarities regarding the number of common complaints of CKD and fibromyalgia symptoms in CKD patients such as pain, chronic fatigue, sleep disturbances, psychiatric co-morbidities such as depression and anxiety, and restless leg syndrome (Khan & Naqvi, 2021). Therefore, it is essential to effectively rule out other disorders from fibromyalgia and provide appropriate treatment to such individuals. According to Khan and Naqvi's (2021) Iranian study, 12.2% of 148 individuals on hemodialysis suffered from fibromyalgia along with higher depression and anxiety level. Khan and Naqvi's statistic proved a higher frequency of fibromyalgia was noted in individuals who were older than 45 years of age. The findings were somewhat reported in a previous study in which prevalence was lowest in the 18–29 age group and higher in the people with age range of 50–59 year (Walitt et al., 2015).

### **Diet**

A balanced diet includes a variety of nutrients that have been linked to helping individuals with fibromyalgia maintain energy and reduce symptoms. Consuming an anti-inflammatory diet consists of green leafy vegetables, fruits, nuts (unsalted, ideally), olive oil, and fatty fish such as tuna and mackerel. In a previous study, individuals living with

chronic conditions have an increased risk for glucose (sugar) metabolism disturbances, and impaired glucose tolerance that may be associated with pain symptom severity (Zetterman et al., 2021). Glucose is the main source of energy for human cells and an indispensable energy source for the brain. Glucose is converted into pyruvate through glycolysis. Pyruvate is then further metabolized either anaerobically by lactate hydrogenase into lactate, or aerobically in the mitochondrial respiratory chain (Zetterman et al., 2021). Elevated levels of plasma lactate have been detected in individuals with fibromyalgia. Both pyruvate and lactate are produced in glucose metabolism and reflect oxidative metabolism.

Metabolic syndrome and Type 2 diabetes mellitus are common comorbidities of fibromyalgia. High glucose levels raise the level of glycated hemoglobin (HbA1c), and higher HbA1c has been linked to the association with an increasing of tender points in individuals with both fibromyalgia and diabetes (Zetterman et al., 2021). There is also a connection between impaired glucose regulation and memory impairment in fibromyalgia has also been reported.

Impaired glucose regulation in individuals living with fibromyalgia are not likely due to the chronic condition itself but to associated lifestyle factors. Zetterman et al.'s (2021) results highlight the importance of early treatment of diabetes and associated complications assessing the glucose regulation status and the lifestyle factors affecting glucose regulation for prevention.

There is a high mortality from diet-related diseases amongst African Americans who have not adopted a diet low in calories, fat, and salt (Diabetes and African

Americans, n.d.) Particularly, African American women have a higher rate of suffering from being overweight and obesity compared to other groups in the United States. African Americans are 20% less likely to engage in physical activity or any being active compared to non-Hispanics. Cultural attitudes are essential to consider because there are certain attitudes regarding certain foods. It has been proven that diet is a major factor in the development of fibromyalgia. Past studies have demonstrated weight loss has been linked to improving pain on weight-bearing joint and non-weight-bearing joints as well (Stubbs et al., 2022). Individuals with obesity are two times more likely to experience non-stop persistent pain than individuals with a normal body mass (BMI). In a study by The National Health Interview Survey, 19% of American reported persistent pain and obesity increased the risk by 60% (Stubbs et al., 2022). Obesity exacerbates pain symptoms significantly, considering comorbid symptoms. One study investigated the association of caloric restriction with fibromyalgia symptoms and showed improvement in total fibromyalgia Impact Questionnaire (FIQ) scores on a 12-to-24-week period. Intermittent fasting has been proven to reduce pain symptoms (Stubbs et al., 2022). A very low-calorie diet, VLED aided in significant weight loss and pain symptoms as well. Vitamin B12 has been used for different pain conditions, back pain, and neuropathic pain. In past studies, fibromyalgia has been linked to sympathetically dominant dysautonomia, yet the connection between the two remains unclear (Pagliai et al., 2020). The pathophysiology remains unclear because of various underlying mechanisms that lead to the fibromyalgia phenotype. The Mediterranean diet is also effective in reducing the

symptoms of fibromyalgia. There were major improvements in chronic pain, depression, anxiety, and gastrointestinal symptoms (Pagliai et al., 2020).

### **Education Access and Quality - Economic Stability - Poverty Income Ratio PIR**

Economic stability includes employment/occupation, income, food insecurity, and housing instability (Janevic et al., 2017). The education access and quality theme include early childhood development and enrollment in higher education. Data show high-impact chronic pain is found throughout the midlife and older population; however, it may disproportionately affect African American adults and those of low socioeconomic status. SES Disparities spans across a wide range of health-related outcomes disadvantaging groups and subgroups of Americans have been observed and proven over decades of research (Janevic et al., 2017). Health inequalities can be pronounced and shown at any age, through social disadvantage and chronic stress. Socioeconomic and racial/ethnic minority status, chronic pain experience and its treatment are all reasons linked to a greater vulnerability to chronic conditions, exposure to occupational hazards, and reduced access to care. Although non-Hispanic Whites also report chronic pain similar or higher overall prevalence of compared to other groups, African Americans and Hispanics tend to report a greater level of pain severity, and African Americans report more pain-related disabilities affecting their day-to-day activities. Statistics show lower educational attainment and fewer economic resources are also contributing factors associated with chronic pain and pain severity; however, socioeconomic patterns are not consistent across studies (Janevic et al., 2017).

Janevic et al.'s (2017) study added to evidence that suggests socioeconomic disadvantage has a stronger negative impact on the prevalence of chronic pain than race/ethnicity. Janevic et al.'s (2017) further state caution the conclusion that "race does not matter but wealth does," given that race is a key SES. There is a gap between White Americans as a whole who vastly have access to more resources and have accumulated more wealth than Black Americans, due in large gap between institutional discrimination and segregation in housing. Janevic et al. (2017) suggested African American and Hispanic respondents together made up only 3% of the top wealth quartile compared with 36% of the lowest. Given the strong link between wealth and pain-related disability observed in the present study, the findings suggest that racial inequalities in wealth along with other established factors such as inequitable pain care, access to healthcare, PIR may be major contributor to the pain burden among older African Americans.

Mathkhor and Atwan (2022) stated that individuals with poorer socioeconomic status (SES) and living in poor conditions have less favorable health outcomes for many diseases. This could be explained by the contributing factors such as access to medical care, health-related behaviors, poor health literacy, low adherence to management recommendations, and financial constraints. Among the best studied health conditions that could be affected by low SES are cancer, cardiac disease, diabetes, and rheumatic diseases such as systemic lupus erythematosus (Mathkhor & Atwan, 2022). In addition, musculoskeletal pain, including chronic widespread pain, is more prevalent in adults living in poorer economic conditions. This relationship is partly explained by such factors as psychological distress, poor mental health, and adverse life events (Mathkhor &

Atwan, 2022). Beyond these, more evident reasons for differences in health status, sociocultural factors may also play a role. However, it is not known whether the severity of chronic pain symptoms in each individual living with the condition may differ depending on SES.

### **Pre-Existing Conditions - Health Care Access and Quality**

The neighborhood and built environment theme contain neighborhood socioeconomic status (SES) and environmental attributes, such as food environment, conflict, and violence, whereas the health and health care theme are defined by access to health services, access to primary care, quality of care, health insurance coverage, and health literacy (Teshale et al., 2023b). Furthermore, environment includes access to grocery stores, recreational areas, access to fast-food restaurant, the distance of a health care facilities, and high traffic density are all factors to be considered to having a higher risk of coronary heart disease and MI (Teshale et al., 2023b).

### **Length of Time at Residence - Social and Community Context**

Social support, social capital, social isolation, loneliness, discrimination, and race and ethnicity all fall under the social and community context theme. The community theme falls under the environment that includes food, conflict, environment, and violence (Teshale et al., 2023b). Violence has been linked to CVD in past studies (Galli et al., 2021). Conflict increases the risk of IHD and heart disease and there is an inconsistent association when the occurrence of stroke and heart disease (Teshale et al., 2023b).

### **Societal Factors**

Cultural and social factors significantly influence an individual's daily lifestyle. The list of marginalized populations is extensive. Social factors related to culture, ethnicity, race, indigeneity, socioeconomic class, gender, sexual orientation, incarceration, intellectual capability, and health that are not valued or acknowledged or respected, which often leads to discrimination and systemic inequities, including, linked to stress, racism, homophobia, poverty, and housing instability. In order to implement better law and policies, a good understanding and application of the sociocultural factors influencing the SDoH among African Americans mental state and living in pain are essential. Imoh and Charity (2023) found social and cultural factors influenced the wellbeing if African American, notably social support, social services and networking, reliance on religious-based groups, networking and social factors among the ethnic groups, peer support and faith-integrated culture, religious and spiritual beliefs, adaptive interactive educational techniques, responsibility perception, and strong cultural and familial relationships (Imoh & Charity, 2023). Craig et al. (2019b) suggested socioeconomic and other environmental challenges complicate and compound the issues with pain and limit access to pain management. Conditions of poverty, such as isolation from family, friends, or health care professionals, inadequate accommodation, physically demanding labor, and limited access to support and work increase the likelihood of inadequately managed pain (Craig et al., 2019b). Financial resources and support and the lack thereof is another concern that is often a key underlying problem. Past research has proven poverty is commonly linked to social marginalization and is associated with disparities in provision and receipt of pain management. Individuals living in

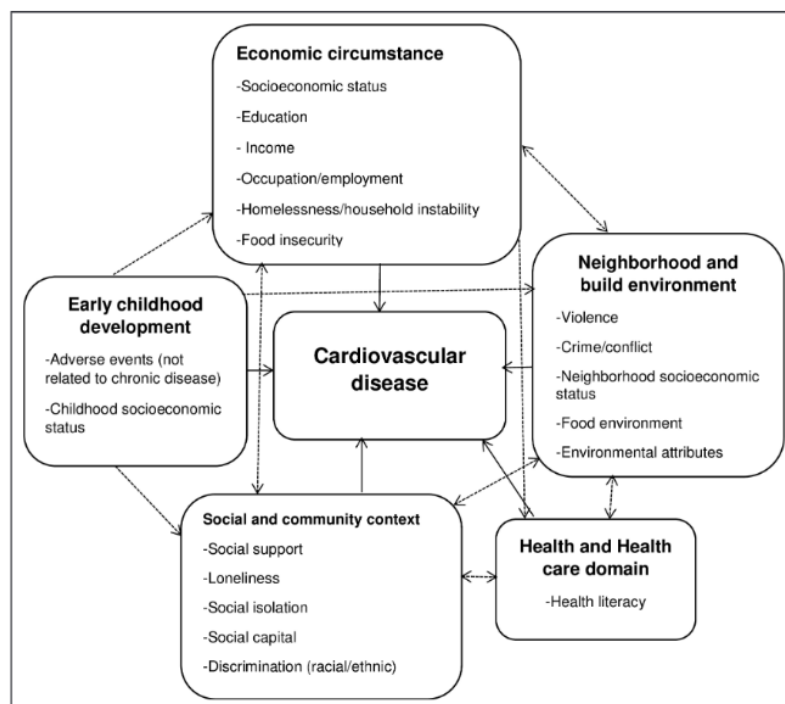
environments with challenges are often subjected adverse childhood experiences, including childhood and family violence and maltreatment associated with inadequate nutrition, sleep, or medical care, and severe or prolonged fear, increase the likelihood of acute and persistent ongoing and untreated pain. In general, this aggregation of factors carries risks of additional and more severe medical comorbidities that complicate care and are known to precipitate personal stress, anxiety, and depression. Neurobiological mechanisms for relationships between adverse life events and pain are only beginning to be understood. Comorbid medical conditions also can contribute to decline in social status and subsequent further disadvantage (Craig et al., 2019b).

There is evidence that societal factors and SDoH are also related to stress, which causes high blood pressure, inflammation, chronic stress, and excess cholesterol. Due to the lack of health literacy and difficulty in accessing medical services means that diseases are diagnosed late or not diagnosed at all which can lead to life-threatening consequences, like mortality attributable to CVD

## **Figure 2**

*Social Determinants of Health, SDoH Cardiovascular Disease*





Conceptual framework indicating the domains of the SDoH and their association with cardiovascular disease. Adapted from Healthy People 2020 and 2030 frameworks.

As shown in Figure 2, *economic circumstance* is an umbrella to overall resources such as socioeconomic status, education, employment, housing stability, and food security that contributes to economic stability and CVD (Teshale et al., 2023).

*Neighborhood and build environment* are an umbrella that considers violence, crime, food environment, and environmental attributes in poor neighborhood social economic status associated with an increased risk of CVD (Teshale et al., 2023). *Social and community contexts* are an umbrella term for social role, social isolation, loneliness, ethnicity, and discrimination were associated with a higher risk of CVD (Teshale et al., 2023). *Health and health care domain* involves access to health literacy. Lastly, *early*

*childhood development* includes adverse events specific to abuse and neglect and lower social economic status associated with an increased risk of later-life CVD (Teshale et al., 2023).

## **Definitions**

### **Alexithymia**

In the past, fibromyalgia has been linked to causing alexithymia, an emotional disposition that affects self-awareness (Di Tella et al., 2017). Amongst the psychological factors such as motivation, learning attitude, and beliefs affected, approximately 20-80% suffer from depression, and approximately 13–64% suffer from anxiety (Di Tella et al., 2017). Alsman et al. (2020) found that 34% of individuals diagnosed with alexithymia were also diagnosed with fibromyalgia. Individuals who suffer from alexithymia cannot adequately interpret how and what they are feeling. Di Tella et al. (2017) have shown that alexithymia has been associated with chronic pain conditions. However, Martinez et al. (2014) suggested there is no correlation between alexithymia and pain. Pain is multidimensional, sensory, and affective. The sensory aspect refers to the intensity of the pain perception, and the affective aspect is the consequence of pain (Di Tella et al., 2017). Individuals suffering from alexithymia identifying and expressing their feelings and having difficulty reflecting and regulating their emotions often experience psychological distress because they cannot effectively communicate verbally. As a result, it leaves the individuals feeling isolated and not understood by others, ultimately contributing to their psychological and emotional distress.

### **Allodynia**

Allodynia is neuropathic pain due to a stimulus or sensation that is not provoked by pain. It is not a symptom, not a disease. The etiology is unknown; however, there is often an instigation event, such as chemotherapy, trauma, herpes, or diabetes (He, 2022). It is a non-painful stimulus that produces excruciating pain (He, 2022). For example, a light touch that would usually cause a sensation, causes pain. Allodynia is different from hyperalgesia. Hyperalgesia is pain exaggerated from a painful stimulus. Neuropathic pain affects 0.9% to 17.9% of the general population and approximately, allodynia affects 15% to 50% of individuals living with neuropathic pain (He, 2022). An individual who experiences pain that should only cause a sensation is allodynia and an individual who experiences excessive pain is hyperalgesia. Allodynia is typically associated with an underlying disease such as diabetes-induced neuropathic tactile allodynia, nociception, or postherpetic neuralgia (He, 2022).

### **Cardiovascular Disease**

Cardiovascular disease (CVD) and osteoarthritis (OA) are functional disabilities that are leading conditions that cause morbidity and chronic pain worldwide (Booker, 2020). Booker (2020) characterized chronic pain as an epidemic in the Black community. Cardiovascular disease risk assessment is becoming more routine in autoimmune inflammatory diseases because CVD is recognized in individuals living with the condition (Surendran et al., 2021). They further stated that chronic pain and multiple chronic disease is considered contributing to higher mortality rates, hospitalization, disabilities, and poor quality of life. Past studies have proven that African Americans have higher blood pressure, contributing to the development of CVD. Although

fibromyalgia can affect individuals of all ages (Fibromyalgia | Arthritis | CDC, n.d.)

Typically, individuals who are diagnosed are middle-aged individuals between the ages of 35 and older (Fibromyalgia | Arthritis | CDC, n.d.). Aging adults have a greater risk of developing multiple chronic conditions, especially in older adults living in an unhealthy environment that does not support a healthy lifestyle (Booker, 2020). Multimorbidity is the co-existence of two or more chronic health conditions. According to Booker, past research has demonstrated a strong association between OA, CVD, and inflammation, leading to different arthritic conditions such as fibromyalgia, rheumatological arthritis, and gout. Barbour et al. (2014) reported that 49% of individuals living with OA have heart disease. 53% of individuals have hypertension, and 47% have diabetes, respectfully. In a present study, 47% of individuals diagnosed with fibromyalgia had an increased risk of developing cardiovascular heart disease, CHD (De Hert & Vancampfort, 2018). In past research, Reyes-Manzano et al. (2018) published that fibromyalgia is prevalent in individuals with chronic heart failure (CHF).

Moreover, the case was bidirectional because fibromyalgia was linked to individuals having worse outcomes CHF. Of the 57 individuals diagnosed with CHF, 13 were diagnosed with fibromyalgia, equal to 3% to 6%, a higher rate in the general population (De Hert & Vancampfort, 2018). Previous studies suggest that cardiovascular disease risk factors are a large waist circumference, body fat percentage, resting heart rate, and high blood pressure, to name a few. They also found that individuals who exercised less had higher risk factors than individuals who had moderate to vigorous exercise activity (De Hert & Vancampfort, 2018).

## **Depression**

The Disease and Statistical Manual-5 (DSM-5) is an assessment used to assess the behaviors that interfere with an individual's activity, daily living, or ability to adjust or participate in different settings. It is implemented as a Cross-Cutting Measure to aid in clinical decision-making for individuals seeking psychiatric services to implement a mental health investigation (Bravo et al., 2018). Comorbid pain and depressive symptoms are more prevalent in African American women than African American men. The depressive symptoms often go untreated or under-treated because they can be misdiagnosed as other conditions. Data conclude that 55.6% of older African Americans experience pain more often at a higher rate than non-Hispanic white older adults. It was reported that African Americans were also prescribed pain medication at a significantly lower rate (Drazich et al., 2022). Although the depressive symptoms in African Americans are more severe than other racial/ethnic groups, 45% of African Americans with major depressive disorders received treatment (Drazich et al., 2022). Previous research suggests that older African Americans are undiagnosed at a higher rate than younger African Americans. The age difference is due to the somatic (the unique reticence among older adults to discuss mental health issues more so than physical issues (Drazich et al., 2022). According to Drazich et al. (2022), African America reported that they pushed themselves through the pain and kept going. They also reported that they dislike the side effects of pain medicine of the pain medication and depression medications.

## **Dysautonomia**

Dysautonomia occurs when the autonomic nervous system (ANS) functions poorly (*Dysautonomia Symptoms & Treatment | Aurora Health Care, n.d.*) Part of the nervous system controls the heart rate, blood pressure, digestion, and automatic reflexes throughout the body (*Dysautonomia Symptoms & Treatment | Aurora Health Care, n.d.*) Although fibromyalgia has been researched many different times, the etiology remains to be determined. Many studies have provided evidence of associating central nervous system sensation with neuropathic pain, NP syndrome, as new findings continue to emerge (On et al., 2022). The evidence suggests that ANS dysfunction is common and plays a significant role in the generation and maintenance of chronic pain and its multisystem symptoms (On et al., 2022). Conversely, other studies suggest that ANS dysfunction increased sympathetic and decreased parasympathetic activity observed in fibromyalgia individuals compared to healthy individuals (On et al., 2022). Other studies have also documented a reduction in ANS activity in both sympathetic and parasympathetic levels in individuals living with the fibromyalgia condition.

According to Zetterman et al. (2023), ANS dysfunction is a mechanism that explains the core and other underlying symptoms in fibromyalgia. Heart rate variability is a common method for assessing ANS (Zetterman et al., 2023). For an individual heart rate, the ANS system regulates HR. The sympathetic nervous system, SNS, increases HR, and the parasympathetic nervous system, PNS, decreases HR. The ANS system is balanced by the time of day, such as breathing, physical activity, emotional state, and other contributing factors. Many studies found that HRV was reduced in individuals diagnosed with fibromyalgia. (Marinkovic et al., 2023) conducted a study measuring

physiological responses in fibromyalgia individuals while relaxing, during cognitive and social stress, and average skin conductance level (SCL). The participants were divided into four clusters. 47% of the first group reported elevated HR, blood pressure, BP, and averaged SCL. 42% of the second group had BP and BP activity, with elevated SCL and SCL activity. 9% of the third group reported elevated HR, BP, and high SCL and SCL activity. Lastly, 3% of HR, Bo, and SCL levels were average. Statistics show BP and SCL are controlled by the ANS, which suggests that ANS functions are different in individuals diagnosed with fibromyalgia. Some studies suggest that the ANS imbalances in different conditions. Malkova and Shoenfeld (2023) suggested dysautonomia conditions are associated with a series of imbalances of autoantibodies to G – protein-coupled receptors, GPCRs. GPCR's antibodies make up almost every cell in the body, *i.e.*, endothelial, epithelial, and immune cells: neutrophils, monocytes, macrophages, dendritic cells, and lymphocytes.

### **Dysthymia**

Dysthymia is milder but lasts longer than depression, typically lasting at least 2 years (Gorwood, 2008). Because of its longevity, it is also called persistent depressive disorder. There are two different subtypes of anxious dysthymia and anergic dysthymia. Individuals diagnosed with anxious dysthymia have symptoms of low self-esteem, interpersonal rejection sensitivity, and undirected relentlessness (Gorwood, 2008). Other individuals are diagnosed with anergy, which causes fatigue, sleepiness, and the inability to experience pleasure, also called anhedonia. Anhedonia has been linked to many other neuropsychiatric disorders, such as Parkinson's disease, substance abuse, and overeating

(Gorwood, 2008). Women are diagnosed with Dysthymia two times more than men (Gorwood, 2008).

### **Fibromyalgia**

Fibromyalgia is a global issue that involves personal issues such as difficulty performing everyday tasks, reduced quality of work, and the consequences of negative effects on work, family, social life, and income (Martinez et al., 2013). It is chronic pain long-term pain felt throughout the body and more prevalent in women than men (Martinez et al., 2013) It affects approximately 2-8 % of the population, majority women. Fibromyalgia characteristics include sleep loss, fatigue, subjective cognitive impairment, and irritable bowel syndrome (Zetterman et al., 2023). All patients who have symptoms are often diagnosed with rheumatic diseases (Wolfe et al., 2014). Fibromyalgia is classified as nociplastic, meaning there is existing pain without any tissue damage (Hansson et al., 2023). Treatment for fibromyalgia includes pharmacological and non-pharmacological interventions depending on the symptoms and the extent of the chronic condition (Hansson et al., 2023). Pharmacological treatments include anti-depressants such as serotonin, norepinephrine, and non-steroidal anti-inflammatory drugs (Hansson et al., 2023).

### **Hyperalgesia**

Hyperalgesia is the medical term used to explain the pain an individual feels that is often due to neuropathy and fibromyalgia chronic pain (Jensen & Finnerup, 2014). Allodynia and hyperalgesia are both classified as sensory modalities such as touch, pressure, cold, heat, and pinprick that is used to interpret sensations. Both are diagnosed



with various peripheral neuropathy and central disorders, and both affect 15-50% of individuals with neuropathic pain (Jensen & Finnerup, 2014). Co-existing allogenic conditions in two internal organs in the same individual may enhance pain symptoms in two or more organs (viscero-visceral hyperalgesia).

### **Hypertension**

Although some research has shown no direct correlation between fibromyalgia and high blood pressure, other studies have shown that individuals living with fibromyalgia are more likely to develop high blood pressure than those living without the condition. Leading to fibromyalgia pain symptoms causes stress anxiety, which can lead to high blood pressure. In a past study, the International Classification of Diseases, ICD-10, and Classification of Diseases, ICD -11, were given to categorize hypertension, resistance hypertension, and hypervolemia. According to Kovaleva et al. (2022b), individuals with fibromyalgia were diagnosed using the American College of Rheumatology, FIQR, and hypertension using the WHO protocol reported changes in cortisol, melatonin, and serotonin blood levels and found that fibromyalgia tender points quantity and FIQR scores are slightly higher in hypertensive individuals compared to other individuals who does not (Kovaleva et al., 2022b).

### **Assumptions**

In analyzing whether there is an association between mental health and fibromyalgia in African Americans, secondary data has been collected from the NHIS. As a result, the following the assumptions African American are less likely to be diagnosed with fibromyalgia because of socioeconomic and racial/ethnic health disparities. Because

the data has been validated by the NHIS, the data collection and recording processes and history obtained from individuals are considered ethical, accurate and correct and recorded in a timely manner.

### **Scope of Delimitations**

There were some limitations due to data being limited and having to relate to data older than 5 years. Secondly, the use of a secondary dataset originally collected for a purpose other than my capstone. Because I am not the original creator nor owner of the survey or datafiles in NHIS, I had to accept certain delimitations of the survey's scope in scale and quality. Ordinarily, for small population groups the prevalent conditions and diseases are less, and data must be accumulated over several years to provide adequate estimates (NCHS, 2022). Responses to the questions in the of individuals surveyed serve as the basis of the independent variable of this study. At the time of the interview, participants between the ages of 1 to 70 years of age and because of COVID-19 data were merged. In March 2020, the COVID-19 pandemic required suspension of NHIS 2011-2018 field operations after data were collected in approximately 18 of the 30 survey locations in the 2019-2020 sample. Because of that, data collection was cancelled for the remaining 12 locations. Moreover, collected data from 18 locations were not nationally representative and were combined with data from the previous cycle (2017-2018) to create a 2017-March 2020 pre-pandemic data file.

### **Limitations**

In a cross-sectional study, causation cannot be determined and because of there is potential for recall bias. Another is social desirability bias where respondents answer

questions based on what the researcher wants to know. A potential barrier when implementing secondary data is that there could be a gap in data because of COVID-19 in 2020. Other limitations of implementing secondary data can be outdated and current research may take longer to locate.

### **Significance**

This study is significant in that racial/ethnic disparities have been studied extensively. It fills the gap in identifying the combined influences of fibromyalgia, depression, diet, economic status, and African American on specific health outcomes. These influences need to be better studied. The results of this study should aid in examining the disparity in chronic disease prevalence in African American economic status and the social gradient by economic status. The association of depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age are explored. Due to racial and ethnic studies conducted in the past, it allows for sufficient data to be determined on a nationally representative level. This study is significant because it fills a gap in understanding by focusing specifically on depression, diet, fibromyalgia symptoms, and societal factors, particularly African American (Diab et al., 2021). The results of this study should aid future research, doctoral committees, and academic programs by providing data for future studies.

Prior research addressing health disparities and societal factors in low-income communities has forced social change by addressing societal inequities. NHIS is a national database, and its broad range increases the diversity of future studies and

research data, making this a unique and relevant study. Specifically, although there is information on how fibromyalgia affects a population, there is a lack of research on the social and economic effects of fibromyalgia in African American women (Awidi & Hadidi, 2021).

This research model explores health disparities in African Americans affected by fibromyalgia symptoms. It identifies strategies and behaviors that African Americans develop in attempts to live a pain-free and healthy lifestyle despite either real or perceived barriers living in their environment. (Lowry et al., 2020). Fibromyalgia has not been studied among African Americans in a nationally representative dataset. This can bring about positive social change by understanding health disparities that lead to chronic pain issues in African Americans. Social change increases awareness and understanding, attitudinal change, to increased community participation, policy change that corrects injustice. Acknowledging that social change must start with the individual, it is essential to emphasize the impact that happens at a broader institutional, group, or community level. Bringing awareness to fibromyalgia and depression and the contributing factors contribute to the increase opportunity for those who need assistance politically, economically, and socially (Ramsey, 2017). Social justice is grounded in the values and ideals of equity, access, and inclusion for all members of society, particularly for poor communities and communities of color that historically and structurally have experienced social inequities. It is essential to provide health literacy on a local and national level to uncover the underlying causes of inequity and seek systemic change in institutions and policies as well as socially upheld behavioral norms that foster fair treatment and share of

benefits (Ramsey, 2017). Social change encourages communities that are low-income, and poverty stricken most affected by social inequity, involving individuals who are most affected in working on the problems and decisions. Social change employs a combination of tactics such as advocacy related to policy, grassroots organizing, litigation, and communications.

### **Summary and Conclusions**

Minority and poor populations who are disadvantaged have a higher prevalence of disease than who are economically advantaged and Caucasian. Statistics show individuals who are economically disadvantaged have a higher rate of disease, disability, and reduced self-efficacy (Conn et al., 2012). Conn et al.'s (2012) study of RA found that African Americans and Hispanics reported worse pain scores than Caucasians. It has been proven that race and social and economic status influence outcomes regarding fibromyalgia and mental disorders such as anxiety and depression.

## Section 2: Research Design and Data Collection

### **Introduction**

The purpose of this quantitative research was to determine if fibromyalgia causes depression in African Americans. Previous studies identified some risk factors; however, no other researcher has investigated the SDoH -related to fibromyalgia, depression, and anxiety in African American alone; moreover, this topic has not been explored with a nationally represented dataset, especially among African Americans in low socioeconomic populations, as it relates to diet and social and economic disparities (Lowry et al., 2020). Stubbs et al. (2022) suggested that fibromyalgia prevalence is lower among racial/ethnic minority individuals due to circumstantial socioeconomic disparities. Stubbs also suggested that physicians are less likely to diagnose racial/ethnic minorities with fibromyalgia than White individuals are, a contributing factor. Other factors limit or affect health-seeking behaviors, such as education level, socioeconomic status, and racial/ethnic minority class (Stubbs et al., 2022). Researchers have not investigated this regarding the ethnic differences in pain, and no nationally representative study creates a knowledge gap. Such determination is needed to understand the role the societal factor has in fibromyalgia, depression, and anxiety.

In the previous section, I conducted a literature review on the SDoH and the factors associated with depression and anxiety in African Americans articles and related materials in the last years. In this section, I articulate the rationale for conducting a cross-sectional study design to answer the three RQs. I also described the methodology implemented which includes the study population, data collection, analysis, and

reporting. Lastly, I discuss the validity as well as address the ethical measures during the study.

### **Research Design and Rationale**

In this quantitative analysis, I explored the influences between fibromyalgia, depression, and anxiety while controlling covariate variables for the classification of SDoH. Through quantitative analysis, I systematically compared the health risk shared by the classifications of diet, age, gender, and comorbid conditions. The NHIS from 2011 – 2018 provides a distinct geographical observation of fibromyalgia and the SDoH. NHIS is a survey health and nutrition generalization that features risk to fibromyalgia and the chronic pain associated. The survey includes one-on-one interviews and physical examinations conducted by medical personnel, physicians, and technicians.

Through a methodical deductive approach, I implemented a cross-sectional diet and anxiety with medication may be associated with depression, anxiety, and fibromyalgia among African American controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

Secondary data assess the socio-ecological approach has on diet and fibromyalgia to determine if there is a relationship between depression, anxiety and fibromyalgia the economic stability, which is a component of social determinates of health among African American after controlling for the variables mentioned (Cetingok et al., 2022). Accessing secondary data with a cross-sectional analysis is inexpensive and is not time consuming because the data is readily available.

According to Wang and Cheng (2020), implementing a cross-sectional analysis is effective because it is often used to measure the prevalence of health outcomes, understand determinants of health, and describe features of a population. The main goal of this study is to determine whether there is a relationship between depression, anxiety and fibromyalgia the economic stability which is a component of SDoH among African American after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

NHIS 2011 -2018 was selected out of other alternatives because of multiple reasons. controlling for, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

This cross-sectional design was appropriate for his study because the data needed controlling for all variables can be collected from surveys and clinical records in NHIS. The data collected in this study can also be used in the future for longitudinal studies. Cross-sectional studies are often inexpensive and easy to conduct. The participants in the study are not deliberately exposed nor treated; moreover, there are seldom ethical difficulties. Cross-sectional includes the inability to assess incidence, to study rare diseases, and to make a causal inference (Wang & Cheng, 2020).

RQ1, the dependent variable, is fibromyalgia “ARTHGLUPEV” and the independent variables are depression with medication DEP\_MED, were explored using the SEM while controlling for cardiovascular disease, chronic kidney disease, arthritis,



education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

If there is a significance between the independent variable fibromyalgia “ARTHGLUPEV” and the dependent variables depression WOR\_MED - number of days mental health was not good,

RQ2 observed if there is an association between anxiety with medication “WOR\_MED” and fibromyalgia “ARTHGLUPEV” among African Americans in the National Health Interview Survey (NHIS) after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

If there is a significance between the independent variable fibromyalgia “ARTHGLUPEV” and the dependent variables depression WOR\_MED - number of days mental health was not good.

RQ3 observed if there is an association between access to healthcare USUALPL-NEW 2, and fibromyalgia “ARTHGLUPEV” among African Americans in the National Health Interview Survey (NHIS) after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

If there is a significance between the independent variable fibromyalgia “ARTHGLUPEV” and the dependent variables depression WOR\_MED -taking anxiety medications currently.

## **Methodology**

The National Center for Health Statistics (NCHS) reported responses rates as a by-product of the previous year's respondent participation by using a logistic regression model. The NCHS applied targeted weights to align the predicted number of samples in each location with an estimation of the demographic reported from the US Census Bureau. For small population groups and less prevalent conditions and diseases, data must be accumulated over several years to provide adequate estimates (NCHS, 2022). NHIS intermittently changed the scope of their examines and alternated the measures by weighting data to accommodate shifts in interest of the demography on hand. Randomly selected, the 30 geographic sections were purposefully staggered in areas representative of the U.S. civilian population.

## **Study Population**

In this quantitative cross-sectional study, African Americans who are diagnosed with fibromyalgia and depression in the United States were included. Non-institutionalized adults who reside with the continental United States data were included as part of this study as well. No-institutionalized adults who reside outside of the United States Over the last 20 years, in the United States African Americans have remained at a higher risk for heart disease than any other population (He et al., 2021). Past research proves SDoH, such as poor access to healthcare USUALPL-NEW 2, and low-income poverty levels are contributing factors. Although the rate of cardiovascular disease and stroke has declined significantly since the 1950s, it remains the leading cause of death nationally (He et al., 2021). Racial and ethnic difference in cardiovascular disease

mortality continue to increase in African Americans despite the significant reduction in the cardiovascular burden in the United States overall population (He et al., 2021). NHIS was accessed to collect health and nutritional data of the U.S. population. A stratified, multistage probability sampling method was implemented in a series of cross-sectional national samples. Every 2 years, the NHIS study is conducted.

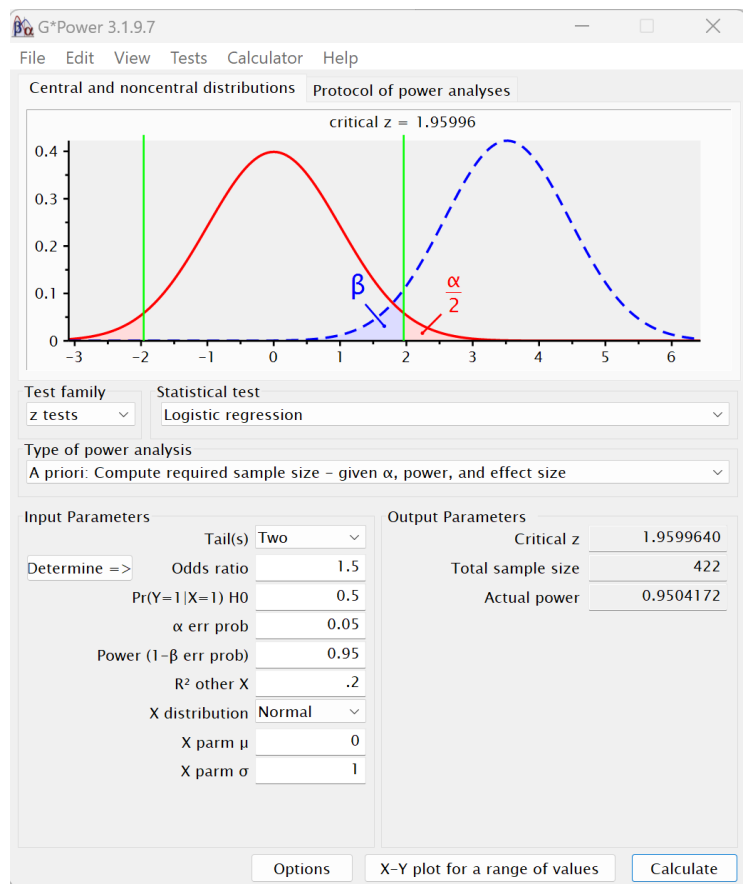
### **Sampling**

The NHIS data set was collected from previous surveys by the NHIS 2011 -2018. Retrospective secondary data analysis was abstracted from individuals who live with the general population in the United States collecting agency, funding institution, or in this section, strategic data is provided to assist researchers to replicate this study in the future. It includes a target population, sampling techniques, and calculation from a sample size. The operationalization of variables and threats to validity and the study's ethical considerations are discussed. (quote how many people participated in the survey). Age was used as a primary variable to the pain markers because it pertains to the chronic pain associated with fibromyalgia. According to a previous study, Hardt et al. (2008) The prevalence of chronic pain estimated to be 10.1% was related to back pain, 7.1% related to pain in the legs/feet, 4.1% related pain in the arms/hands, and 3.5% related pain to a headache. Overall, 11.0% and 3.6% of individuals associated chronic both widespread and regional, respectively.

Sampling procedures consisted in retrieving results of 15,560 participants from 29 primary sampling units geographically around the United States. The selected domains resulted in 1,260 interviews and 14,300 examinations. Data collected by the NCHS Vital

Statistics team from 2017 to 2020 recorded respondents 1,260 underwent interviews, 14,300 performed medical examinations, 7,839 participants were female, and 7,721 participants were male. According to data from the CDC, the response rates from this time would have been 8.10% interviewed and 91.90% examined (CDC, 2021).

### **Power Analysis**

**Figure 3***Power Analysis Logistic Regression*

The NHIS data set is conducted every 2 years. The data set contains 15,560 responders who are 20 years or older from the aforementioned data set. The main analysis for this study is logistic regression. For a logistic regression analysis, sample size of 422 yield a power of 95% with an  $\alpha=0.05$  and a minimum detectable odds ratio of 1.5 with depression as the predictor variable and chronic pain as the outcome variable. The minimum detectable odds ratio of 1.5 was used because based on the odds ratio

acceptable. In light of these calculations in support of the power analysis, there is confidence that the sample size of 9,254 was adequate to perform the analysis.

### **Data Analysis Plan**

Depression has a high prevalence rate and is a common comorbidity of fibromyalgia. According to Gau et al. (2023), meta-analysis findings showed approximately  $\frac{1}{4}$  of individuals living with fibromyalgia have comorbid depression and another  $\frac{1}{2}$  experience a major depressive disorder at some point in their lives. Inferential analysis consisted of the what and the why. Logistic regression, outcome dependent variable is chronic pain, yes vs. no. The dichotomous binary logistic regression. Independent variable. WOR\_MED is number of days mental health was not good, anxiety. Physical activity variable is too broad and would and is more of a scope I can determine (Aaron et al., 1997). Geographical environment is urban vs rural areas in terms of NHIS. IBM's Statistical Package for Social Sciences (SPSS) is the modeling software that constructs numerical measure, statistical patterns and trends to accurately forecast anomalies of progression to support research, presumed gaps test theories and study complex data relationships.

All variations are gathered through SPSS which enable coding and other quantitative functionalities through high correlation and variability influences and predictable expression are represented. SPSS merge variables, transform, code, and locate missing values that were not previously discovered in previous studies. It is essential statistical calculations are searched for the though an appropriate statistical test such as

the null and one or two-tailed research hypothesis, the effect size (variability), the desired level of statistical significance for a one or two-tailed test (Merrill, 2019).

Observing outcomes further, the association between predictor variables and disease outcome, a logistic regression to determine a ratio of two probabilities of depression dementia and heart disease occurring simultaneously with similar relative health risk of fibromyalgia. The data design was created to draw indicators on the affecting influences of depression, chronic pain, cognitive health, and heart disease respectfully (coronary heart disease and myocardia heart disease) and is a regression analysis (He et al., 2021) Regression is a valuable extraction of casually production, naturally occurring relationships that are not manipulated to achieve a statistical significance when compared to their counterparts. The five steps implemented in processing the statistical hypotheses was making assumptions, stating the null hypothesis, and selecting alpha, selection of the sampling distribution, specifying the test statistic, and computing the test statistic and making a decision and interpreting the results.

The null hypothesis is used as a default practice. The “true” hypothesis is established and is challenged by an alternative hypothesis of the “research.” The probability of the research can be rejected by the current hypotheses, or failing to reject the hypotheses which solidifies that a point of contention exists. My null and alternate hypothesis are:

$H_0$ 1: There is no association between depression and fibromyalgia among African American after controlling for cardiovascular disease, chronic kidney disease, arthritis,

education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

$H_{a1}$ : There is an association between depression and fibromyalgia among African American after controlling for physical activity, diet, age, pre-existing conditions, societal factors, demographics, poverty income ratio and PIR.

$H_{o2}$ : There is no association between anxiety and fibromyalgia “WOR\_MED” among African Americans in the NHIS after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR diabetes, gender, and age.

$H_{a2}$ : Is there an association between anxiety with medication and fibromyalgia “WOR\_MED” among African Americans in the NHIS after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

$H_{o2}$ : There is no association between anxiety with medication and fibromyalgia “WOR\_MED” among African Americans in the NHIS after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

The rationale of the analysis is a predicted pattern for the outcomes between (independent variable) fibromyalgia and (dependent variable) and depression while controlling for (covariate variables). It is a rationalization that PCPs are challenged when addressing unique health indicators in an unfamiliar environment. A rising disease



prevalence signals a disease progression which forms into a predictable diagnostic pattern.

RQ1: What is the association between fibromyalgia “ARTHGLUPEV” and depression while controlling for depression with medication “DEP\_MED”, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age? In RQ1, the independent variable, fibromyalgia “ARTHGLUPEV”, and the dependent variable, and depression with medication DEP\_MED, were explored to observe the ecological dynamics while controlling for depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age.

RQ2: What is the relationship between fibromyalgia “ARTHGLUPEV” and anxiety with medication while controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age? In RQ2, fibromyalgia and depression were explored to observe the ecological dynamics while controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

RQ3: To what extent does access to healthcare connected with fibromyalgia after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level

(*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age?

RQ3 asks if there is an association between the independent variable, medical access, and the dependent variable, fibromyalgia, after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

The data from the NHIS 2011 – 2018 was used to determine the connection between African Americans diagnosed with fibromyalgia as it relates to medical access after controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

The secondary data were selected from the Centers for Disease Control website. I was collected data from NHIS 2011 -2018 data set to determine depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age measured in African American diagnosed with fibromyalgia.

The variables include depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, PIR, diabetes, gender, and age.

Scale of Measurement: IV: = nominal; DV = yes/no. Lastly, the analysis is made through multiple binary logistic regression.

Missing data or missing values occur when the data value is not stored for a variable in the observation of interest. It is a common problem in research to have missing data and can have a significant effect on the conclusions from the data collected. Missing data can reduce the statistical power and can produce biased assessments, leading to invalid conclusions. The best possible method of handling the missing data is to make efforts in preventing the problem in the beginning of the research study and by well-planning the study and collecting the data carefully. Detailed documentation should be developed that includes methods of the procedure to collect and enter data.

### **Instrumentation and Operation of Constructs**

#### **Instrumentation**

Secondary Analysis was performed using secondary data from the NHIS database conducted in 2011-2018. The survey included a complex, stratified, and multistage survey in NHIS. The Primary Sampling Units sample selection is methodologically performed in the first stages. I extracted data from NHIS 2011 - 2018 database that is readily accessible from the internet (*Fibromyalgia | Arthritis | CDC*, n.d.) The sample selection is broken down into three parts. Collecting data is the first part of the selection process. The selection process was methodically performed through stages.

The survey began with questions regarding diagnosis, demographic information, such as gender, age, and ethnicity were assessed. The online questionnaire included questions regarding length of time in chronic pain and pain level at the time of the survey as measured to determine the impact of the independent variables, the questionnaire included valid and reliable measures of pain beliefs, coping strategies, and social support

(Booker, 2020). The dependent variables depression were measured by diagnosis to determine whether any one or more of the independent variables had a greater influence on pain severity, depression, and quality of life.

### **Operationalization and Instrumentation of Variables**

Operationalization is the process of converting abstract concepts into measurable observation (J. He et al., 2021). Multivariable analysis to address the clinical prediction to estimate the risk of experiencing outcome based on individual's variables. Selection techniques are essential in forecasting the proposed outcome within an analysis model fit to address errors; moreover, modeling is essential when developing statistical settings. Operational establishes framing parameters and sets principles for the inputs to frame the outputs.

There were multiple variables that were used in this study. The variables can be divided into independent variables and dependent variables that was adjusted for confounding variables. The dependent variable is fibromyalgia. The independent variables are variables depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age. Fibromyalgia causes comorbid diseases, and some diseases can cause fibromyalgia (Fibromyalgia | Arthritis | CDC, n.d.).

### **Confounding Variables**

Study covariates included sociodemographic such as age, gender, race/ethnicity, education level, marital status, and annual household income, pre-existing conditions,

societal factors, demographics, PIR, chronic health conditions such as high blood pressure, stroke, heart disease, weight status, depression, and mental health conditions.

**Table 1**

*Variables Names and Descriptions*

Variable Name	Description
ARTHGLUPEV	Fibromyalgia
DEP_MED	Depression with medication
WOR_MED	Anxiety with medication
USUALPL	Access to healthcare
DIABETICEV	Diabetes
EDUC	Education level
AGE	Age
SEX	Gender
DIETDYR	Diet
ARTHLIMIT	Arthritis
KIDNEYWKYR	Chronic kidney disease
HEARTCONEV	Cardiovascular disease

### **Threats to Validity and Reliability**

#### **Validity**

Internal validity is to conduct the analysis without bias, while external validity is recovering the same results in a different environment (Andrade, 2018). There are different types of internal and external validity applied to cross-sectional studies. It is essential to examine internal validity by considering all possibilities, the selection bias, confounding variables, and correct measurement tools. Furthermore, external validity can be analyzed by ensuring the proper sample representation and findings apply to the real world. To overcome the issues participants were selected at random and a multivariate

logistic regression controlled for the possible confounders. This study may be vulnerable because secondary data was retrieved; therefore, it relies on the data from previous research. Additionally, SPSS could display different results. My study considered the main covariates but not all influencers. Additional covariates could include other mental health issues, time at residence, exposure, and rank. Furthermore, my data set is from 2017 before COVID-19 and during COVID-19; therefore, the results may be different today. The data Sampling has been scrutinized thoroughly and methodically collected through NHIS. Even with the challenges of validity, NHIS was selected because of its robust method to validate and ensure each data is retrieved with integrity throughout its research; furthermore, NHIS was chosen because it met the requirements for my analysis. Data screening and cleaning techniques were conducted to ensure the integrity of my research design.

### **Reliability**

Steps to mitigate the threats to validity were considered along the process of this analysis. Internal validity means conducting the design without bias, while external validity means getting the same results in a different environment, or simply replicated (Andrade, 2018). Certain types of internal and external validity apply to cross sectional studies. It is important to examine internal validity by considering selection bias, confounding variables, and correct measurement tools. Furthermore, external validity can be analyzed by proper sample representation and ensuring that the findings apply to the real world. To overcome these issues, participants were selected at random and proper statistical tests such as Pseudo *R* Squared were applied, in addition, a multivariate

complex samples logistic regression controlled for possible confounders. This study may be vulnerable to a certain degree because this is a secondary quantitative analysis, and not a primary study-- therefore it relies on the data from prior research. In addition, another processing system, not SPSS, could display different results. This study took into consideration the main covariates but not all influencers. Additional covariates could include other mental health issues, time-in-service, combat exposure, and rank. Furthermore, the data set is from 2009; therefore, the results may be different today. The data sampled was thoroughly scrutinized and methodically aggregated through NHIS. Even with the challenges of validity, NHIS has a robust method to validate and ensure data integrity throughout its research. NHIS was chosen at random because it met the requirements for my study. To ensure the integrity of this research design, data screening and cleaning techniques were used. Furthermore, the most updated version of SPSS to measure results was used.

### **Ethical Procedures**

The survey data was collected from an open-source website, NHIS; no permission from NHIS was needed to obtain the information. The initial data approval was from the CDC review board. Private data were not needed to access or collect private information from the primary study. NHIS ensures staff implements quality assurance methods to maintain standards and protocols throughout each study. Anonymity and informed consent were required and obtained for all individuals in the original study. I obtained approval for this study from Walden University's Institutional Review Board.

### **Limitations**

This study is one of few studies attempting to examine chronic pain conditions in relation to the risk of all-cause depression among nationally representative sample of African American adults who reside in the United States to explore the role of fibromyalgia in reducing the risk of all-cause comorbid illnesses and mortality among individuals with chronic pain (Ross & Zaidi, 2019). My findings should be interpreted in light of study limitations, including the use of subjective measures to assess the levels of fibromyalgia and comorbid illnesses and chronic pain conditions (Ross & Zaidi, 2019). Specifically, addressing chronic pain levels and physical activity were derived from the contexts of leisure-time activities and may not be sufficient to describe daily lifestyle of physical activity across different contexts. Further, the classification of chronic pain and depression conditions used in this study did not account for the severity of pain and depression symptoms, which may have a greater impact on health outcomes (Aaron et al., 1997).

### **Summary**

In this section, the research design and methods used in this study were explained in detail. The study population and the sampling techniques were thoroughly detailed in the methodology section and discussed. A sampling strategy included retrospective secondary data analysis abstractive from individuals living in general population. I also thoroughly defined and discussed the operationalization of the independent variable and the independent variables as well as their levels of measurement. Prior to discussing the statistical methods, I restated the three RQs. The IBM SPSS statistical software for data analysis was selected. I discussed the internal and external threats to validity and their



potential effect on the study results and mitigations strategies identified. Lastly, ethical considerations and authorization for accessing the dataset were explained by the process of accessing secondary data. In the next section, I present and discuss the statistical results and findings of my analysis in relation to the three research questions.

## Section 3: Presentation of Results and Findings

### **Introduction**

The purpose of the study was to explore statistical influences between the dependent variable (fibromyalgia), and the independent variables (depression, was observed while controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age. After controlling for covariates, e.g., age, a secondary analysis from 2011-2018 National Health Interview Survey was applied. In Section 3, statistical properties are characterized in the samples, offering validity for my assumptions. The appropriateness of the study of fibromyalgia, depression, in the United States warrants further research. Further recommendations were made for future research after studying the relationship between depression, anxiety, and medical access among African Americans.

### **Accessing the Data Set for Secondary Analysis**

The data used within this study were retrieved from a data set curated by the NCHS. The NCHS administers a questionnaire each year comprising the National Health Interview Survey that is readily accessible through the CDC website. The data set contained de-identified data with multiple variables. Each data set had a concatenated unique identifier that was used to merge multiple datasets. The final data set was created by merging using the unique identifier, as this is the only variable that was common in each data set. Once merged, the data set was cleaned to prepare for further analysis of the data.

## Results

**Table 2**

*African American Sample for Fibromyalgia and Depression With Medication*

RQ 1

Variables	Percentage	Frequencies
<b>Fibromyalgia</b>		
Yes	79.4%	2749
No	20.6%	713
<b>Depression (medication)</b>		
Yes	18.1%	627
No	81.9%	2835
<b>Cardiovascular disease (CVD)</b>		
Yes	18.3%	634
No	89.9%	3112
<b>Chronic kidney disease</b>		
Yes	10.1%	350
No	89.9%	3112
<b>Arthritis</b>		
Yes	51.6%	1786
No	48.4%	1676
<b>Education level</b>		
Some high school	30.9%	1070
High school graduate	42.7%	1478
Some college and above	26.4%	914
<b>Diet</b>		
Yes	64.4%	2230
No	35.6%	1232
<b>Poverty-income-ratio</b>		
Yes	62.4%	2160
No	37.6%	1302
<b>Diabetes</b>		
Yes	81.3%	2815
No	18.7%	647
<b>Sex</b>		
Male	34.1%	1181
Female	65.9%	2281
<b>Age (mean)</b>	62 years	

Percentages of each of the covariates within the African American Sample for Depression

As provided in Table 2, of the participants, 65.9% ( $n = 2281$ ) identified as female and (34.1%,  $n = 1181$ ) as male. As reported 79.4% ( $n = 2749$ ) suffered from fibromyalgia and 20.6% ( $n = 713$ ) did not. 18.1% ( $n = 627$ ) were taking medication for depression and 81.9% ( $n = 2835$ ) were not on medication for depression. 18.3% ( $n = 634$ ) were diagnosed with having cardiovascular disease while 89.9% ( $n = 3112$ ) did not have the diagnosis. The larger percentage of reported participants did not have chronic kidney disease at 89.9% ( $n = 3112$ ) with 10.1% ( $n = 350$ ) did have chronic kidney disease. The largest percentage of reported having arthritis at 51.6% ( $n = 1786$ ). Followed by the lowest at 48.4% ( $n = 1676$ ). Education level was 30.9% ( $n = 1070$ ) for some high school education with 42.7% ( $n = 1478$ ) high school graduates, with 26.4% ( $n = 914$ ) reported some college education. The larger percentage reported consuming a healthy diet at 64.4% ( $n = 2230$ ) while the lowest at 35.6% ( $n = 1232$ ) did not consume a healthy diet. 62.4% ( $n = 2160$ ) income was below the poverty level while 35.6% ( $n = 1232$ ). The largest geographic region reported having diabetes at 81.3% ( $n = 2815$ ). Followed by the individuals without diabetes 18.7% at ( $n = 647$ ). For this study the adult was 21 and above and the mean age was reported at 62 years.

### **Table 3**

*African American Probability Value for Fibromyalgia and Depression with Medication*

RQ1

Variable	Odds ratio	95% confidence interval	<i>p</i> -value
Depression (medication)	1.82	(.64–5.18)	0.26
Cardiovascular disease	1.77	(.64-4.90)	0.27
Chronic kidney disease	0.67	(.23–1.92)	0.45
Arthritis	4.20	(1.84–9.59)	0.001
Education level			
Some high school	0.62	(0.25–1.56)	0.17
High school graduate	0.41	(.16-1.04)	0.17
Some college or higher	Ref.	Ref.	
Diet	0.75	(0.35-1.58)	0.44
Poverty-income-ratio	0.56	(.23–1.39)	0.21
Diabetes	1.01	(.41-2.49)	0.98
Gender (Ref=F)	1.78	(0.79-4.03)	0.16
Age	0.96	(0.93-0.98)	0.002

Those individuals with depression were 1.82 times more likely to develop fibromyalgia than those without anxiety. The *p*-value is 0.26 making the relationship not statistically significant. The 95% confidence interval is between 0.64 and 5.18. While not statistically significant, this means that the true effect lies between the two values.

Those with CVD are 1.77 times more likely to develop fibromyalgia than those without CVD. The *p*-value is .27 making the relationship not statistically significant. The 95% confidence interval is 0.64 and 4.90. It means that the true effect lies between the two values.

Compared to those who have no CKD, those that have CKD are 0.67 times more likely to develop fibromyalgia. The *p*-value of .45 makes the relationship not statistically significant. The 95% confidence interval is between 0.23 and 1.92. It means that the true effect lies between the two values.

Compared to individuals who have arthritis, those who do not have arthritis are 4.20 times more likely to develop fibromyalgia. The  $p$ -value of less than .001 makes the relationship statistically significant. The 95% confidence interval is between 1.84 and 9.59. It means that the true effect lies between the two values.

Compared to an individual who had some college and beyond, those individuals with some high school education are 0.62 (CI 0.25-1.56) times more likely to develop fibromyalgia. Additionally, compared to an individual who had some college and beyond, those individuals that are high school graduates are .41 times more likely to develop fibromyalgia. The  $p$ -value is 0.17, making the relationship statistically significant. The 95% confidence interval is between .16 and 1.04. It means that the true effect lies between the two values.

Compared to individuals who consume a healthy diet, those individuals who do not consume a healthy diet are 0.75 times more likely to develop fibromyalgia. The  $p$ -value is 0.44 making the relationship not statistically significant. The 95% confidence interval is between 0.35 and 1.58. It means that the effect of the true value lies between the two values.

Compared to individuals whose income is above 100% of federal poverty guideline, those individuals below the aforementioned poverty are .56 times more likely to develop fibromyalgia. The  $p$ -value is 0.21, making the relationship not statistically significant. The 95% confidence interval is between .23 and 1.39. It means that the effect of the true value lies between the two values.

Compared to individuals who do not have diabetes, those individuals with diabetes are 1.01 times more likely to develop fibromyalgia. The  $p$ -value is 0.98, making the relationship not statistically significant. The 95% confidence interval is between .41 and 2.49. This means that the effect of the true value lies between the two values.

Compared to individuals who are females, males are 1.78 times more likely to develop fibromyalgia. The  $p$ -value is .16 making the relationship not statistically significant. The 95% confidence interval is between .79 and 4.03. It means that the effect of the true value lies between the two values.

The probability of fibromyalgia occurs based on a one-unit change in age when all other independent variables are kept constant. Decreasing age was associated with an increased likelihood of exhibiting fibromyalgia (0.96 CI=0.93-0.98,  $p$ =.002).

**Table 4**

*African American Sample for Fibromyalgia and Anxiety With Medication*

RQ2

Variables	Percentage	Frequencies
<b>Fibromyalgia</b>		
Yes	79.4%	2749
No	20.6%	713
<b>Anxiety (medication)</b>		
Yes	15.5%	537
No	84.5%	2925
<b>Cardiovascular disease (CVD)</b>		
Yes	18.1%	627
No	81.9%	2835
<b>Chronic kidney disease</b>		
Yes	10.2%	353
No	89.8%	3108
<b>Arthritis</b>		
Yes	51.8%	1793

No	48.2%	1669
<b>Education level</b>		
Some high school	30.7%	1063
High school graduate	42.9%	1485
Some college and above	26.5%	917
<b>Diet</b>		
Yes	64.3%	2226
No	35.7%	1236
<b>Poverty-income-ratio</b>		
Yes	62.3%	2157
No	37.7%	1305
<b>Diabetes</b>		
Yes	81.2%	2811
No	18.8%	651
<b>Sex</b>		
Male	33.0%	1142
Female	67.0%	2320
<b>Age (Mean)</b>	62 years	

Percentages of each of the covariates within the African American Sample for Anxiety

As provided in Table 4, of the participants, 67.0% ( $n = 2320$ ) identified as female and 33.0% ( $n = 1142$ ) as male. As reported, 79.4% ( $n = 2749$ ) suffered from fibromyalgia and 20.6% ( $n = 713$ ) did not. 15.5% ( $n = 537$ ) were taking medication for anxiety, and 84.5% ( $n = 2925$ ) were not on medication for anxiety. 18.1% ( $n = 627$ ) were diagnosed having cardiovascular disease while 81.9% ( $n = 2835$ ) did not have the diagnosis. The larger percentage of reported participants did not have chronic kidney disease at 89.8% ( $n = 3108$ ) with 10.2% ( $n = 353$ ) did have chronic kidney disease. The largest percentage of reported having arthritis at 51.8% ( $n = 1793$ ). Followed by the lowest at 48.2% ( $n = 1669$ ). Education level was 30.7% ( $n = 1063$ ) for some high school education with 42.9% ( $n = 1485$ ) high school graduates, with 26.5% ( $n = 917$ ) reported some college education. The larger percentage reported consuming a healthy diet at 64.3% ( $n = 2226$ ), while the lowest at 35.7% ( $n = 1236$ ) did not consume a healthy diet. 62.3% ( $n = 2157$ ) of income was below the poverty level while 37.7% ( $n = 1305$ ). The largest geographic region reported



having diabetes at 81.2% ( $n = 2811$ ). Followed by the individuals without diabetes 18.8% at ( $n = 661$ ). For this study the adult age was 21 and above the mean age reported at 62 years.

**Table 5**

*African American Probability Value for Fibromyalgia and Anxiety With Medication*

RQ2

Variable	Odds ratio	95% confidence interval	<i>p</i> -value
Anxiety (medication)	0.77	(1.65-5.54)	0.38
Cardiovascular disease	1.66	(.61-4.54)	0.32
Chronic kidney disease	0.71	(.25–2.05)	0.59
Arthritis	4.17	(1.82–9.54)	0.001
Education level			
Some high school	0.62	(0.24–1.53)	0.16
High school graduate	0.41	(.16-1.03)	0.16
Some college or higher	Ref.	Ref.	
Diet	0.76	(0.36-1.59)	0.45
Poverty-income-ratio	0.57	(.24–1.4)	0.22
Diabetes	1.00	(0.40-2.64)	0.46
Gender (Ref=F)	1.77	(0.78-4.00)	0.17
Age	0.96	(0.93-0.98)	0.002

Those individuals with anxiety were 0.77 times more likely to develop fibromyalgia than those without anxiety. The *p*-value is 0.38 making the relationship not statistically significant. The 95% confidence interval is between 0.54 and 1.65. While not statistically significant, this means that the true effect lies between the two values.

Those with CVD are 1.66 times more likely to develop fibromyalgia than those without CVD. The *p*-value is .32 making the relationship not statistically significant. The 95% confidence interval is .61 and 4.54. It means that the true effect lies between the two values.

Compared to those who have no CKD, those that have CKD, are .71 times more likely to develop fibromyalgia. The  $p$ -value of .59 makes the relationship not statistically significant. The 95% confidence interval is between .25 and 2.05. It means that the true effect lies between the two values.

Compared to individuals who have arthritis, those who do not have arthritis are 4.17 times more likely to develop fibromyalgia. The  $p$ -value of less than .001 makes the relationship statistically significant. The 95% confidence interval is between 1.82 and 9.54. It means that the true effect lies between the two values.

Compared to an individual who had some college and beyond, those individuals with some high school education are 0.62 (CI 0.24-1.53) times more likely to develop fibromyalgia. Additionally, compared to an individual who had some college and beyond, those individuals that are high school graduates are .41 times more likely to develop fibromyalgia. The  $p$ -value is 0.16, making the relationship statistically significant. The 95% confidence interval is between .16 and 1.03. It means that the true effect lies between the two values.

Compared to individuals who consume a healthy diet, those individuals who do not consume a healthy diet are 0.76 times more likely to develop fibromyalgia. The  $p$ -value is 0.45 making the relationship not statistically significant. The 95% confidence interval is between 0.36 and 1.59. It means that the effect of the true value lies between the two values.

Compared to individuals whose income is above 100% of federal poverty guideline, those individuals below the aforementioned poverty is .57 times more likely to

develop fibromyalgia. The  $p$ -value is 0.22, making the relationship not statistically significant. The 95% confidence interval is between .24 and 1.40. It means that the effect of the true value lies between the two values.

Compared to individuals who do not have diabetes, those individuals with diabetes are 1.00 times more likely to develop fibromyalgia. The  $p$ -value is .46, making the relationship not statistically significant. The 95% confidence interval is between .40 and 2.64. This means that the effect of the true value lies between the two values.

Compared to individuals who are females, males are 1.77 times more likely to develop fibromyalgia. The  $p$ -value is .17 making the relationship not statistically significant. The 95% confidence interval is between .78 and 4.00. It means that the effect of the true value lies between the two values.

The probability of fibromyalgia occurs based on a one-unit change in age when all other independent variables are kept constant. Decreasing age was associated with an increased likelihood of exhibiting fibromyalgia (0.96 CI=0.93-0.98,  $p$ =.002).

## **Table 6**

*African American Sample for Fibromyalgia and Access to Healthcare*

RQ3

Variables	Percentage	Frequencies
<b>Fibromyalgia</b>		

Yes	20.3%	703
No	79.7%	2759
<b>Access to healthcare</b>		
Yes	3.8%	1316
No	96.2%	3330
<b>Cardiovascular disease (CVD)</b>		
Yes	15.5%	537
No	84.5%	2925
<b>Chronic kidney disease</b>		
Yes		
No	9.8%	3393
	90.2%	3123
<b>Arthritis</b>		
Yes	51.2%	1773
No	48.8%	1689
<b>Education level</b>		
Some high school	31.7%	1097
High school graduate	39.6%	1371
Some college and above	28.7%	994
<b>Diet</b>		
Yes	63.9%	2212
No	36.1%	1250
<b>Poverty-income-ratio</b>		
Yes	64.1%	2219
No	35.9%	1243
<b>Diabetes</b>		
Yes	83.2%	2880
No	16.8%	582
<b>Sex</b>		
Male	33.0%	1142
Female	67.0%	2320
<b>Age (Mean)</b>	62 years	

Percentages of each of the covariates within the African American Sample for Medical Access

As provided in Table 6, of the participants, 67.0% ( $n = 2320$ ) identified as female and 33.0% ( $n = 1142$ ) as male. As reported, 79.7% ( $n = 2759$ ) suffered from fibromyalgia and 20.3% ( $n = 703$ ) did not. 3.8% ( $n = 1316$ ) had access to healthcare and the largest of participants at 96.2% ( $n = 3330$ ) did not. 15.5% ( $n = 537$ ) were diagnosed having

cardiovascular disease, while 84.5% (2925) did not have the diagnosis. The larger percentage of reported participants did not have chronic kidney disease at 90.2% ( $n = 3123$ ) with 9.8% ( $n = 3393$ ) having chronic kidney disease. The largest percentage of reported having arthritis at 51.2 ( $n = 1773$ ), followed by the lowest at 48.8% ( $n = 1689$ ). Education level was 31.7% ( $n = 1097$ ) for some high school education with 39.6 ( $n = 1371$ ) high school graduates, with 28.7% ( $n = 994$ ) reported some college education. The larger percentage reported consuming a healthy diet at 63.9% ( $n = 2212$ ), while the lowest at 36.1% ( $n = 1250$ ) did not consume a healthy diet. 64.1% ( $n = 2219$ ) of income was below the poverty level, while 35.9% ( $n = 1243$ ). The largest geographic region reported having diabetes at 83.2% ( $n = 2880$ ). Followed by the individuals without diabetes 16.8% at ( $n = 582$ ). For this study the adult as was 21 and above the mean age reported at 62 years.

**Table 7**

*African American Probability Value for Fibromyalgia and Access to Healthcare*

RQ3

Variable	Odds ratio	95% confidence interval	<i>p</i> -value
Access to healthcare	1.34	(.42–4.28)	0.63
Cardiovascular disease	1.83	(.89-3.77)	0.10
Chronic kidney disease	0.68	(.33–1.38)	0.29
Arthritis	1.89	(1.81–3.01)	0.22
Education level			
Some high school	1.04	(0.53–2.05)	0.95
High school graduate	0.41	(.53-1.73)	0.95
Some college or higher	Ref.	Ref.	
Diet	1.10	(0.67-1.80)	0.71
Poverty-income-ratio	1.09	(0.64.–1.86)	0.75
Diabetes	1.46	(.79-2.69)	0.22

Gender (Ref=F)	1.32	(0.75-2.33)	0.34
Age	0.96	(0.94-0.98)	0.001

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Those individuals without access to healthcare were 1.34 times more likely to develop fibromyalgia than those with access to healthcare. The  $p$ -value is .63 making the relationship not statistically significant. The 95% confidence interval is .42 and 4.28. While not statistically significant, this means that the true effect lies between the two values.

Those with CVD are 1.83 times more likely to develop fibromyalgia than those without CVD. The  $p$ -value is .10 making the relationship not statistically significant. The 95% confidence interval is .89 and 3.77. It means that the true effect lies between the two values.

Compared to those who have no CKD, those that have CKD, are .68 times more likely to develop fibromyalgia. The  $p$ -value of .29 makes the relationship not statistically significant. The 95% confidence interval is between .33 and 1.38. It means that the true effect lies between the two values.

Compared to individuals who have arthritis, those who do not have arthritis are 1.89 times likely to develop fibromyalgia. The  $p$ -value of .22 makes the relationship statistically significant. The 95% confidence interval is between 1.81 and 3.01. It means that the true effect lies between the two values.

Compared to an individual who had some college and beyond, those individuals with some high school education are 1.04 times more likely to develop fibromyalgia. Additionally, compared to an individual who had some college and beyond, those

individuals that are high school graduates are .95 times more likely to develop fibromyalgia. The  $p$ -value is 0.95, making the relationship statistically significant. The 95% confidence interval is between .53 and 2.05. It means that the true effect lies between the two values.

Compared to individuals who consume a healthy diet, those individuals who do not consume a healthy diet are 1.10 times more likely to develop fibromyalgia. The  $p$ -value is 0.71 making the relationship not statistically significant. The 95% confidence interval is between 0.67 and 1.80. It means that the effect of the true value lies between the two values.

Compared to individuals whose income is above 100% of federal poverty guideline, those individuals below the aforementioned poverty is 1.09 times more likely to develop fibromyalgia. The  $p$ -value is 0.75, making the relationship not statistically significant. The 95% confidence interval is between .64 and 1.86. It means that the effect of the true value lies between the two values.

Compared to individuals who do not have diabetes, those individuals with diabetes are 1.46 times more likely to develop fibromyalgia. The  $p$ -value is .22, making the relationship not statistically significant. The 95% confidence interval is between .79 and 2.69. It means that the effect of the true value lies between the two values.

Compared to individuals who are females are 1.32 times more likely to develop fibromyalgia. The  $p$ -value is .34 making the relationship not statistically significant. The 95% confidence interval is between .75 and 2.33. It means that the effect of the true value lies between the two values.

The probability of fibromyalgia occurs based on a one-unit change in age when all other independent variables are kept constant. Decreasing age was associated with an increased likelihood of exhibiting fibromyalgia (0.96).

### Summary

In this study, I presented the results from the analysis of the NHIS dataset of 2011-2018. In Section 3, I included the purpose of the study, the baseline descriptive and demographic characteristics of the samples, the analysis of the descriptive statistics that properly characterize each sample. The RQs and hypotheses were tested, along with the key findings. I examined the categorical independent variables of the participants diagnosed with fibromyalgia, taking medication for anxiety and depression. The dependent variable was fibromyalgia. I used the binary logistic regression statistical test to analyze the variables study. In RQ1, I tested whether there was an association between fibromyalgia, depression, and heart disease in African Americans. Logistic regression analysis, including  $p$ -values, Pseudo  $R$  Squares, and confidence interval demonstrated a lack of association both before and after controlling for cardiovascular disease, chronic kidney disease, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, were measured in African American as the  $p$ -values were not statistically significant; however, age and arthritis were statistically significant. Therefore, I failed to reject the null hypothesis in RQ1 for depression, with medication “DEP\_MED”, while controlling for cardiovascular disease, chronic kidney disease, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes,



gender, and concluded that there was no association between fibromyalgia, depression, and heart disease. In RQ2, I examined the relationship between fibromyalgia and anxiety with medication “WOR\_MED” while controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age. I failed to reject the null hypothesis and concluded that there was no association between fibromyalgia and depression among African Americans with heart disease. For RQ3, I examined To what extent fibromyalgia and access to healthcare “USUALPL-NEW 2”. The logistic regression analysis results showed there was no significant association between fibromyalgia and access to healthcare controlling for cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age. I failed to reject the null hypothesis and concluded that there was no association between fibromyalgia and access to healthcare among African Americans with heart disease. The odds of an African American suffering from fibromyalgia and depression were 68.8% higher than those of a nondisplaced one (95% CI [.610 – .777],  $p < .001$ ).

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

### Introduction

The purpose of this study doctoral quantitative analysis was to assess the statistical relationships between fibromyalgia and depression, in African Americans. Secondary data was gathered from the National Health Institute. The controlled variables were e.g., depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, in African Americans. The data from this study can be used by the government and organizations seeking statistical data gathered from African Americans only. According to Awidi and Hadidi (2021), the factors identified in African Americans as possible impediments to cancer participation included distrust of the medical/scientific community, poor access to primary health and medical care, the failure on the researcher's behalf to recruit African Americans, the alienation of minority health professionals, and lastly, the lack of knowledge about clinical trials, language and cultural barriers. Awidi and Hadidi went on to report that Black Americans are under-represented in cancer clinical trials. Considering multiple myeloma, as an example, a cancer in Black Americans account for about 22% of yearly cases, 32,270 new cases are estimated to occur per year. The age-adjusted incidence rate difference between the period 2011-2015 for multiple myeloma was approximately 8.4 and 7.2 per 100,000 population higher for male and female Black Americans, respectively, when compared with Whites (Awidi & Hadidi, 2021).

Regression analysis was the statistical method applied to determine the structure of the relationships through binary logistic regression. The statistical patterns were created through SPSS and equated trends to closely forecast anomalies affiliated with fibromyalgia, depression, and heart disease considering the sociodemographic factors. I assumed the expected outcomes of cross tabulating by conducting a literature review and researching the factors of health risks as reported in recent studies. Defining numerical measures of presumptive gaps in research due to the lack of data in African Americans, data sets from the NHIS annually aligned survey was selected to address a suitable analysis plan of the unobserved and observed variations of coding functionalities through statistical software.

In the secondary data set, African Americans were the only data selected and accessed once granted permission from my institution and committee members, once granted observable relationships between fibromyalgia, coronary heart disease in the African Americans within the United States were accessed. In observation, the (independent variable) fibromyalgia, and (dependent variables) depression, cardiovascular disease, chronic kidney disease, arthritis, education level (*ie. Some high school, high school graduate, some college or higher*), diet, poverty-income-ratio, PIR, diabetes, gender, and age were measured in African Americans. According to Merrill (2019) and Frankfort-Nachmias et al. (2018), an increase in the number of variables is represented by a higher correlational relationship and represented in a predictable expression.

The ratio of the probabilities of depression with medication, anxiety with medication, and access to healthcare co-curing simultaneously is statistically similar relative in each of the research questions. Chi Square test was a statistical test used to compare the observed results with the expected results. The purpose of this test is to determine if a relationship between the observed data and expected data is due to chance, or if it is due to a relationship between the dependent and independent variables. RQ1 measured the association of depression with medication concurrently with fibromyalgia along with the independent variables measured in African Americans; with the  $OR = 1.82$  95% CI [.64 – 5.18]  $p = .26$ . RQ2, measured the association of depression with medication concurrently with fibromyalgia along with the independent variables measured in African Americans; with the  $OR .77$ ; 95%CI [.54 – 1.65]  $p = .38$ . RQ3 measured the association of depression with medication concurrently with fibromyalgia along with the independent variables measured in African Americans; with the  $OR 1.34$ , 95%CI [.42 – 4.28]  $p = .63$ .

### **Interpretation of the Findings**

One major finding in this dissertation was that depression with medication is not statistically associated with fibromyalgia in African Americans. Age is associated with fibromyalgia after controlling for potential confounders. In a previous study, Drazich et al. (2022) found older African American women reported having chronic pain have an increased risk for experiencing co-morbid pain and depressive symptoms; however, in many cases, comorbid pain and depressive symptoms in older African American women are often contributed to the misdiagnoses, and under-treatment of either or both

conditions which contributes to the data being reported. On the contrary, due to the low sample size in African Americans, there is no significance; however, researcher Munipalli et al. (2022) linked depression to poorer outcomes in individuals with fibromyalgia overall. Contrary to the findings in this dissertation, another study, Henley et al. (2023) showed that due to low enrollment numbers for African Americans found that 90.6% of the participants were White, 4.9% were Black, and 4.5% were from other ethnic minority groups. Despite Black and other ethnic groups, respectively, making up 13.6% and 10.6% of the population., all together, reporting that fibromyalgia is at least prevalent in non-White populations, they also reported that the proportion of ethnic minorities recruited to trials should have doubled, even when accounting for small changes to this proportion over the past 20 years.

Another finding in this dissertation, RQ2, anxiety with medication is not statistically associated with fibromyalgia. In another study, Galvez-Sánchez et al. (2019) reported that there is evidence of a high prevalence of psychiatric comorbidities in individuals suffering from fibromyalgia particularly, depression, anxiety, borderline personality, obsessive-compulsive personality, and post-traumatic stress disorder. Moreover, there is also evidence of high levels of negative thoughts, neuroticism, perfectionism, stress, anger, anxiety and alexithymia in individuals living with chronic conditions. Galvez-Sánchez et al. (2019) also reported that because of ongoing chronic pain, it is a risk factor for suicidal ideation and behaviors. It is estimated that the prevalence of suicidal attempts has been reported as 16.7% and rising to 58.3% in the case of individuals suffering from comorbid migraines; however, the reports include

individuals as a whole and not only pertains to African Americans. For years, the negative stigma of mental health education and awareness have been plaguing the African American communities (Holliday et al., 2018). Along with other factors such as racial discrimination and a lack of equitable access to resources and services. Another study statistic showed that in a large national survey it found that nearly 50% of African Americans reported experiencing major discrimination during their lifetime, including being passed over for a job or promotion, being hassled by police, and being denied or receiving inferior medical care which contributed to post traumatic stress syndrome (PTSD) and anxiety (Holliday et al., 2018).

RQ3 analyzed if access to healthcare is not statistically associated with fibromyalgia. Janevic et al.'s (2017) data were not significant as well. They demonstrated the prevalence differs by in different categories such as education, race/ethnicity and age; however, arthritis and depression were significantly associated with high-impact pain in multivariable analysis (Janevic et al., 2017). They further stated African Americans in the lowest wealth quartile reported more pain-related disability across activity domains (Janevic et al., 2017). Access to healthcare is a health disparity that causes a burden on disease, injury, violence, and opportunities to achieve optimal health in communities that are disadvantage (*Arthritis Health Disparity Statistics / CDC, n.d.*). Lack of insurance and access to healthcare is a part of significant structural barriers to health equity. Limited health literacy is an additional barrier to healthcare access and utilization in African American communities (*Arthritis Health Disparity Statistics / CDC, n.d.*). In

addition, Gaskin et al. (2012) stated many Black families face geographical barriers living in areas with limited access to doctor's offices and other health care facilities.

Other findings showed that access to health is an ongoing issue and a major concern; however, the relationship was not statistically significant and thus is not interpreted. Depression with medication, the relationship was not statistically significant. However, as has been documented through other studies, there is a relationship between African Americans who are on medication for depression and fibromyalgia compared to an individual who do not have fibromyalgia. The probability of fibromyalgia increased based on a based-on age and a history of arthritis is African Americans.

The theoretical framework that was used to guide the study was the SEM. The SEM served as a model of interconnection to understand the complex interaction between depression, fibromyalgia, and social and health conditions. The logical connections between the framework presented and the nature of this study includes a framework for prevention between individual, relationships, community, and societal factors. The SEM schematic framework is more comprehensive because it improves an overall understanding of fibromyalgia on multiple levels (i.e., individual are the characteristics that influence health behaviors such as age, gender. Interpersonal; includes the social and emotional support from spouses, family, friends, and marital status to support healthy leaving. Organizational includes structures such as ministries and/private organizations. Community includes the relationships between organizations. Public policy enforces national, state, and local laws and regulations (Scarneo et al., 2019). In addition, the SEM is a multilevel conceptualization that is sorted by biological and individual factors of

fibromyalgia and stress at the intrapersonal (isolation), organizational level (sedentary lifestyle), community level (community involvement and social capital), and policy levels (knowledge about the disease, disability, income, education, and access to health food/meals; Scarneo et al., 2019). The SEM variables influence behaviors associated with fibromyalgia and societal factors, that aims to improve understanding of risks and interactive approaches. Since this is a study focusing on the individual level, this equates to intrapersonal variables. The interpersonal level has to do with fibromyalgia and how this affects the population of African Americans. The SEM is grounded on the models or the norms that considers how individuals, relationships, communities, and societal factor interacts, that predict the environmental influences and barriers, thus paving the way for or encouraging opportunities toward social change.

### **Limitations**

Multiple limitations in this study are needed to be adequately addressed. There is paucity of preexisting information concerning the association of fibromyalgia as the dependent variables in no nationally representative study, particularly in African Americans. Another limitation was the inability to reference an extensive amount data in previous research studies to represent causation data in a national survey. To overcome the gap of paucity information, a theoretical frameworks and conceptual models were utilized to better understand the association between fibromyalgia in African Americans.

Another third limitation was when using previously collected data, human error was taken into consideration. The problem increased due to human error because of the lack of inability or lack of ability to check for complete accuracy of the data that were



previously presented. Because the NHIS survey goes through numerous iterations and in order for the data to be appropriately analyzed it is essential for the researcher to include as many questions as possible. Because of the neglect or inability to check for accuracy in data, statistical error increases as well. It is essential for the researcher to pay careful attention to details and carefully think thorough the design and the methodologies that are implemented. Lastly, it is very important to consider several iterations of the research design with the intentions to adopt and follow. Moreover, it is essential to consider statistical requirements and choosing the correct research methods that is in alignment with the analysis, specific to the topic and research study and decide on the best method to collect and report data, and it good to consider peer reviews. By following the steps, it helps negate and eliminate the possible errors in the research analysis undertake more accurate and effective research work.

Because of the limitations occurs throughout a study, such as collection of data, time constraints, sample size, limited to information, research, data, and methodology, it is good ethical stands to consider the types of restrictions that arise from the study's design to implementing the methodology during the testing phase. Unfortunately, there will always be limitations in a research analysis due to the subjective nature of testing a hypothesis. It is essential to anticipate the possible limitations before a research analysis to be properly prepared for them when they arrive. Additionally, knowing and anticipating the limitations creates a gap for more research opportunities, leading the researcher to analyze the limitations and determine how to incorporate or address them in a in future analysis of tests or create a new hypothesis altogether. It also helps the

researcher and readers understand the optimum conditions for how to apply the results of your testing.

Validity refers to how accurately a method is measured and what it is intended to measure. If research analysis has high validity, it means the results that were produced were valid and reliable and correspond to real analysis, characteristics, and variations in research (Ahmed & Ishtiaq, 2021). In a research analysis, reliability should be considered throughout the data collection process. It is important to ensure all findings are precise, stable, reproducible, and accurate, when a tool or a technique is implemented to collect data (Ahmed & Ishtiaq, 2021). Another important potential limitation to consider is whenever there is a reliance on self-reported information, it could also lead to bias; therefore, instead of using self-reported information, the data set should be made more robust to consider the future studies when collecting the data; however, on the other hand, this approach could compromise the national representation of the study (Ahmed & Ishtiaq, 2021). Hence, it is best to continue to use a national represented data set.

It is essential to consider the extent of sensitive information such as the questions asked may contain private and/or sensitive topics, such as self-reporting of, drug use, family history, income, and violence that is being shared when using surveys, questionnaires, or interviews to collect data, in a study (Ahmed & Ishtiaq, 2021). Thus, when anonymity and confidentiality cannot be guaranteed at the time of data collection; self-reporting data can be affected. According to Ahmed and Ishtiaq (2021), bias can be referred to as social desirability bias (Latkin et al., 2017).

### **Recommendations**

Further studies should provide an improved understanding of the risk factors of fibromyalgia, including social, economic, and lifestyle factors. In order to determine how the social and economic lifestyle factors affect fibromyalgia affects African Americans over time, a longitudinal, prospective cohort study must be conducted. In other studies, risk factors such as diabetes and stress may be linked to fibromyalgia and further associations can be made (Pappolla et al., 2021).

### **Implications for Professional Practice and Social Change**

Future studies should also compare interventions and preventative measures amongst African Americans diagnosed with the chronic conditions, it is imperative to increase awareness and promote healthy lifestyles to aid in controlling and preventive measures.

Social change implications are important to determine by considering the societal factors and determinants of health that affect the diagnosis, management, and prevention of chronic condition. The association between lifestyle, socio-economic factors, and the determinant of health needs to be established, the next step is to empower individuals through knowledge of the condition to achieve a better health lifestyle and equity in populations with greater barriers to access for African Americans. As demonstrated by Mokdad et al. (2018), the differences in health outcomes, morbidity, and mortality at the state level indicate the need for greater investment in preventive and medical care to be considered on a national level. Motivating, engaging, and empowering individuals concerning chronic health conditions such as the importance of inflammation in disease progression, and improvements that can be made in physical health and daily lifestyle,

just to name a few high-risk groups. Through this dissertation, the assertion could be made to consider lifestyle and social factors in the progression of chronic diseases for a greater awareness on a national level which can contribute to future studies. Similarly, the importance of inflammatory markers in the development of subsequent renal disease needs to be emphasized among individuals and become a national priority (Mokdad et al., 2018). The implications of this study are multifold. The findings from this study will not only impact individuals who have fibromyalgia, but also bring a general awareness about the importance of considering other variables such as, education, lifestyle, physical activity, comorbid conditions, and the SDoH overall monitoring inflammatory markers in the chronic condition and its risk factors.

Researchers, doctors, practitioners, professors, dieticians, and stakeholders can use this information to educate individuals regarding living a healthy lifestyle and following an anti-inflammatory diet, which leads to optimal health. It has been suggested in the past that nutrition labels should indicate the dietary inflammatory index of a specific food to directly inform the consumers which foods cause an increase in inflammation, and which does not. For the implementation of these policies, major governmental agencies such as the Food and Drug Administration and health practitioner such as doctors, health practitioners, dietitians, etc. need to be convinced of the importance of treating the source of the condition and not the symptoms to address the proper anti-inflammatory nutrition and prevention in the context of fibromyalgia and its risk factors. Additionally, it has been proven that taking certain vitamins and dietary

supplements could aid in decreasing inflammation and preventing the progression and development of fibromyalgia (De Carvalho et al., 2018).

By providing knowledge to healthcare practitioners, professors, students, stakeholders, providers, and the community, they will be empowered to inform the individuals who they encounter that suffers from the chronic condition the importance of making positive changes in their lifestyles which aids in prevention of disease which ultimately leads to lower healthcare-related expenditures and the propagation of positive social change from healthcare practitioners to the community.

### **Positive Social Change**

Positive social change involves the implementation of revised policies, procedures, and standards (Árnadóttir et al., 2023). The development of specific intervention programs aimed at educating on health literacy, lifestyles, and preventative measures on the rapid progression of fibromyalgia in African American population. Positive social change and health literacy are aimed at changing individual behavior and lifestyle for the betterment of individuals. However, due to the limited health literacy and resources it has become a public health challenge in many countries (Árnadóttir et al., 2023). This research study is aimed to bridge the gap, providing updated data on chronic disease and the risk factors associated for various interest groups on the local, state, and international level (Mokdad et al., 2018b). The environmental conditions show the source of how and what individuals have access to and practice. The environment shows if and what resources are available. Moreover, the environment demonstrates if an individual has the option to live better lifestyles, if they wanted to. The behavior of engaging in a

more extensive social network or social change is a derivative of lifestyle on the environment.

Through this study, public health practitioners, doctors, students, and other health literacy groups can discuss a plan for social impact. Positive social change and health literacy empowers and drives equity (Árnadóttir et al., 2023). It involves the access to knowledgeable data, motivation, and competency to access, address, understand, and apply information to form a profound judgement and make decisions in terms of healthcare, disease prevention, and health promotion to maintain and improve quality of life during the life course (Sørensen et al., 2018). Equity in health relates reveals an absence of systematic disparities in health between groups with different levels of underlying social advantage/disadvantage – that is wealth, and social status (Sørensen et al., 2018). Subsequently, statistics proves when addressing positive social change, there is limited health literacy and access to the tools needed which proves there is a need for the provision of equality through accessible health information and understanding health services across different population groups (Sørensen et al., 2018). However, access to information and resources is a neglected public health challenge in many countries. In order to bridge the gap, it is essential to form a multidisciplinary collaboration collective action.

A research study suggests that is a broader economic concern surrounding social and environmental forces that are factors in many diseases and behaviors that contribute to ill health (Sørensen et al., 2018). Implementing an effective positive social change

model can effectively address the immediate concerns and the behavioral challenges to locate the problem within the individuals and communities to promote change strategies.

### **Conclusion**

There are wide differences in the burden of fibromyalgia and the risk factors on a state, local, and national level. Specific diseases and risk factors, such as access to health care, anxiety, depression, high BMI, poor diet, diabetes, and are increasing and warrant increased attention. The data from this research study can be used to inform national health priorities for research, clinical care, and policy.

Although previous studies shows that the United States and many individual states have made progress in reducing mortality for fibromyalgia, there has been limited success in reducing the chronic condition. Mokdad et al. (2018c) suggested their findings point to an urgent need to address mental health and also suggested there is a need for improved access to quality mental health care and screening to improve outcomes, as well as programs to prevent mental disorders and promote mental health.

Fibromyalgia is often exacerbated by multiple risk factors and psychological components, which contributes to the disorder itself (Sørensen et al., 2018). However, there is no disease-modifying treatment for fibromyalgia; thus far, numerous modalities of treatments are available for symptomatic improvement, but pain relief is not achieved in a significant proportion in individuals despite pharmacological and non-pharmacological approaches available (Mokdad et al., 2018c). Research has proven that there is an economic burden of other chronic painful musculoskeletal conditions, are enormous and have been shown to be the second most common condition with

expenditures of \$129.8 billion in 2016, an increase of 35% from 2013 of \$95.9 billion (Sørensen et al., 2018).

Many of the risk factors that contribute to the disparities in burden are amenable within the context of supportive behavioral and lifestyle changes. For example, it has been found that many cardiovascular risk factors, such as high blood pressure and high cholesterol levels, now can be treated more effectively with early detection and proper follow-up. Therefore, expanding health coverage for certain conditions and medications should be considered and adopted to reduce burden.



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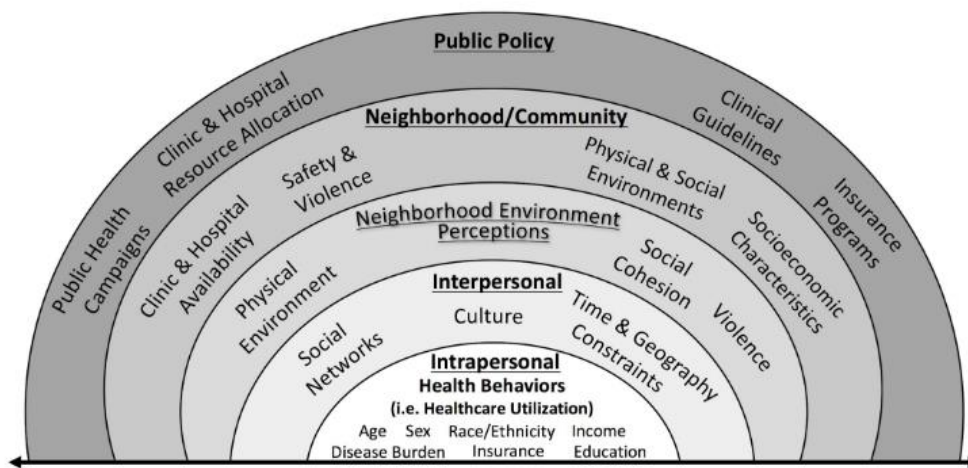
Appendix

Figure 1

**The Social Ecological Model of Health**



**Figure 1.** Social ecological model of health. Adapted from McLeroy et al. (6) by Tasha Golden (7).



**Fig 1. The socio-ecological model for health behavior.** This modified socio-ecological model introduces the influence of both objective and perceived neighborhood factors which may be associated with an individual's health behaviors, including healthcare utilization.

<https://doi.org/10.1371/journal.pone.0230041.g001>

## Facts on Fibromyalgia syndrome

Fibro means fibrous tissue (ligaments & tendons), myo means muscle, and algia is used to describe pain.



### Fibromyalgia is a very real

Fibromyalgia syndrome is a collection of conditions that make up fibro. Fibromyalgia is a chronic pain condition, which causes generalised pain and muscle stiffness in many parts of the body.

Fibromyalgia can affect people of all ages and all socioeconomic groups, but it is fairly common in young to middle aged women.

Fibromyalgia can flare due to stress, extremes of temperature, over-exercise, hormones, sleep issues, changes in medication, exercise, and illness & injury.

### Treatment

There are several types of medications your treating Dr may offer you.

**Antidepressants** - which help with depression, and may help with pain muscle pain/spasm.

**Anti-seizure drugs** - helps with pain, migraines. **Pain medication** - Nerve pain medication is often prescribed, and suggestion of various OTCs, rather than prescription pain scripition.

**OTC** - (over the counter) is the preferred pain relief, but there is some evidence that some chronic pain sufferers require stronger pain relief.



### Signs & symptoms

Widespread musculoskeletal pain, muscle weakness, numbness & tingling in the arms, leg, fingers & toes and stiffness in the muscles & bones that last more than 3 months, extreme fatigue, headaches/migraines, cognitive issues, eyesight, hearing, sleep disturbance, depression/anxiety, indigestion issues, thermostatic stability, etc.



### Alternative treatments

Magnesium tablets/oil  
Vitamin A, B, C, D, etc  
Zinc  
Fish oil

Antioxidants (e.g. CoQ10)

Herbal teas

Hot/cold packs

Epsom salts - bath/foot-spa  
Acupuncture, tai chi, massage, meditation, relaxation therapy & yoga, massage, hot rocks massage, aromatherapy, physio kinesiology, hydrotherapy



### Co-existing disorders

Thyroid dysfunction, ME/CFS, Myofascial Pain Syndrome, Multiple chemical sensitivity, Restless leg syndrome, IBS & Digestive issues, Menstrual issues. In about 25% of cases, fibromyalgia co-exists with an autoimmune condition. Two serious autoimmune diseases that predominantly come up with fibromyalgia is Lupus & RA.



### Diagnoses

Fibromyalgia is difficult to diagnose, as there is no widely used diagnostic test for it. Your GP will refer you to a rheumatologist who will do a thorough examination, ask for family history & request a full panel blood tests to rule out other conditions, X-rays, Scans or MRIs dependant on your signs & symptoms.

Fibromyalgia is not an autoimmune or inflammation based illness, but it is believed the nervous system is involved.



### Support & Support groups

Fibromyalgia can be very isolating.

So having support from family, friends is vital. Along with your treating GP/specialist and community advocacy service.

And gathering information, support & friendship from support groups, face to face or online.

