INVESTIGATION OF GENTRIFYING NEIGHBORHOODS

AND RESIDENTS' HEALTH IN EAST AND

SOUTHEAST AUSTIN, TEXAS

by

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DEDICATION

To my late mother, Mrs. Funmilayo Iyanda and Late Dr. Akinwale Ojo (The Ruwaji of Ile-Oluji)

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Description
AA	African Americans
AICc	corrected Akaike Information Criteria
ANOVA	Analysis of Variance
AOR	Adjusted Odds Ratio
ARA	Austin Revitalization Authority
ASR	Access to Socioeconomic Resources
AURD	Austin Urban Renewal Department
BE	Built Environment
BMI	Body Mass Index
BP	Blood Pressure
CAO	City of Austin
CBD	Central business district
CCAHS	Chicago Community Adult Health Study
CDC	Centers for Disease Control and Prevention
CEAMP	Central East Austin Master Plan
CEANP	Central East Austin Neighborhood Plan
CFI	Comparative Fit Index
CHCs	Chronic health conditions
CHDH	Childhood Health

CI	Confidence Interval
CMS	Chronic Mild Stress
COVI-19	Novel Coronavirus 2019
CPES	Collaborative Psychiatric Epidemiology Surveys
CRP	Community Redevelopment Plan
CVD	Cardiovascular Disease
DASS	Depression, Anxiety, and Stress Scale
DM	Diabetes Mellitus
DOHZ	Defend Our Hoodz
DVs	Dependent Variables
ED	Emergency Department
EFA	Exploratory Factor Analysis
GEADC	Greater East Austin Development Committee
GFI	Goodness-of-Fit Index
HBP	High Blood Pressure
HIA	Health impact assessment
HIV	Human Immunodeficiency Virus
HMem	Number of Household
IDI	In-Depth Interviews
IRB	Institutional Review Board
IRR	Incidence Rate Ratio

KII	Key Informant Interview
LCT	Life Course Theory
LLR	Likelihood Ratio
LTRs	Longtime residents
m-CHCs	Multiple Chronic Health Conditions
MESA	Multi-Ethnic Study of Atherosclerosis
MFI	Median Family Income
MHI	Mental Health Illness
MSA	Metropolitan Statistics Area
NB	Negative Binomial
NB-MLE	Negative Binomial Estimated with Maximum Likelihood
NCCDPHP	National Center for Chronic Disease Prevention and Health Promotion
NCI	Neighborhood Cohesion Instrument
NIH	National Institute of Health
OR	Odds Ratio
PEH	Political Ecology of Health
PGS	Perceived Gentrification Scale/Score
POC	People of color
PODER	People Organized in Defense of Earth and Her Resources
PSC	Psychological Sense of Community

RMSEA	Root Mean Square Error of approximation
SD	Standard Deviation
SDOH	Social Determinants of Health
SE	Standard Error
SEM	Structural Equation Model
SES	Socioeconomic Status
SPSS	Statistic Package for Social Sciences
SRGH	Self-Rated General Health
SRH	Self-Rated Health
SRMH	Self-Rated Mental Health
SRPH	Self-Rated Physical Health
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
TLI	Tucker-Lewis Index
UGCoP	Uncertain Geographic Contextual Problem
US	United States
WHO	World Health Organization
YrSCHL	Total Years in School

ABSTRACT

This study examines the role of urban gentrification on residents' health and wellbeing. The author adopts the World Health Organization definition of health as "a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity." By definition, gentrification is the movement of the higher-income population into lower-income neighborhoods, thus increasing property values, tax, and rents leading to the voluntary and involuntary displacement of low-income longtime residents. Gentrification has been a hot topic in the city of Austin for over two decades. The city of Austin, mainly East Austin, is known for its vibrant social and cultural lifestyle. It is home to live music, restaurants and cultural food, and historical landmarks. Despite its current diversity, most of those who have long resided in East Austin are people of color (POC), including Black/African Americans (AA) in the northern part and Hispanics in the south. Historically, East Austin has witnessed structural segregation, mostly leading to economic disinvestment in these minority neighborhoods principally due to the 1928 City Zoning policy. Due to urbanization, migration, globalization, and various local and national segregationist policies, the spatial and demographic characteristics of East Austin have dramatically changed in the past two or three decades. The historical covenants and conventions exposed the neighborhoods to uncontrolled mixed land uses, which permit industries' siting near residential areas. Consequently, different opposing bodies, including PODER (People Organized in Defense of Earth and Her Resources), have moved against urban policy resulting in gentrification and other

detrimental effects on residents—displacement. In this dissertation, the author assesses gentrification subjectively based on residents' level of perception of neighborhood change and thus developed a perceived gentrification scale from five items.

Based on the post-positivist worldview, this study adopts a mixed-method research method to achieve the two research objectives: (1) to quantitatively examine the probable impact of gentrification on residents' health, and (2) to qualitatively explore the meaning, concerns, perception of neighborhood effect on health, and strategies or coping mechanisms adopted by residents in the gentrifying environments to weather the impacts of gentrification. The mixed method includes a mixture of quantitative analyses of the perception of gentrification on health based on survey data, oral historic interview, and a one-on-one online interview to understand the effect of gentrification on residents' health. Specifically, the quantitative aspect examined the relationship between the perception of gentrification, self-rated health, mental health, and chronic health conditions (CHCs). On the other hand, the qualitative aspect was used to deeply explore and understand participants' opinions for meaning, symbol, belief, self and community identity, and sense of commitment to their neighborhood.

In the first chapter, I present the statement of problem and justification for carrying out the research. Chapter Two of the dissertation examines Austin's historical background and some of the policies that facilitated gentrification in East Austin. This research understands self-rated health and CHCs from different theoretical lenses, including the political ecology of health (PEH), subculturalist, social determinants of

health (SDOH), and life course theory (LCT). Discussion of the theoretical perspectives is included in Chapter Three of this dissertation. In Chapter Four, I presented the research methodology and described the systematic processes of data collection. In chapters 5-8, I present the results from the quantitative analysis and the qualitative interpretation of the interviews. The overall conclusions and discussion of my findings are presented in Chapter Nine.

In Chapter Five, I show that perceived gentrification among community members was significantly associated with 'poor/low' self-rated mental health and high reports of 'good/high' self-rated physical health and self-rated general health. Longtime residents reported lower/poorer self-rated general and physical health compared to recent residents. In contrast, longtime residents surprisingly reported higher/good self-rated mental health than recent residents. Similarly, older residents in gentrifying neighborhoods rated their mental health better than middle-aged residents. I also found that the three types of self-rated health significantly varied by socioeconomic status (e.g., educational attainment), but I did not find any significant difference by race/ethnicity.

Chapter Six used a triangulation method including univariate, bivariate correlation, and multiple linear regression implemented through the structural equation model to examine the complex pathways to three health outcomes—measured stress, self-rated mental health, and depression symptoms. Bivariate Pearson's correlation indicated a significant positive association between gentrification scores and mental health symptoms and stress. However, the direct association between gentrification and

depression disappeared in the causal/path model. In support of the weathering hypothesis, which posits that repeated exposure to stressor without any intervention deteriorates health, I found that objectively measured stress was directly related to symptoms of depression among residents in the study area.

In Chapter Seven, I employed non-linear techniques suitable for Poisson distribution to estimate the association between gentrification and reports of chronic health conditions, a count variable. First, I found a significant positive association between the perceived gentrification score and CHCs in all three probability models—Poisson, Negative Binomial (default), and Negative Binomial estimated with maximum likelihood (NB-MLE). Second, there was a significant positive association between historical childhood health and CHCs supporting the life course theory. An additional investigation based on mediation analysis to explore the indirect effect of gentrification through access to socioeconomic resources and historical health conditions explained 54% and 11% variation in the report of CHCs, respectively.

Chapter Eight qualitatively explores the perceived impact of gentrification on residents' health and wellbeing using information from key informant interview (KII) and in-depth interviews (IDI). Several themes related to environmental stress and weak neighborhood interest emerged deductively, while other themes emerged inductively. Regarding the perspective of gentrification on health, many participants discussed how gentrification could contribute to psychological/mental stress that could eventually lead to physiological health symptoms. Almost every participant indicated that they had

previously been involved in one community or neighborhood organization—formal or informal. Nevertheless, participants raised concerns about eroding social capital due to gentrification and the displacement of the minority population in East Austin. Despite acknowledging increased diversity, participants had a sense of loss in neighborhood activism compared to when the neighborhoods were less diverse. A frequently expressed way residents resist or have been able to remain in their neighborhood was through employment and family support. The majority of the participants had never done anything politically to resist gentrification.

The findings add to the understanding of the effect of gentrification on residents in Austin. It is crucial to make policymakers and other stakeholders aware of urban renewal policies' deleterious impact leading to gentrification. The study will also help foster strategies that will compensate and mitigate against the persistent implications of (re)development programs on citizens, particularly those who may be actively witnessing gentrification, the owner-residents. Finally, the research also contributes to the health impact assessment (HIA) and social injustice related to urban renewal programs in Austin, Texas, and beyond.

I. INTRODUCTION

Background

Health is defined in the constitution of the World Health Organization (WHO) as "a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity" (World Health Organization 1946, 1). Though health matters to everyone, the quality of health varies across space, socio-economic spectrum, age, racial identity, or social class (Shavers 2007; Braveman et al. 2011; Carter-Pokras and Baquet 2002). People in the lowest social class of society, the underprivileged—mostly minority groups and the elderly—are disproportionately impacted by the adverse effects of neighborhood change. There is also a spatial agglomeration of classes. Coined as structural segregation, people of the same social, economic, and cultural classes tend to cluster conspicuously in urban spaces (Massey 1979a; Wyly and Hammel 2004). Globally, structural segregation produces poor health, health inequality, and unhealthy human stock (D. R. Williams and Collins 2001).

The concept of neighborhood effect is academically fascinating, yet it is of particular interest to policymakers at different levels. In this project, I examined the association between residents' perception of gentrification and three common measure aspects of health: self-rated health, mental health conditions, and chronic health conditions. In recent times, the "neighborhood effect" has emerged as a framework in which health disparities are being studied for achieving health equity through public health intervention. One such dimension of the neighborhood indicator is gentrification, chiefly produced from government policies (urban renewal and housing policies), globalization, urbanization, and structural inequality (Davidson 2010; Kovács, Wiessner,

and Zischner 2013; Bailey 1959). Despite the long-debated impact of gentrification on health, the mechanisms remain poorly understood among public health practitioners. Hence, this study investigates the perception of neighborhood change[1], aka gentrification, and health among East and Southeast Austin residents for policy implications toward improving residents' health. Additionally, in this dissertation, I operationalized gentrification subjectively based on residents' level of perception of neighborhood change and thus developed a perceived gentrification scale from five items.

The Concept of Place and Health

One of the most controversial areas of debate in contemporary cities concerns how urban policies such as urban renewal programs have resulted in contested space (K. Lee 2009; Eade 2006; A. Newman 2011; Curran and Hamilton 2012; Wolch, Byrne, and Newell 2014; Anguelovski 2015; Pearsall and Anguelovski 2016; C. B. Smith 2016; Öz and Eder 2012; Hou and Tanner 2002; Chaskin and Joseph 2015; Weinstein and Ren 2009; N. Dines 2002; N. T. Dines and Dines 2012). The literature on place and health has burgeoned (Minh et al. 2017; Buzzelli 2007; Gebreab et al. 2017; Izenberg, Mujahid, and Yen 2018; Casciano and Massey 2012; Levitt 2015; Way, Mueller, and Wegmann 2018; Mujahid et al. 2017; Howden-Chapman, Signal, and Crane 1999). Although this research area is not new, it can be traced to Hippocrates's investigation of environmental impact on human health in his book 'Airs, Waters, and Places' (Van der Eijk 1991).

Some health scholars primarily focused on individual-level characteristics. Recently, attention is shifting from individual-focused investigation to studies exploring the complex factors between individual contextual and compositional factors in order to

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[1] Please note that not all neighborhoods that are experiencing changes are qualified t be gentrified. However, the study area for this project qualified using both terms.

understand neighborhood effects on health outcomes (Vo et al. 2017; Arcaya et al. 2016; Kwan 2009). This research area has essentially been advanced by the political ecology school of thought, which combines lower and upper contextual factors to investigate health outcomes (Jackson and Neely 2015; Mayer 1996). Lower contextual factors include neighborhood factors such as resources available to individuals, including housing, employment, education, social network, or social capital. The upper-level factors refer to several government policies that have indirect effects at the local level (Office of Disease Prevention and Health Promotion 2020). For example, federal, state, and local government housing, transportation, and public safety policies also have implications on the standard of living and wellbeing. Residential segregation and lack of access to mortgage/finances to a specific group of people can lead to neighborhood depreciation. In this research, I investigate one dimension of the environment and its impacts on health, mainly from the political ecology standpoint. Explicitly, it investigates the impact of gentrification on current residents' health in gentrifying neighborhoods in Austin, Texas.

As shown in Figure 1 below, individual characteristics such as genetics, family structure, age, education, and temperament combined with the total physical, social and structural environments to determine individuals' health outcomes. By structural determinants, I refer to age, family structure, main activity, education, occupation, income, and social support to govern health (Denton and Walters 1999; Crear-Perry et al. 2020). Within the context of gentrification, the interaction between the structural, physical, and social environment predisposes individuals or a group of people to both physical and psychological insults (e.g., stress, air pollution). However, these exposures

could be averted or controlled based on the available opportunity/resources to protect individuals from various insults emanating from the environment. Furthermore, one's health risk or health outcomes may vary depending on the life course or mobility. Put differently, the accumulated exposure to risk depends on other sociocultural factors such as job mobility, education, and marriage.
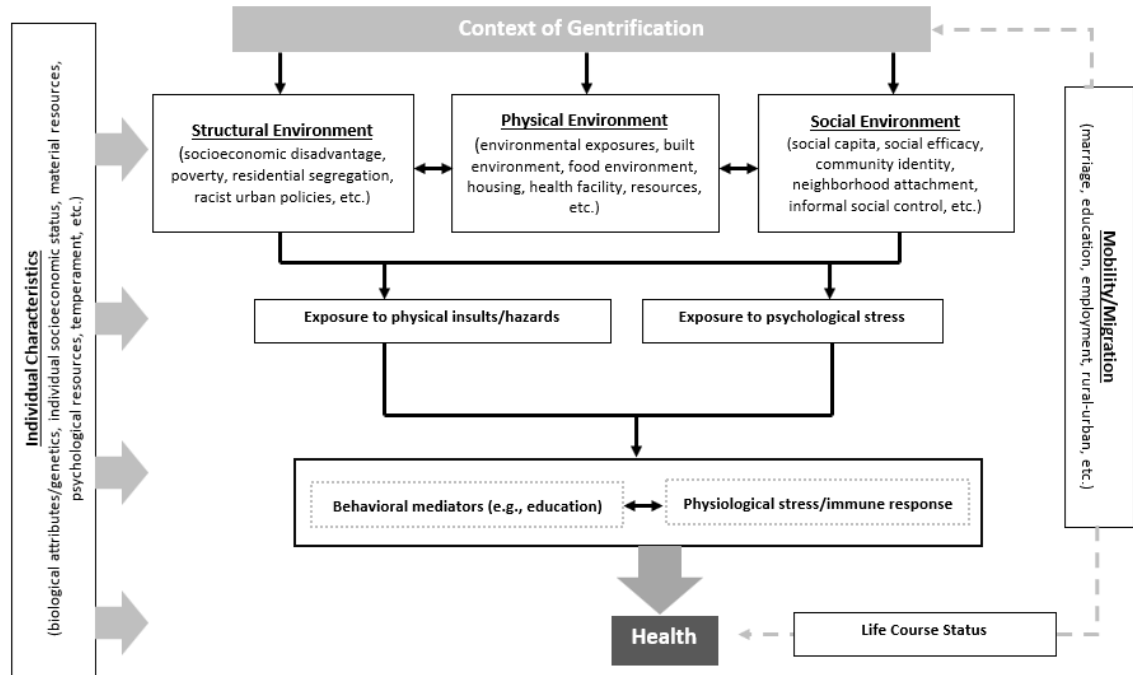
Figure 1. Conceptualization of the Relationship Between Gentrification and Health.

Gentrification, broadly defined, is a process that reverses the declining and disinvestment in the inner-city[2] and attracts the return of capital into neighborhoods leading to sociospatial rearrangement of the inner-city landscapes (Alonso 1964; Freeman 2005; 2016; N. Smith 1979). The definition of gentrification I adopted in this study aligns with those that have been used widely by scholars, which is the movement of the higher-

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[2] Note that not all redevelopment of inner-city always lead to gentrification, the definition in this context is based on urban investment and revitalization that cause gentrification based on the literature cited in this context.

income population into lower-income neighborhoods, thus increasing property values, tax, and rents leading to the voluntary and involuntary displacement of longtime residents (LTRs) (R. Atkinson et al. 2011; Freeman and Cai 2015; R. Atkinson 2004; 2000; Rucks-Ahidiana 2020). Scholars like Neil Smith described gentrification as "a systematic, comprehensive policy for city building," which connotes inequality in many research arena (N. Smith 2008a, 196). On the other hand, urban gentrification advocates argue that gentrification increases housing stock, restoration of neighborhood quality, dissolution of poverty rate, new businesses and investors' attraction, and tax revenues for municipal government. Conversely, gentrification is associated with the physical and cultural displacement of vulnerable residents, including the elderly and lower-income groups, leading to or intensifying homelessness, landlord harassment, chronic health conditions, and psychological distress (R. Atkinson 2004; Whittle et al. 2015). For the purpose of this dissertation, I operationalize gentrification subjectively. This decision was informed based on recent advocates for a universal measure of gentrification due to instability in the objective measure of gentrification in the literature (DeVylder, Fedina, and Jun 2019).

Problem Statement

In a recently published work in Progress in Human Geography, Elliott-Cooper and colleagues poignantly revealed the gap in gentrification research. The authors argue that "work in gentrification studies has historically tended to focus on middle-class gentrifiers and the production of gentrified living spaces...rather than the consequences of this for low-income groups" (Elliott-Cooper, Hubbard, and Lees 2019, 3–4). Consequently, this study built on previous research based on identified research gaps in

gentrification-health literature and proposed investigating the health impact of urban renewal, aka gentrification, among East and Southeast Austin residents. Longtime residents in these neighborhoods are currently experiencing chronic displacement and rapid neighborhood change. Generally, longtime residents in gentrifying neighborhoods are faced with the dispossession of their cultural and physical environment, precipitating emotional and physical health challenges (Perrino et al. 2008).

Furthermore, in understanding different mechanisms contributing to health, the role of gentrification is not yet clear. As a result, there is a need to understand how different policies, including urban renewal programs that produce gentrification and displacement, impact citizens' health—notably, the most economically and socially disadvantaged society. Understanding the social and structural determinants of health has also been the interest of social epidemiologists. Social epidemiologists are concerned about the social determinants of health (SDOH). The determinants of health range from government policies, economic and socio-cultural contexts that operate at different scales to affect people. Health determinants can be understood from political ecology and socio-ecological perspectives (J. I. Kim and Kim 2017; Schölmerich and Kawachi 2016). Therefore, this research investigates the geographic and socio-economic factors associated with residents' health and diseases in East and Southeast Austin.

Purpose of the Study

This study aims to examine if and how gentrification impacts residents' health in Austin, where the historical communities in the Eastside are experiencing what I refer to as 'active gentrification.' Recent studies have expanded the concept of gentrification beyond residential displacement to address access and inequality and consequently

6

deemed as environmental and social justice issue (Mullenbach and Baker 2020; Anguelovski 2016; Pearsall and Anguelovski 2016). Hence, it has been hotly debated in the (social) media among elites, politicians, and opposing groups[3]. Urban literature is replete regarding the production of gentrified living spaces and displacement as an outcome of gentrification. However, few studies have examined the physiological and psychological health impacts of gentrification (G. S. Smith et al. 2020; A. S. Schnake-Mahl et al. 2020). More interestingly, limited scholarship in the United States (US) has considered the direct impact of gentrification on chronic health conditions (e.g., mental health, hypertension, obesity, asthma) and examination of multiple CHCs within the context of gentrification and neighborhood change are lacking.

Till now, there is no clear understanding of how gentrification can contribute to the current incidence of CHCs in most US urban cities, notably in Austin. Therefore, a microscale study can help us understand the link between urban neighborhood change, urban policy, market neoliberalism, and health (Quastel 2009). Cross-examination of the literature on gentrification and health indicates an undershoot in this area of research. This study will fill this gap using primary field survey data and in-depth interviews to understand the relationship between gentrification and health.

Previously, Wyly and Hammel (2004) argued that city redevelopment plans have deleterious impacts on low-income minority groups. Additionally, scholars have projected for urban renewal without displacement (Castagnola 2015; Levitt 2015; Shaw and Hagemans 2015; Eckerd 2011; Uitermark and Loopmans 2013) but less concern for gentrification and healthy living. This study investigates a critical outcome of the urban

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[3] Examples of opposition groups in East and Southeast Austin are the community activist groups such as the People Organized in Defense of Earth and Her Resources (PODER), Defend Our Hoodz or DOHZ

renewal program apropos, its effects on the changing pattern of the built environment (BE), and its effects on the residents' health. Since gentrification is a social and environmental problem, its effect on residents' health is significant for various reasons, such as revealing spatial disparity and developing geographic-specific policies for sustainable health.

The present study is critical for several reasons. First, it will bring to the fore the discussion on the probable impact of gentrification on health for meaningful public health interventions. Second, it is intended to reinvigorate the magnitude of the problem to the policymaker's awareness to develop strategies that compensate and mitigate against the persistent effects of urban renewal and (re)development programs, especially on people who are most impacted by the changing neighborhood environment in East and Southeast Austin. Specifically, the research contributes to understanding the ongoing gentrification discourse and helps reveal the effect of neoliberalism[4] currently displacing old residents of East Austin (Cocola-Gant 2019).

Research Aim, Objectives, and Questions

This study aims to assess the impact of gentrification on residents' health. The overarching aim was subdivided into two objectives:

Objective 1. To quantitatively examine the probable effect of gentrification on residents' subjective and objective measures of health (Subjective measure health: self-rated health and chronic health conditions; Objective measure health: Depression, anxiety, and stress measured by standardized scale)

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[4] Massive funding of (re)investment in inner-city neighborhoods aimed at improving housing stock (Wyly and Hammel 2002).

Objective 2. To qualitatively explore the meaning, concerns, perception of neighborhood effect on health, and strategies or coping mechanisms adopted by residents in the gentrifying environments to weather the effects of gentrification.

To achieve these objectives, I employed structured questionnaires to elicit residents' awareness of the physical, social, and cultural changes, health conditions, and access to socio-economic resources in their neighborhood and interviewed a few residents to gain a subjective perception of their feelings of the effect of neighborhood condition and health. Aligning with these research objectives are a series of research questions I pursued throughout this study.

Quantitative Research Questions

- Do residents' perceptions of gentrification associate with their subjectively measured health (self-rated health, physical and psychological chronic health conditions) and objectively measured health (e.g., depression, anxiety, and stress)? If yes,

- To what extent does access to social capital, socio-economic resources, and historical health influence the associations?

- Do participants' subjective and objective health vary by race/ethnicity, gender, and socioeconomic status (SES: education, income)?

- Is residents' self-rated health related to their objective measured health?

- To what extent can social capital (neighborhood interaction, attraction, and cohesion) influence residents' health?

Qualitative Research Questions

- How do residents perceive neighborhood change or gentrification?

- What are the current residents' major concerns in East Austin, Texas?

- Do residents think gentrification makes people sick?

- What are the coping strategies used to resist displacement by longtime residents?

Organization of the Dissertation

The first part of the study lays out the background and presents broad concepts germane to the study of place and health. It further presents the problem statement, the study's purpose, research aim, research objectives, and the associated research questions.

Chapter Two presents information on the study area and cross-examined extant literature related to Austin's historical background, the definition of gentrification, gentrification and health, and closed with the presentation of the gap in the literature.

Chapter Three covers the theories and models that guide the study, namely political ecology, subcultural, and ecological models. The chapter also examines several sub-models, including rent theory, social determinants of health, and life course theory.

Chapter Four presents the research methodology, data collection process, and the general description of the research instrument and participant selection.

Chapter Five examines self-rated health, defined as the assessment of overall health, physical health, and mental health within the gentrifying environment. The study examines the disparity of self-rated health (physical health, mental health, historical childhood and parental health, and overall health) by socioeconomic status, race/ethnicity, marital status, residence, and tenancy. The chapter used quantitative techniques to explore the association between gentrification and resident's self-rated health.

Chapter Six focuses on mental health outcomes and explores complex pathways leading to depression using path analysis and structural equation models. The chapter used multivariate regression implemented through structural equation model (SEM) to link between self-rated mental health, gentrification, stress, and depression.

Chapter Seven presents evidence of the link between gentrification and chronic health based on Poison probability and Negative-Binomial models. It also documents the mediating effect of access to socioeconomic resources.

Chapter Eight presents the result from the in-depth interviews (IDIs). The chapter explores residents' perceptions of gentrification, social capital, coping strategy, and health perception.

Chapter Nine summarizes the research's major findings and contributions to the broad literature of gentrification and health.

II. LITERATURE REVIEW

Introduction

This section explores several sources to lay a background for the research's main goal: understanding the link between gentrification and health. I utilize historical perspective to trace the development of gentrification in Austin, Texas, mostly from the grey literature (e.g., historical document published online, online newspapers, personal websites of individuals, working papers, Wikipedia, in tandem with oral history from a key informant in East Austin). I also used published research on gentrification, neighborhood change, and health. Therefore, the earlier part of the chapter addresses urban settlement, population growth, Black population boom, urban planning, Grid street patterns, and segregation issues to understand the development and structural production of East Austin's gentrification. The latter part focuses on the perception of neighborhood change and health in East and Southeast Austin. The chapter ends by highlighting some gaps in the literature on gentrification and health.

Historical Perspective: Austin in the 18th Century

In July 1770, the first European settler arrived in present-day Austin[5] from East Texas on a religious mission. Before their arrival, history had it that there were traces of native Nomadic American tribes who fished and camped along the creeks, including the Barton Springs in the present-day of west Austin. At that time, there were three tribes of native nomadic American tribes—*the Tonkawa* were the predominant tribe, followed by *the Comanche*, and *the Lipan Apaches* tribes, known as Prairie Indians (Wharton, 1922). As a result of unfavorable environmental conditions, the European missionaries who

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[5] The present-day Austin was originally known as Waterloo village.

founded three missions by the Colorado River, also near Barton Springs, emigrated to San Antonio. After Mexico, known as New Spain, gained independence from their Spanish colonizer, there was a drastic upward migration of Anglo-Americans toward Texas's southern border. Around the 1830s, the Anglo-American migrants continued to move until they reached today's Central Texas. Political historians believed that the first settlement in Waterloo's village was in 1837 near the Colorado River and Shoal Creek's confluence for a livelihood (Wharton 1922). The river, the creeks, and the springs serve as tangible support for the pioneers and the first settlers. The water bodies are the embodiment of the current Austin until today, a natural monument that must not be underemphasized when chronicling Austin's development (Busch 2017).

Austin Became the Capital Seat of Texas

Austin emerged as Texas's capital seat after the successful Revolution[6] (1885-1886). Texas gained independence on March 2, 1836, from Mexico and became a state under the US on February 19, 1846 (Wharton 1922) and declared the Republic of Texas, and at least five Texas sites represented as temporary Capitals, a time that was referred to as a period of political "disarray." In 1837, General Sam Houston, who served as the first and third President of the Republic of Texas, moved the Republic's Capital to Houston from Buffalo Bayou[7] (Houston) and remained the capital seat till 1840 (Wharton 1922).

After President Mirabeau B. Lamar's election in 1838, the capital was moved back to Waterloo Town [Austin]. President Lamar, therefore, commissioned a site-

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[6] Texas revolution was a rebellion of colonists from the United States and Tejanos (Texas Mexicans) in putting up armed resistance to the centralist government of Mexico. See https://en.wikipedia.org/wiki/Texas_Revolution

[7] Houston on Buffalo Bayou," as it is written in the congressional record, was yet a city in prospect when it was selected on November 30th, 1836 for the temporary capital of the Republic. See Wharton (1922, p.166-168).

selection committee to assess the optimal site for the new Capital (Cryer 2019). President Lamar's instruction "stipulated that the site should be between the Trinity and Colorado and above the San Antonio Road." The committee then reported "that we have selected the site of the town of Waterloo, on the east bank of Colorado." (Wharton 1922, 171). On his visit to the site in 1838, he was fascinated by the beauty and richness of Waterloo's Westside [Austin]. He (President Lamar) was futuristic and economically convinced about the economic prospects of Waterloo's newfound. President Lamar's decision was boosted by Austin's centrality—lying between San Antonio and Santa Fe, with many economic potentials that could benefit the new Republic. As a result, the commission acquired 7,735 acres (3,130 hectares) of land along the Colorado River (Hazlewood 2010)

Historically, what became the present-day City of Austin was named after Stephen F. Austin, the son of Moses Austin[8], who participated immensely in negotiating the boundary treaty with the local Native American Indians at the Treaty Oak site; a site that referenced the location where many settlers were raided and killed at the time (Wharton 1922). The name of Austin was formally Chartered in 1839 by the Texas Congress, and it grew to become the present-day City of Austin.

Austin City Land-Use Planning and Black Population in the 18th Century

The old city planning system across the country relied upon the intersection of streets at the right angle, commonly known as the *Grid Plan*. The grid plan was first used by Hippodamus (498 – 408 BC) in planning development and social order restoration in Piraeus, Greece. The rest of the world followed suit by adopting his planning innovation

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[8] Moses Austin, the father of Stephen Fuller Austin, was the first and last person who was granted colonial privilege from the Spanish government to establish a Colony in Texas and settled 300 families in 1821.

in most world cities. The first Hippodamian grid plan in the US was in planning the city of Philadelphia by William Penn in 1662 (Knight 2012). The grid plan system has been hyped for its indexical qualities. By its nature, the grid plan style has no built-in hierarchical arrangement. Therefore, it naturally promotes *equality*; that is, no area is superior to the other. Most American cities are built based on this grid plan system. In the US, Philadelphia was also the first city to use the indexical system of numbers for north-south streets and *tree* names for east-west streets (ibid.). Hence, "because of this coordinate system, the intersection at 12th/Walnut has no social or political meaning than that at 18th/Cherry" (ibid.). The grid plan promotes essential *spatial equity* in terms of physical area.

Hippodamian grid plan system was adopted for the new city [Austin] by Edwin Waller, who became the first Mayor of Austin. The new development plan was done on a 640-acre (260 ha) site on "a bluff" above the Colorado River, nestled between Shoal Creek to the west and Waller Creek to the East, as seen in Figure 2 (Humphrey 2010). The grid plan charted by Waller was on a single square-mile plot with 14 blocks running in both directions (see Figure 2). The grid planning approach adopted by Waller was very similar to the one used by Penn in Philadelphia. The name of rivers and trees were used in naming the streets running north-south and east-west, respectively. In 1888, the street naming system was reversed to numerical numbering style, running from the 1st street from the south [river] to 15th street in the north; and from East Avenue to West Avenue[9] in Austin. This design still exists in the City of Austin today.

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[9] Demarcated by the present interstate Highway 35. The present I-35 was the then East Avenue.

Figure 2. Birds Eye/ Ariel View of Austin in 1873. (Picture by Augustus Koch, 1840-?). Original Comment: Austin, Texas, in 1873. Bird's Eye View of the City of Austin Travis County, Texas 1873, 1873. Lithograph (hand-colored), 19.7 x 28.1 in. Published by J. J. Stoner, Madison, Wis. Center for American History, The University of Texas at Austin. Accessed from Wikipedia, 2019.

Austin Population Growth and Black Population

The population of Austin in 1850 was 854 (dropped from 890 in 1840 due to civil war), which include 225 slaves and one free Black. At that time, slaves were commodified, and 48% of Austin's household-owned slaves as property (Humphrey 2010). A decade later (1860), the Austin population rose to 3,494, and about 28% were slaves (989); 12 (1.2%) were free Blacks (Gibson and Jung 2012). After the end of the American civil war (1861-1865), there was an exponential increase in the Black/African American population by 57%. Between the late 1860s and 1870s, the period of Black emancipation, there was a sporadic Black residential community in Masontown,

Robertson Hill, Wheatville, Pleasant Hill, and Clarksville (Busch 2017). The total

population (4,428) of Austin in 1870 was composed of 36% freed Blacks who lived in

communities highlighted in Figure 3. By 1940, the population rose to 90,000 people with

an incorporated area of about 30,000 square miles. Half a decade later, the population had

gone up to 472,020 with an average 40% rate per decade. Between 1940 and 1990, the

total incorporated land also increased by sevenfold to almost 225.40 square miles. The

population continues to surge, and in 2000, it reached 656,562 (Humphrey 2010). As of

July 1, 2019, Austin had a population of 978,908, up from 790,491 at the 2010 census

(Wikipedia 2020). As shown in Table 1, the percentage racial composition in Austin

changed significantly between 1950 and 2010. More notably, the percentage of Blacks'

composition changed from 13.3% to 8.10 in 2010 while Asian increased from less than

one percent to over six percent.

Table 1. Racial Composition in Austin, 1950-2010.				
Racial composition	2010	1990	1970	1950
White	68.30	70.60	87.20	86.60
—Non-Hispanic	48.70	61.70	73.40	N/A
Black or African American	8.10	12.40	11.80	13.30
Hispanic or Latino (of any race)	35.10	23.00	14.50	N/A
Asian	6.30	3.00	0.20	0.10

Sources: United States Census Bureau, 2012; Wikipedia, 2020 (N/A data not available)

Context to Segregation in Austin: The 1928 City Plan

Before the 1928 city plan, the Black communities were dispersed, and the

enclaves of Black settlements were based on family ties, religious affiliations, and

connection to pre-emancipation slave status with common slave owners. The 1928 Koch

and Fowler's city plan was instrumental to the Black population's concentration toward

the Eastside of the City across East Avenue, now I-35. In most American cities, city plan

or zoning law was used as a segregation tool for 'sieving out' Blacks from Whites

(Resseger 2013). The recommendation by Koch and Fowler's 1928 report designated East Austin as "Negro District" (Busch 2017). By 1932, almost all the Blacks had moved to the designated negro district in the Eastside of Austin. The municipal council provided schools, sewers, and parks as an incentive to draw other Blacks to the negro district from the city's Westside (Humphrey 2010). As part of the strategy to remove the remaining Black household from the Westside (white neighborhoods), Black children's primary school in Wheatsville in Central Austin was closed (Busch 2017).

Despite the discrimination enforced, the Black population increased to 14,861 in 1940 but decreased sharply from 33% to 17% years after (Humphrey 2010). East Austin did not only house the segregated *negros*, but other minority groups were also made uncomfortable to mingle and settled in white neighborhoods. By 1900, the Hispanic population had also moved to the south of East Austin, initially designated for the African Americans or *negros*. According to historic demographic records, there were 335 Hispanics who represented less than two percent of the total population and by 1940 rose to 11%, numbered as 9,693 (Cryer 2019). As seen today, East Austin is witnessing a great deal of gentrification and a mix of the population comprising urban White professionals, Hispanics, African Americans, and other ethnic groups (Tretter and Sounny-Slitine 2012; City of Austin 2018; 2016).

Figure 3. Map of Austin's Urban Freedmen's Communities, Circa 1900. (Source: www.fredmcghee.com)

The effect of segregation continued to hunt minorities in the US (Weaver 2019b; 2019a), particularly residents of East Austin, as reflected in Austin's redlining in the 1935 Homeowners' Loan Corporation (HOLC) historical map (Map 3 in Tretter 2012). According to *Austin Restricted,* African American communities/neighborhoods are disproportionally disfavored. This series of evidence through a historical map of Austin shows that East Austin, which has a people of color (POC) concentration, had less strict zoning laws to protect sporadic, unhealthy, and unlawful developments (Tretter and

Sounny-Slitine 2012). Mainly, redlining was a planning tool used to segregate neighborhoods with a high POC concentration from assessing financial resources or discouraging neighborhood reinvestment, mostly determined by the concentration of minority races (Weaver 2019a).

According to a critical reaction to this longstanding issue of segregation in Austin, Zehr (2019) wrote that "[R]edlining not only blocked most minority residents from the country's single-largest accumulation of household wealth, it also denied them the compound interest that future generations could derive from such affluence." (Zehr 2019). Most of the protective restrictions completely exempted the areas occupied by *negros* [Blacks] in Austin and generally in the US. For instance, Alcohol Outlet Restriction prevented the sale of intoxicating substances in most neighborhoods except in Black communities; this restriction was not limited to sales of *substances*; it was also "expanded to immoral activities" (Tretter and Sounny-Slitine 2012, 53). Examples of AOR in its original [handwritten] words stated that:

> No lot or park thereof shall be used for illegal or immoral purposes, or the sale of spirituous, vinous, malt, or other intoxicating liquors.

> No vinous, spirituous or malt liquors shall ever be manufactured or sold or exposed for sale, not any trade, manufacturing or mercantile business of any kind, shall ever be carried on or be permitted to be carried on, on any property in the resubdivision.

Black neighborhoods were left to experience unrestricted immoral behaviors (e.g., drug dealings) and uncontrolled use of social space, which dominated part of East Austin, particularly on E. 11th Street (Busch 2017)—because where no law or restriction guiding human behaviors or activities, disorderliness is expected to be the order of the day. Given this, one would wonder and be forced to think whether Black neighborhoods' seclusion

would have any meaningful association with the level of Black-associated crime and violence predominant in most African American neighborhoods today. From the second quote of alcohol outlet restriction in Figure 4, it appears that illegal trading can occur in any of the Black neighborhoods without any enforcement intervention.

During the era of strict racial segregation, some of the *Covenants/Restrictions* categorically prevented persons other than White from occupying some properties in Austin's specific neighborhoods (Figure 4). Explicitly, the Covenants declared POC as "anyone of negro or Mexican blood" [descendant]. All these still have an intergenerational effect in all variant forms—social, economic, and health.

According to the assessment of economic challenges in most Black communities in the US, African Americans are three times more likely to live in poverty, two times more to be unemployed, and are 13 times less likely to have a median net worth than a White household. The measure of economic wellbeing in 2018 showed that out of the total Texas state share of the Black population, 7.4% (of 12.3%) were unemployed, the median household income of 59% was lower than that of the White population, and had a poverty rate of 19.6% higher while it was 8.2% for Whites (Joint Economic Committee 2020). This evidence indicates persistent socioeconomic segregation in both Texas and the US (Weaver 2019b).
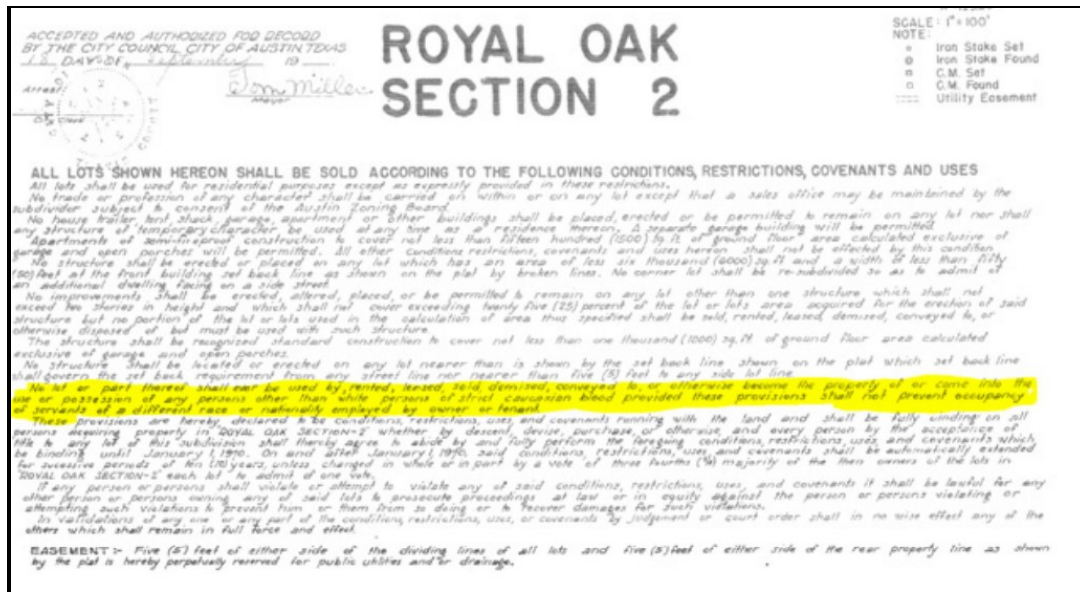
Figure 4. Handwritten Covenant in Royal Oak Preventing People of Color from Owning any Property. (Source: Austin Restricted, 2012).

The City of Austin in the 20th Century to Date

The City of Austin (COA) is a medium-sized 'smart city' that is an environmentally conscious, culturally diverse, and progressive city (McLean, Bulkeley, and Crang 2016; Tretter 2013a; Tretter and Sounny-Slitine 2012). Like most metropolitan cities, COA has experienced a significant number of transformations in its physical, economic, social, and demographic characteristics since the 20th Century. Indeed, the city has grown fast; it has consistently been recognized as one of the fastest-growing economies in Texas and the US (R. D. Atkinson and Wu 2017; Kotkin 2010; Singer, Hardwick, and Brettell 2008). Consequently, the economic growth, coupled with its national recognition as a progressive city, makes it an attractive destination for many skilled and unskilled migrants and a favorite place to live and work. In recent times, both the economic growth and migration flows have pronounced implications for Austin's traditional neighborhoods, which has attracted political

and scholastic discourses (Lavy, Dascher, and Hagelman 2016; McLean, Bulkeley, and Crang 2016).

The COA has been a place of envy for its feats as a 'sustainable city and as a 'smart city' while also enjoying robust economic growth. Because the city has been able to grow sustainably without relying on the economy of industrialization and overcame some previous environmental issues such as dam flooding and drought (Busch 2017), it has been adopted by some policymakers who seek to replicate the 'Austin model' (Long 2010).

While observing that the old economy's scope was national, the new economy is currently global, shaping the local settings or geographies of things. According to the 2017 State Economic Index, Texas housed the most 'Fast 500' companies after California and ranked second among states experiencing the highest globalization rate (R. D. Atkinson and Wu 2017). Interestingly, Austin has 7.5 Inc. 500 firms per million residents, which is an excellent value compared to other cities in its league. This is partly due to advancing technology and services and the (re)location of tech companies to Austin, increased oil prices, and because of the 'eruption' of local businesses, which is linked to the presence of the University of Texas at Austin, majorly in producing skills and knowledge for entrepreneurial development (R. D. Atkinson and Wu 2017). UTA serves as the chief source of human capital for most tech companies in Austin, and any deficit is supplemented by importing skilled and non-skilled workers (Tretter 2013a). Due to its attractiveness to businesses and skilled workers alike, the COA is currently facing the highly competitive housing market, urban sprawling, transportation problems, gentrification among neighborhoods near the central business district (CBD), and fast-

changing in its demographic compositions. All these are contributing to the remaking of the city's fabrics (Frey 2018).

Over time, the demand for inner-city land has increased dramatically, not only in the US but also across cities globally (Quastel 2009; N. Smith 2010; Lees, Shin, and López-Morales 2016; Lees, Slater, and Wyly 2013). Consequently, the local government has been trying to centrifuge the pressure on the city's available land resources in meeting the present and future needs through various strategies, including urban renewal and city aesthetics projects.

From a sustainable point of view, the COA participates in different sustainable strategies that provide economic support to local 'green' industries, creating bike lanes, developing modern and friendly transportation systems, and embarking on affordable housing policies intended to enhance competitive advantage (Tretter 2013a). Some people refer to these sustainable strategies as 'Smart City.' These plans make the city convenient for the majority and attractive to the "knowledge" middle class (Busch 2017, 108–32). Despite the city's rapid economic expansion in the 1960s, which favors more of the external, middle class, and skilled laborers, Austin minority communities "had minimal positive benefits" (134). Till today, some of these developments' spatial distribution is yet to be balanced, therefore raising concerns about social and environmental (in)justice (Tretter 2015).

More than the other, one part of the city is always compromised. In Austin's case, the Eastside, traditionally occupied by nonwhite population, is segregated from the Westside; geographically, the landscape of COA shows a left (the West Avenue) and right (East Avenue) divide by a physical landmark, I-35 (Skop 2009) that runs from

Laredo in the south to Gainesville in the north of Texas. The Eastside (East Austin),

formerly called "Negro District," has political and historical context traceable to the 1928

zoning plan. Prior evidence revealed that East Austin is targeted to continue to receive

significant urban development than it has ever seen in the past (Tretter 2013a; McCarver

1995).

According to Busch (2017), "planning injustices went as far back as planning

itself in Austin" for minorities in Austin. Adopting a chronological scope in documenting

Austin's social, economic, and political trajectories, Busch revealed the hidden hole in

the sustainability agenda adopted by the progressive elites that are not sustainable for its

historically disadvantaged residents (Busch 2017). In an in-depth interview conducted in

2008 with one of the leaders of Save Our Springs Alliance (SOS), founded in 1990,

Tretter (2013: 304) revealed the intention of the COA's elites, which aim to decongest

the Westside and divert dense development to the Eastward as reflected in the following

excerpt:

> Keep this area [pointing on a map at the Hill Country] as low density and
> protected as we can by *steering our more intensive urban development to
> the east* and downstream of the Edwards Aquifer and along the preferred
> growth corridor in the comprehensive plan and then was restyled during the
> green Watson council as the desired-development zone . . . Build here and
> preserve here [pointing to the western and eastern areas of the map]. This is
> your water supply to support your cities . . . Preserve this—water and
> unbelievable biodiversity that still existed —species that live here and
> nowhere else in the world. Build here, this was the Blackland prairie mostly,
> it had already been denuded of its biodiversity by the plow, and it is suitable
> for building (interview, September 4 2008).

The quote above points, in part, to the origin of the current gentrification in East

Austin, which was known to be homes to the minority population. Figure 5 shows the

Eastside and Westside of Austin. The east side is composed of Black/African American

(AA) in the northern part and the Hispanic population's concentration in the southern part. Although many scholars [and the media] have raised concerns about the direction of the city's urban renewal policies, which have impacts mostly on the community of minority residing in these neighborhoods, not many things have empirically researched about the health disparity among the LTRs in the context of gentrification and various city policies. As noted in previous research that focused on households exiting gentrifying neighborhoods, less attention has been given to those who did not move, that is, the current longtime homeowners who form the target population in this dissertation. The question now becomes: what happens to those homeowners who refused to move in the face of gentrification? What health effects do the changing environment (i.e., gentrification) have on current residents in East Austin, particularly those who choose to stay, that is, the remaining minority and low-income residents? These are the critical questions this study intends to answer at the end of this dissertation.
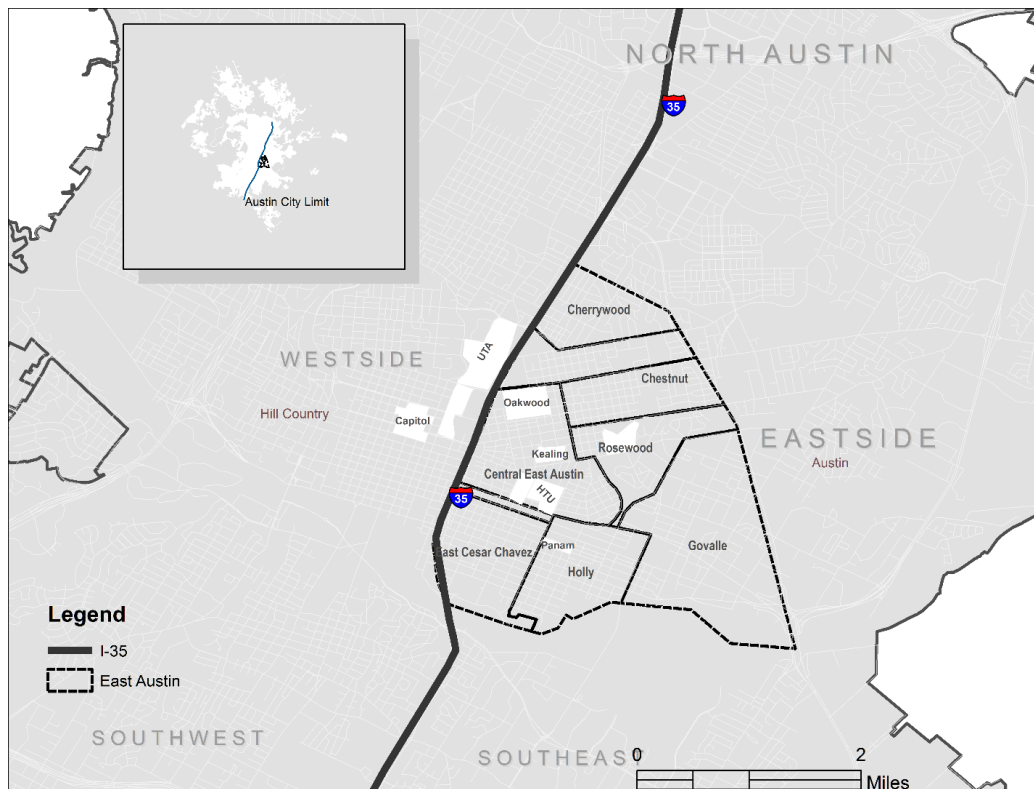
Figure 5. Map Showing Neighborhoods in Eastside of Austin, Texas.

Housing Policy and Racial Segregation

At the beginning of the 21st-century, the US Department of Housing and Urban Development celebrated the inner transformation of contemporary urban policy— a "vision for change" which lays particular emphasis on homeownership, devolution, and the use of market forces to transform low-income inner-city neighborhoods which have been taunted by historical discrimination and disinvestment (Wyly and Hammel 2004; Weaver 2019b). Consequently, this period characterized a regime of inflicting high displacement on low-income urban residents, race and class isolation and exclusion, and gentrification at its zenith in the US low-income inner-city.

Figure 6 shows the private housing ownership pattern in the Austin Metropolitan Statistics Area (MSA) since the beginning of the 21st-century. The start of this Century

signifies a momentous negative trajectory in the housing market conceivably due to the

economic hardship and increase in the unemployment rate that peaked at the beginning of

the 21st-century (US Bureau of Labor Statistics 2019). The unemployment rate increased

from 2% in December 1999 to 3.4% in January 2000. The 2001 economic recession in

the US also hit hard on the Austin Metropolitan Housing market. The gulf in housing

ownership observed in 2008 reflects the second part of the economic downturn in the

21st-century in the US, which had local effects on the housing market. Probably, many

homeowners foreclosed their houses during these economic downturns. Figure 6 also

indicates that the rate of privately-owned housing in Austin MSA was about threefold

higher in 2012 (0.91%) than the US rate at 0.32%.
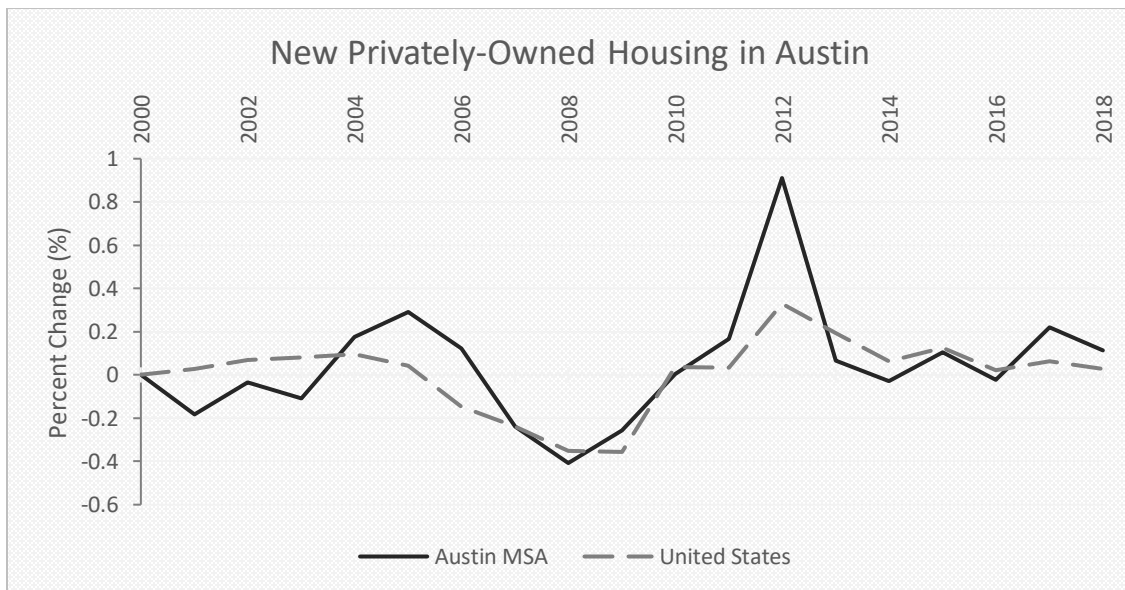
Figure 6. New Privately-Owned Housing Units Authorized by Building Permits in Austin
Metropolitan Statistical Areas. (Data Source: Austin Chambers 2019)

Minority in the Contemporary Austin

Despite the increasing population of Austin, the population growth is highly

skewed toward certain races/ethnicities, and it varies by geography. The city has now

"crossed the threshold of becoming a Majority-Minority city" (City of Austin 2016). The proportion of the city's non-Hispanic Whites has decreased below 50%, and Black is nose-diving. There is speculation that the Hispanic population may surpass the White population anytime soon. Interestingly, the Asian population seems to be the fastest-growing group. The percent share of Asians in Austin had grown from 3.3% in 1990 to 6.3% in 2010 (City of Austin 2016).

Austin is currently experiencing what a group of researchers from the University of Texas at Austin termed "black flight" (Tang and Falola 2016). For these reasons, Austin is being perceived as a city that is becoming "whitewashed" by the day, making life unwelcoming for other minorities (Withers 2017; Oyeyemi 2017). Unfortunately, Austin is the only city that gained in its general population and losing its minority group; the African American population has reduced by 5.4% (Tang and Falola 2016). Most of the city's Black in the middle class is moving to Austin City hinterlands while Hispanics are intensifying spatially in the lower east Austin, greater Dove Springs, and the St. Johns area neighborhoods (City of Austin, 2016).

In 1990, census data showed that the African American population was concentrated in Central East Austin and Chestnut neighborhood, but this pattern took a considerable turn a decade after. There was a shocking decline in the African American population in 2000. According to the study conducted among those who exited (displaced) East Austin, three primary reasons were associated with the city population's disappearance, including housing affordability, poor infrastructure, and racism (Tang and Falola 2016).

Gentrification: Definition and Discordance

Since the conceptualization of gentrification in London by Ruth Glass in the 1960s (1964), there has been a growing body of literature on the phenomenon among scholars beyond the local or national level and has steered global debates (Brown-Saracino 2013; Lees, Slater, and Wyly 2013). Some scholars perceived gentrification as a result of imbalanced power relations. For example, Eric Clark (2011) sees gentrification as the colonialization of neighborhood space due to polarized power relations or social inequality. Ruth Glass, in her classical work on housing stock in North Kensington in 1959, described what she observed about the changing pattern of London neighborhood, and her description of gentrification is termed 'classical gentrification':

> One by one, many of the working-class quarters of London have been invaded by the middle classes—upper and lower. Shabby, modest mews and cottages—two rooms up and down—have been taken over, when their leases have expired, and have become elegant expensive residences. Larger Victorian houses downgraded in an earlier or recent period—which were used as lodging houses or were otherwise in multiple occupations—have been upgraded once again. Nowadays, many of these houses are being subdivided into costly flats or "houselets" (in terms of the new real estate snob jargon). The current social status and values of such dwellings are frequently in inverse relation to their status and their neighborhoods. Once this process of 'gentrification' starts in a neighborhood, it goes on rapidly until all or most of the original working-class occupiers are displaced, and the social character of the district is changed. (Glass 1964: xviii-xix)

The above famous quote from Glass's pioneer work on gentrification lays a basic background for understanding the process of urban gentrification, even for contemporary studies. It also expresses 'power relations' between the economically capable and the vulnerable population, particularly the working-class (Harvey 2004). Most definitions of gentrification by other scholars are built on this classical description of neighborhood change. Though the definition might not be a 'fit-it-all,' other gentrification observations

mimic Glass's description. Thus, gentrification is many things to different people, depending on the chosen perspective.

The definition is slightly different for urban retail geographers; to them, they see gentrification as the transformation of the built environment (BE), which encompasses the retail environment, socioeconomic and demographic characteristics, to more sophisticated architectural structures, stylish and modernized retailing, more homogeneous socioeconomic class or new racial/ethnic group (N. Smith 2010; Zukin 2010). Zukin (1987) described gentrification has as a "corporate expansion of urban space." However, when the condition that favors capital expansion seized to occur or when it is saturated, a total or partial redevelopment or internal redifferentiation occurs in the urban space as a precondition for gentrification (Freeman 2005; Zukin 1987). Evaluation and reinvestment in disinvested rundown urban space contribute to "a supply of 'gentrifiable' building stock" to meet newcomers' demand in high cultural class than the existing residents (Zukin 2010). Revitalized urban space (e.g., urban neighborhoods, downtown) undergoes physical and economic improvement, therefore soaring property's values, rents, and taxes (R. Atkinson 2004).

Although there exists no universal definition for gentrification (N. Smith 1996), I present the description provided in a book titled *Gentrification* by Lees, Slater, and Wyle (2013: 9) quoted from Neil Smith's (1982: 139) description related to Ruth Glass's description of gentrification:

> By gentrification, I mean the process by which working-class residential neighborhoods are rehabilitated by middle-class homebuyers, landlords, and professional developers. I make the theoretical distinction between gentrification and redevelopment. The redevelopment involves not rehabilitation of old structures but the construction of new buildings on previously developed land.

Krase (2012) portrayed the process as a spatial and social visualization of urban or

neighborhood change. This description brings both geographers and sociologists to the

heart of the gentrification discussion. However, despite the global discussion of

gentrification, changes in urban neighborhood environments are better understood in a

local context or very small geography, particularly at the neighborhood level[10]. Clark

(2011) and Beauregard (2013) frown at how some scholars have tried to narrow down the

definition of gentrification, which they argue that these myopic definitions only make the

matter more complicated than getting to the epistemology of the subject matter

(Beauregard 2013). Many authors have used several adjectives to describe and abstract

gentrification, such as inner-city or residential gentrification (Slater 2011; Lees, Slater,

and Wyly 2013; R. Atkinson et al. 2011; R. Atkinson 2004), rural gentrification (Ghose

2004; Nelson, Oberg, and Nelson 2010; M. Phillips 2005; 2010; 1993; Solana-Solana

2010; Stockdale 2010), tourism gentrification (Gotham 2005; Bures 2001; Cocola-Gant

2018; Liang and Bao 2015), and recently green gentrification (Anguelovski, Connolly,

Garcia-Lamarca, et al. 2019). In addition, Eric Clark (2011) argues that scholars' efforts

toward gentrification typology only jeopardize the common goal of understanding

gentrification and make the matter worse instead of working toward a universal

knowledge of it. A more general definition of gentrification is presented by Clark (2005:

25):

> Gentrification is a process involving a change in the population of land users such
> that the new users are of a higher socioeconomic status than the previous users,
> together with an associated change in the built environment through reinvestment

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[10] It is worth noting that the definition of what counts as a neighborhood varies among scholars. This
current proposed study uses the administrative delineation of the geographic boundary at the census tract
and block group level for different analyses. Mainly, the gentrification index will strictly be defined at the
census tract level in this study because of the availability of most of the variables at this unit of geography.

in fixed capital. The more significant the difference in socioeconomic status, the more noticeable the process, not least because the more influential the new users are, the more marked will be a concomitant change in the built environment. It does not matter where, and it does not matter when. Any process of change fitting this description is, to my understanding, gentrification.

Among urban sociologist, gentrification is a popular term which has been coined as a globalized socio-spatial phenomenon. The socio-spatial perspective assumes that social space is both a *product* as well as a *producer* of changes in the urban environment (Phillips 2004; Marcińczak and Sagan 2011; D. P. Smith 2004; Cassiers and Kesteloot 2012). Mainly, it concerns how city policies, politicization, society, economy, culture, and urban space produce new forms of urbanism or urban lifestyle (Helbrecht 2016; Lees, Slater, and Wyly 2013). Another concept used to understand the effect of global decisions or policies locally is 'glocalization' (Bauman 1998; Khondker 2004; M. Smith 2007), and it is also gaining traction in the study of health (Hernandez-Truyol 2017; Shinohara 2018) and neighborhood change (Wyly 1999; Helvacioglu 2000; Krase and Shortell 2009).

While urbanism is a product of many things, gentrification is a tool for producing new urban space in the hand of urban 'elites' composed of city councils/planners, real estate agents, property investors/banks, and urban developers (Helbrecht 2016; Molotch 1976). On the other hand, there also exist consumers who are lured by the new urban landscapes referred to as "urban pioneers" or "gentrifiers" based on their social and cultural tastes for urban charm (Helbrecht 2016; Alonso 1964; Beauregard 2013).

Gentrification in Austin

East Austin neighborhoods' locational proximity, the relatively cheap land and property, and tax incentives accelerated gentrification. This has been echoed among the

quantitative scholars of gentrification (Brown-Saracino 2017). Gentrification in East

Austin is believed to start from East 2nd Street/ Cesar Chavez Street in 1987 and the

Chestnut neighborhood in 1990 (McCarver February 25, 2020; personal communication).

McCarver described the incidence of gentrification in East Austin as a "wildfire." In

1997, PODER, an environmental justice organization, fought against environmental

pollution caused by some of the oil farms that were eventually relocated from East Austin

(Busch 2017; Tretter 2015). Following the victory over oil-farm removals, the COA

conducted a study to examine housing and industrial land uses in the area of East Austin.

They found incompatibility in the land-use code, which forced the city council to change

the land-use code system to compatible residential land use. The new change, combined

with the cheap land/housing prices, attracted developers to the area where most of the

East Austin houses were the wealthy Whites. What follows is the rapid change in the

current landscape of gentrification fueled by the city council's desire to promote "smart

growth," which was principally directed to most areas in East Austin (Tretter 2015;

2013a).

      In the case of Austin, revitalization through gentrification was very controversial.

Longtime residents of East Austin were very uncomfortable with the intended changes

that would accompany the revitalization policy. Notably, the people of color felt that

another discriminatory effort that previously drove the underdevelopment of the Eastside

traceable to the 1928 zoning policy was underway. Then, the fear was that the

revitalization policy would ultimately displace the remaining nonwhites, which

eventually happened (Tang and Falola 2016; 2017). Tretter (2015) argued that the

Eastside did not substantially improve the housing stock until many nonwhites left the

area. Propelled by PODER, the city council formed the Gentrification Taskforce to investigate the impacts of Historic Zoning in 2002 with no member of the group on board. Instead, the PODER members were allowed to attend some of the taskforce committee meetings as community stakeholders. The report submitted by the committee afterward showed that Austin's smart growth policy and the preservation of older homes were the principal causes of displacement of longtime minorities, mainly African Americans and Hispanics. The committee gave three specific recommendations (City of Austin 2001) that:

1. the data from the 1990 census and 2000 census should be used to determine whether gentrification was likely to occur or already active based on some of the indicators of gentrification (e.g., income, ethnicity, immigration status, homeownership, housing stock-single family/multi-family, eviction rates, housing conditions, multiple listing services data on changing property values, the status of commercial property, mortgage data, small business administration reports on loans and types of business, population-based on education levels and non-English speaking population).

2. Low-income owner-residents and renters who earn less than 50% of Median Family Income prioritize public investment when the city attempts to mitigate gentrification's potential impacts because they are the most vulnerable to voluntary displacement.

3. Equitable development should be the goal of Austin's neighborhood revitalization efforts. Equitable development was defined as " the creation and maintenance of economically and socially diverse communities that stable

over the long term, through means that generate a minimum of transition costs

that unfairly on lower-income residents."

Following the report, members of the PODER group found that most racial/ethnic

shift was around the project area, notably around the I-35 corridor (Tretter 2015).

According to Austin's inventory on displacement and gentrification, these

recommendations are yet to be implemented[11].

A Brief Examination of Urban Renewal in Austin

East Austin, Texas, is a minority neighborhood that originally housed African

American and Hispanic communities following the 1928 zoning policy. Due to the

institutionalized segregation, the Black and Hispanic neighborhoods, for long, were

neglected and less developed, which led to urban decay or blight (Busch 2017; 2015).

Following World War II, African Americans were pushed out of suburbs by racial

covenants and redlining US cities' policies. In 1954, the Austin City Council started

exploring urban renewal by creating the Greater East Austin Development Committee

(GEADC). The idea was to study the needs of the East Austin community and the

housing conditions in an area defined by East 19th Street (Martin Luther King

Boulevard), Airport Boulevard, Springdale Road, the Colorado River (Lady Bird Lake),

and East Avenue/I-35 (Figure 7). The GEADC birthed the Urban Renewal Program's

idea, whose primary aim was to improve the built environment (BE) in general (Austin

History Center 2007). As a result, Austin Urban Renewal Department (AURD) was

created. Urban renewal projects dramatically altered the Eastside landscape during the

1960s. For a neighborhood to be qualified for renewal, the AURD had to declare half of

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[11] https://data.austintexas.gov/widgets/acst-e5v8

the structures as "dilapidated beyond a reasonable rehabilitation" (Busch 2015; City of

Austin 1999).
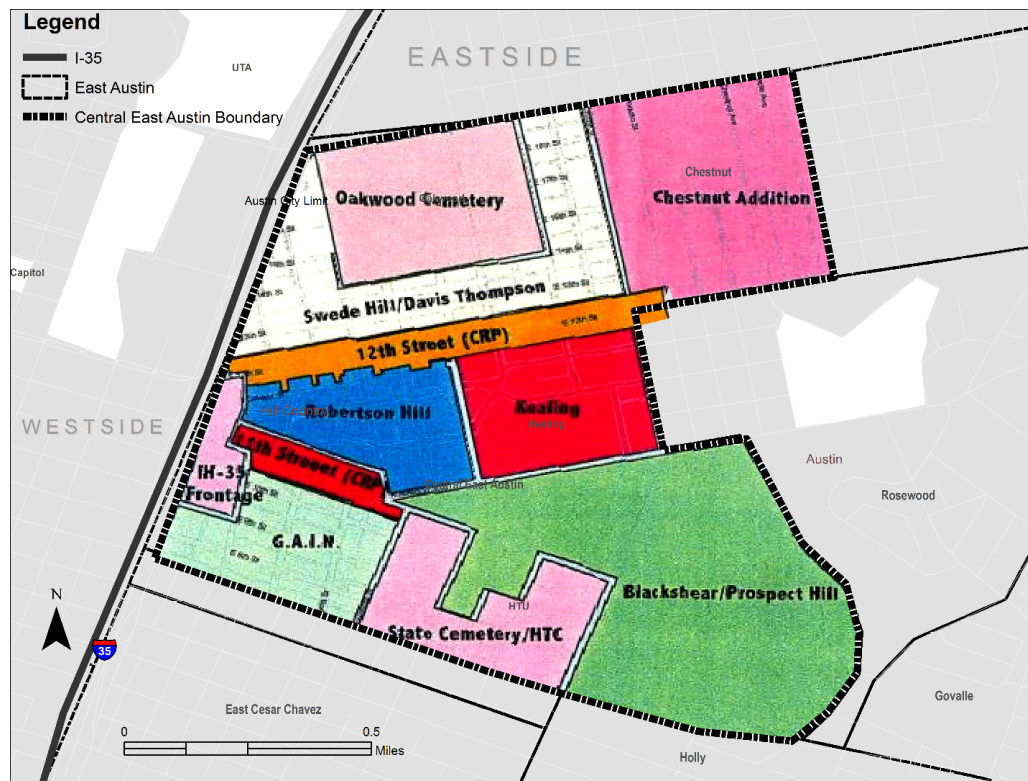
Figure 7. Project Areas in 11th and 12th Street: Central East Austin Renewal Program.

Fast forward to 1996, the Austin Revitalization Authority (ARA) initiated the

Central East Austin Master Plan (CEAMP) targeted at redeveloping the 11th and 12th

Street Corridors (henceforth, project area). The project area comprises neighborhoods

with buildings classified as blighting structural conditions, vacant land, and tax

delinquency (Figure 8). Alongside, a Community Redevelopment Plan (CRP) for the

target project area was commissioned. The city of Austin then passed a resolution in

support of the CEAMP project. Thus, the target area was declared urban renewal areas,

and the CRP was translated into the East 11th and 12th Streets Urban Renewal Plan.

CEAMP recommended detailed land use and zoning studies for other areas outside the

project area. The master plan provided a framework for developing the Central East

Austin Neighborhood Plan (CEANP) years later (City of Austin 1999).

	Table 2. Central East Austin Neighborhood Plan Goals, 1999.
1	Preserve, restore, and recognize historic resources and other unique neighborhood features.
2	Create housing that is affordable, accessible, and attractive to a diverse range of people.
3	Promote new development for a mix of uses that respects and enhances the residential neighborhoods of Central East Austin.
4	Promote opportunities to leverage positive impacts and encourage compatibility from civic investments.
5	Create a safe and attractive neighborhood where daily needs can be met by walking, cycling, or transit.
6	Improve bicycle, pedestrian, and transit access within Central East Austin and to the rest of Austin.
7	Respect the historical, ethnic, and cultural character of the neighborhoods of Central East Austin.
8	Enhance and enliven the streetscape.
9	Ensure compatibility and encourage a complementary relationship between adjacent land uses.

Author's compilation; Adapted from the CEANP report, December 2001.

As presented in Table 2, the principal aims of the CEANP were to create a safe

environment, provides all residents with ample opportunities and assets to enjoy life in

these neighborhoods. However, things did not go as expected; instead of reaping the

improved neighborhoods' outcome, longtime residents are being uprooted (Way,

Mueller, and Wegmann 2018), and many were displaced due to increased property tax

and rent (Tang and Falola 2016; 2017).
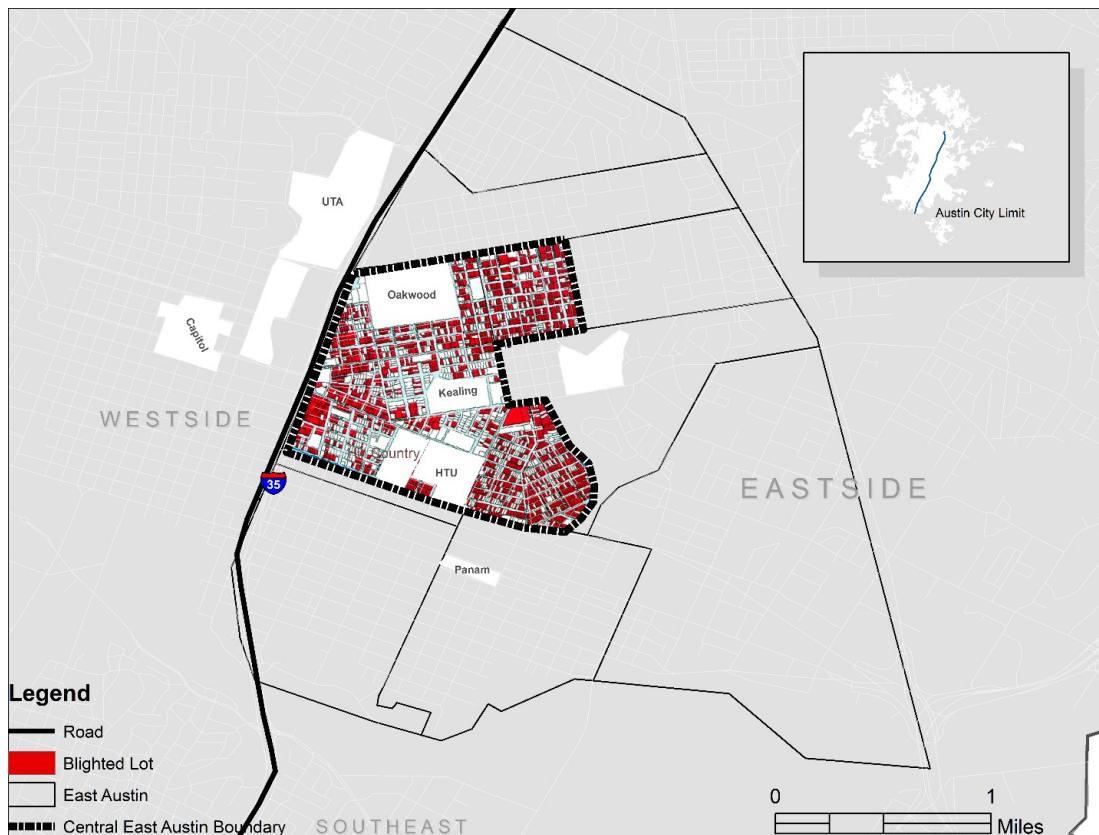
Figure 8. Blighted Lots in Central East Austin, Texas.

Poverty, Blight, and Urban Renewal

Urban decay in the Eastside of Austin could be traced to the endemic poverty

situation in the area compared to the rest of the city. The poverty rate in the region

increased from 37.5 % in 1970 to 52% in 1990 (Busch 2015). Following the

implementation of urban renewal programs that targeted East Austin's core—Central East

Austin, the demographic landscape shifted considerably. Between 1970 and 1978, a

particular neighborhood (Census Tract 8), which housed 97% minority, had lost 1,976

residents and 446 families, representing a 14.8% decline for both categories (City of

Austin 1999). Combined with the historic preservation, which started in 2004, the

improvements to infrastructure and streetscape on East 11th Street and community

parking lots in the target project area have accelerated housing and demographic shifts.

These shifts were evident in the targeted project areas and diffused to the adjoining communities in East Austin and Southeast Austin neighborhoods like Riverside and Montopolis (Mcghee 2017; Way, Mueller, and Wegmann 2018). In recent times, the physical and demographic change in East Austin neighborhoods has precipitated public outcries and violent protests by anti-gentrification groups (Cantu 2017; Rice 2017; Incendiary 2019; Jankowski 2018).

Previous studies that interviewed "those who left" (Tang and Falola 2016) and "those who stayed" (Tang and Falola 2017) showed that increased tax forced longtime residents out of their long-lived community to neighboring towns (e.g., Manor, Pflugerville) and currently threatens the stayers who are mostly low-income earners, widow/widowers, elderly, and low-income earners. However, how the process of urban renewal affects residents' health in this locale has been overlooked. Consequently, this study applied weathering hypothesis (Geronimus 2000; 2001) to examine the impact of urban renewal programs that had generated several debates on gentrification in East Austin, Texas, to assess residents' health impact.

Nature, Power, and Gentrification

Contemporary environmental scholars have argued that nature plays a significant role in societal dynamism (Bryson 2013) and have shown how nature matters in urban landscape change. Recently scholars have implicated urban green space in gentrification processes. According to environmental historian Matthew Klingle, nature is a social tool for transforming society and controlling humans as part of nature (M. W. Klingle 2003; M. Klingle 2006). Bryson (2013, 579) asserted that "moving dirt, protecting urban

40

ecosystems, or otherwise manipulating physical nature are political ecological acts that can transform the power dynamics within a city."

As part of environmental sustainability efforts, the city of Austin prioritizes green infrastructure as a critical strategy for achieving a smart city. The green infrastructure project aims to improve tree cover in every neighborhood, increase access to parks, and integrate nature into the city. Although urban green has many environmental health benefits, environmental scholars have argued that it is political machinery for propagating gentrification (Anguelovski, Connolly, Garcia-Lamarca, et al. 2019; Curran and Hamilton 2012; Checker 2011; Csete and Horváth 2012; Alkon and Cadji 2020). In addition to proximity and vibrant urban lifestyle, the intentionality of controlling nature in transforming the human environment set East Austin up for today's gentrification. I draw this assertion from extant research showing how city elites can transform a city's social and natural environment using monopolistic power to control urban natural resources (Harvey 1987; Bryson 2013; M. Klingle 2006; M. W. Klingle 2003; Swyngedouw 1997).

Neighborhood Conceptualization

Figure 9 below shows the study area used for the purpose of this study. The spatial unit of most studies on gentrification has been at the neighborhood level. However, the meaning of neighborhood is elusive. Even though there is no concrete definition of neighborhood, it remains an exciting topic and, at the same time challenging for social science researchers in the last three decades. Researchers have grappled with what should be the universal criteria for defining a neighborhood and have resulted in various problematic questions such as what makes a boundary? What is the appropriate

threshold for delineating a boundary? What features should be included or excluded?

Moreover, how big should a neighborhood be?

Figure 9. Map showing the selected neighborhood of interests covering East and Southeast Austin, Texas.

Here, I reference Leonard Bowden's definition of the neighborhood who described the term as "the state or quality of living near one another, a community, region, territory or area, especially with regard to some common characteristics" (Bowden 1972, 227). Bowden argued that a neighborhood's conceptualization only exists in people's minds, and the idea varies subjectively. According to an "11-year-old boy" concept of neighborhood, a definition of a neighborhood by a male child will differ from that of a girl that grew up in the same geographic area because boys, by nature, are explorers! They go beyond defined boundaries (e.g., busy traffic arteries) and break protocols. Thus, only those who have lived in a neighborhood are qualitatively able to

42

define their neighborhood. In essence, the qualitative conceptualization of a neighborhood is limited by several factors based on an individual's demographic characteristics, such as age (child/adult) and gender, duration of residence, and personality (e.g., outgoing/introvert). Finally, the neighborhood's construct is socially construed and "not an economically shed to a central place"(Bowden 1972, 228).

In his 12-year case study of the Blackland neighborhood in East Austin, McCarver gave a different definition of a *community* and a *neighborhood*. He argued that a neighborhood is an "occupation of a space" and sees it "as a group of people living in close proximity in an area with flexible boundaries." On the other hand, he defined a community based on the Weberian definition to imply a sense of belongingness. In this study, I adopt the term neighborhood to imply people in an area bounded by physical features/boundaries such as an administrative boundary for convenience interpretation and the sake of analysis.

Nevertheless, most social science studies relied on census and administrative boundaries such as census tracts and predefined range in defining neighborhoods due to the convenience of these approaches (Clapp and Wang 2006; Foster and Hipp 2011). Recently, such research is facing criticism on the ground that people may not necessarily perceive the rigidly defined boundaries as the extent of their community except for few studies (Robinson and Oreskovic 2013). Instead, residents usually perceive the neighborhood as the extent of their social networks through social interaction (Coulton et al. 2001; Kwan 2012). The study of the neighborhood's adolescent perception using coupled devices (i.e., GPS and accelerometer) and census data to define neighborhoods found no significant difference (Robinson and Oreskovic 2013).

As part of the delimiting neighborhood challenge, recently, Mei-Po Kwan (Kwan 2018; 2009; 2012) promoted the idea of delineating a neighborhood based on an individual's daily visit, especially in measuring geographic determinants of health using portable technology or activity diary. Kwan's central argument is that exposure to environmental insults such as air pollution is not only limited to people's residences. The issue attached to using a simple conceptualization of a neighborhood includes an increase in uncertainty in the study. A problem referred to as an uncertain geographic contextual problem, UGCoP (Kwan 2012). UGCoP essentially suggests a lack of certainty about which geographic contexts truly influence individual behavior or health outcomes. No doubt, UGCoP is a problem that all social researchers need to pay attention to before making inferential calls on their findings of neighborhood effects (Kwan 2012, 962). Despite the intuitive idea of subjectively delimiting neighborhoods, as Kwan and others proposed, it might be too expensive to implement for a population-based study but ideal for an individual-based survey. She conceded that "[T]hese methods are thus not suitable for obtaining data for large populations in a short period of time" (965).

Summarily, because this study is population-based, it is not feasible to follow an individual in their activity space to determine the effect of place on their health over time considering limited research resources (e.g., time and money). However, this limits the extent one can account for past behavior or exposure that might have influenced their present health condition except in longitudinal studies. However, one can still retrospectively account for past health based on historical self-report of health and experiences, which inherently has some limitations related to recall bias. The figure

below shows the study area subjectively delimited as the neighborhood of interest for the purpose of this study.

Health Effects of Gentrification

Studies that have examined minority health in a gentrifying neighborhood are very controversial and few. While some scholars agree that gentrification hurts the existing residents in a gentrifying neighborhood, others believe it improves the old neighborhoods (Papachristos et al. 2011; Steinmetz-Wood et al. 2017; R. Atkinson 2004; R. M. Atkinson 2002). Rising rents and property tax, common indicators of gentrification, can place a significant financial burden on existing residents, leading them to sacrifice basic needs such as health care and healthy foods (Whittle et al. 2015; 2017). One collective impact of gentrification that has received considerable attention is the displacement of the poor, the children, women as head of household, the elderly, and members of racial/ethnic minority groups (R. Atkinson 2004; Gibbons, Barton, and Brault 2018; Gibbons and Barton 2016; Whittle et al. 2015; 2017; Henig 1981). Empirically, measuring displacement remains a challenge among gentrification researchers (Elliott-Cooper, Hubbard, and Lees 2019). Though many studies have made efforts to track the victims of displacement, scant studies are available on 'stayers.'

Mixed evidence of the impact of gentrification on health has been documented in recent systemic review studies (G. S. Smith et al. 2020; A. S. Schnake-Mahl et al. 2020). Critical health literature argues that people living in a gentrifying environment are more susceptible to multiple social and environmental insults (Antunes, March, and Connolly 2020; Mehdipanah et al. 2018). Residents in gentrifying neighborhoods are more likely to have a shorter life expectancy, a higher cancer rate, a high rate of adolescent pregnancy,

high juvenile delinquency, community violence, and more congenital disabilities (Centers for Disease Control and Prevention 2017).

Furthermore, evidence of high infant mortality rate, increased stress levels, depression, and mental illness, and other chronic health conditions, including cardiovascular diseases, diabetes, obesity, HIV, and asthma, abound in the literature (Centers for Disease Control and Prevention 2017; Whittle et al. 2017; C. Clark et al. 2008; A. S. Schnake-Mahl et al. 2020; G. S. Smith et al. 2020; Tran et al. 2020; Anguelovski, Triguero-Mas, et al. 2019). Minority populations in gentrifying communities also lack access to affordable healthy housing, healthy food choices, transportation choices, low quality of schools, physical exercise facilities, and low social networks (Centers for Disease Control and Prevention 2017; Whittle et al. 2017; 2015).

Chronic Health Conditions

This part examines some of the chronic conditions among adults, such as hypertension, diabetes, obesity in adults, and mental health. Neighborhood stress may worsen these health situations among people living in a neighborhood undergoing active gentrification. This term has been widely discussed under the psychological effect of the environment on health (R. J. Smith, Lehning, and Kim 2018; Kendler et al. 1995; Lim et al. 2017). A few studies have investigated the association between gentrification and chronic health conditions in the literature. Most studies generally focused on self-rated health (SRH) (Izenberg, Mujahid, and Yen 2018; Gibbons and Barton 2016; Gibbons, Barton, and Brault 2018). The few studies that have studied individual chronic health placed less emphasis on the effect of gentrification per se but echoed more on disadvantaged/deprived neighborhoods. In the following subsections, I discussed CHCs

under the physical and psychological/mental chronic health. Specifically, under the physical health chronic conditions, I discussed some selected chronic physical health conditions among adult populations (>18 years), drawing from studies conducted within and outside the US. Under the physical health conditions, I touched on hypertension or high blood pressure, diabetes, and obesity.

Hypertension. Hypertension or high blood pressure (HBP) is the force of blood pushing against the arteries' walls that transport blood from the heart to other parts of the body. The irregularities of the upward and downward flow of blood cause significant health problems. According to the old guideline, hypertension occurs when blood pressure is higher than the standard measurements (systolic ≥ 140 mmHg/ diastolic ≥ 90 mmHg). The recent guidelines have reduced HBP measurement, which is now 130/80 for more precautionary measures (American Heart Association 2018).

Hypertension is a risk factor for other chronic diseases such as heart disease and stroke, leading to death in the US (Centers for Disease Control and Prevention 2019a; Heidenreich et al. 2013). According to the 2018 estimates by the American Heart Association, 103 million American adults have HBP, which represents half of the adult population. Sadly, not very many people with hypertension/HBP have the situation under control; only 54% of adults had controlled BP in previous estimates. Consequently, the hypertension death-related rate increased by 37.5% between 2005 and 2015 (Benjamin et al. 2018). It also has substantial health costs, accounting for all direct health care expenditure on cardiovascular disease in the US (Heidenreich et al. 2013).

The possibility of developing hypertension is associated with many risk factors; prominent among them is nutrition. Nutrition is inherently linked to the food

environment, and gentrification plays a significant role in the food environment. Studies have shown that a diet rich in protein reduces the risk of developing hypertension, and food with high carbohydrates may increase its risk. Potassium supplementation drug, which contains both glycemic carbohydrate and potassium, is usually prescribed for preventing chronic diseases such as hypertension (Borgi et al. 2016). Its effectiveness in preventing hypertension is currently debated due to the carbohydrate content, which increases hypertension risk.

Within the context of gentrification, Bhavsar et al. (2019) used electronic health record data from the Duke Health System and Lincoln Community Health Center from 2008-2010 and 2014-2016 to quantify the census tract prevalence of some chronic diseases, including diabetes, hypertension, obesity, and CVD (myocardial infarction or stroke hospitalization). A census tract is said to be gentrified if 3 of 4 SES indicators (positive z-score for median household income, median rental price, % with bachelor's degree, or a negative z-score for % living below the poverty line) improved over a definite period (i.e., 2008-2010 and 2014-2016). Their study indicates that the prevalence of the CHCs increased in gentrifying and non-gentrifying neighborhoods over time and was higher in LTRs than movers, particularly among hypertensive residents.

According to a study that examined the incidence of hypertension-related emergency department (ED) visits in the US between 2006 and 2012, about 23.6% of the 701,952,422 adult ED visits were due to hypertension (McNaughton et al. 2015). Additionally, about 6.4 million (0.9%) were diagnosed primarily with hypertension. The study showed an increase in the yearly rate of hypertension-related ED visits by 5.2%, and the primary diagnosis of hypertension in the US increased by 4.4% (McNaughton et

al. 2015). Similarly, Morenoff et al. (2007) used the Chicago Community Adult Health Study (CCAHS) data to understand hypertension's neighborhood context. Their study, among others, found that affluence/gentrification had a negative association with hypertension (Morenoff et al. 2007). In Chicago, Viruell-Fuentes, Ponce, and Alegría (2012) examined the role of neighborhood context and the risk of hypertension among Latinos and found similar relationships found in Morenoff et al.'s (2007) study.

Diabetes. Diabetes is a chronic metabolic disease of the body that prevents adequate usage of the energy and nutrients produced from food (World Health Organization 2018b). In more medical term, it occurs when the β-cells in the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces, also referred to as insulin resistance (Dendup et al. 2018a). Many factors or biological/chemical processes affect the secretion of insulin by the β-cell. Some of these include fat accumulation in the liver, muscle, and pancreas from excess calories, oxidative and endoplasmic-reticulum stress, raised lipid level, amyloid accumulation, and physical inactivity (Kahn, Cooper, and Del Prato 2014; Fonseca 2009). Generally, scientists characterize diabetes as elevated levels of blood glucose or blood sugar. When not diagnosed early, it can eventually damage other body organs, including the heart, blood vessels, eyes, kidneys, and nerves (Dendup et al. 2018a). Furthermore, in 2016, 1.6 million deaths were directly caused by diabetes alone, while 2.2 million were attributable to high blood glucose in 2012, making it the seventh leading cause of death in 2016 (World Health Organization 2018b).

There are two types of diabetes mellitus (DM): Type 1 Diabetes Mellitus (T1DM) and Type 2 Diabetes Mellitus (T2DM). The cause of T1DM has not been medically

proven, but the age of symptomatic onset is in childhood or adolescence, probably as a result of genetic processes (Pociot and Lernmark 2016). It is characterized by a lack of insulin production and requires the daily administration of insulin. Some of its symptoms include excessive urination or polyuria, thirst or polydipsia, dry mouth, constant hunger, weight loss, poor vision, and sudden fatigue (P. A. Moore et al. 2001; Katsarou et al. 2017). T2DM is an adult-onset, formerly known as non-insulin-dependent. It results from the ineffective use of insulin and has been linked to excess body weight and physical inactivity in adults and children. The other type is gestational diabetes, which occurs during pregnancy in women due to rising blood glucose values above normal but usually below those found in diabetic patients. Gestational diabetes increases the risk of childhood diabetes T1DM and future risk of T2DM among children.

Globally, 425 million people had diabetes in 2017, and it is projected to rise to 629 million by 2045, a 45% increase (International Diabetes Federation 2017). By projection, different regions of the world will be disproportionally affected. In North America, the rate will increase by 34%, in Europe by 16%, in Western pacific by 15%, in South and Central America, it will increase by 62%, increase by 110% in the Middle East and North Africa, and 156% in Sub-Sharan Africa (International Diabetes Federation 2017). Although the projected data show that developing regions of the world are most likely to experience the most debilitating diabetes burden, North America has the most significant risk among the world's developed regions.

The prevalence of diabetes among the socially disadvantaged population has been well documented in the literature (Chaufan, Davis, and Constantino 2011; Booth et al. 2013; Mendenhall et al. 2017; Ramachandran et al. 2002; Hsu et al. 2012; Gaskin et al.

2014). In Boston, Piccolo et al. (2015) used a Community-Based Health Survey of 2764 residents to determine the disparity in type 2 diabetes among culturally diverse neighborhoods in Boston, MA. The authors used both the individual/compositional and contextual/neighborhood variables. The spatial distribution of the diseases was significantly clustered in space. Multilevel model results show that neighborhood characteristics (neighborhood socioeconomic status or SES, racial composition, recreational open space, walkability operationalized as the distance to the closest grocery store, crime, violence, safety, vacant building, cleanliness) did not explain the pattern of diabetes observed. Lifestyle (physical activity, obesity) instead, and SES (income, education), demographic characteristics (age, race) contributed to the 35% variability observed among the neighborhoods (Piccolo et al. 2015).

In a longitudinal study of neighborhood physical and social impact on the incident of T2DM using the Multi-Ethnic Study of Atherosclerosis (MESA), T2DM was defined as a fasting glucose level of 126 mg/dL or use of insulin or the use of oral antihyperglycemics among study participants. The study found that the lower risk of developing T2DM was associated with healthy neighborhood food and the availability of neighborhood physical activity resources. The study concluded that access to neighborhood resources to support lifestyle and living are viable strategies for reducing the prevalence of T2DM in the US (Christine et al. 2015). In a similar study using data from Jackson Heart Study, Gebreab et al. (2017) focus on the neighborhood social and physical environments among African Americans. The study showed that neighborhood cohesion was associated with a lower incidence of T2DM, and the concentration of unfavorable food stores in neighborhoods was associated with a higher incidence. The

study concludes that improving community ties or attracting good food stores may reduce adult diabetes prevalence.

A recent systematic review by Dendup et al. (2018) examined the neighborhood environment's role on T2DM prevalence based on published articles. The study highlighted seven standard measures of the neighborhood in some selected articles. These measures include walkability, food environment, green space, residential noise, traffic and proximity to roads, air pollution, neighborhood conditions, safety, and other environmental characteristics. On a positive note, most studies that assessed these measures agreed that the risk of T2DM decreases with increasing neighborhood walkability, access to physical activities, access to green space, less concentration on unhealthy food stores.

Other studies that access the negative influence of the environment (air pollution, residential noise, traffic, proximity to roads, and neighborhood conditions, safety) on the risk of T2DM did not find any significant association. From the systematic review, several gaps were identified. In their conclusion, Dendup et al. (2018) observed that the variation in most of the articles' findings on the link between neighborhood characteristics and the risk of DM was due to the choice of method and research design. The study also observed that most of the studies failed to consider the changing characteristics of the neighborhood they studied, such as the effect of neighborhood transformation (gentrification) and urban sprawl. Besides, the study emphasized the need to investigate the interaction between environmental characteristics and other factors such as the dialectic relationship between food environment and safety, pollution and walking environment, and other interactions possible (Dendup et al. 2018b).

Adult obesity. The National Institute of Health (NIH) defines obesity as a body mass index or BMI of 30 and above. BMI is determined based on body weight, usually in kilograms (kg) divided by an individual adult's height in squared meters (m^2). Obesity in an adult is usually measured differently from that of children and adolescents. Obesity is often multifactorial, linked to genetics and behavioral factors. Between 2015 and 2016, adult obesity was estimated at 93.3 million, representing 39.3% of the total US adults aged 20 and above (Centers for Disease Control and Prevention 2019b).

In 2019, Robert Wood Johns Foundation conducted a national survey on obesity using the most recent Behavioral Risk Factor Surveillance System (BRFSS) data. They found that Mississippi, West Virginia, Arkansas, Louisiana, Kentucky, Alabama, Iowa, North Dakota, and Missouri have obesity rates higher than 35% and are classified as category one. The rate of obesity among the 21 states in the second category ranged between 30.1% and 34.8%; Texas and Oklahoma shared equal rates of 34.8% (Robert Wood Johns Foundation 2019). Furthermore, between 2017 and 2018, adult obesity rates increased in seven states comprising Florida, Kansas, Minnesota, Missouri, New Mexico, New York, and Utah. The rate declined only in Alaska and remained unchanged/stable in the rest of the country (ibid.).

There is a social and demographic disparity in the prevalence of adult obesity in the US. The rate was highest among the Hispanics (47%) and non-Hispanic Blacks (46.8%), followed by non-Hispanic whites (37%). Non-Hispanic Asians (12.7%) had the least rate after the study adjusted for age (Ogden et al. 2015). Also, men and women with a college degree had lower obesity rates than those with less education. Men in extreme income groups (lowest and highest) had the lowest obesity rate than men in the middle-

income group. Meanwhile, women in the highest income group had the lowest obesity rate than those in the middle- and lowest-income groups (Ogden et al. 2015). The pattern was consistent among non-Hispanic white, non-Hispanic Asian, and Hispanic men and women.

According to a media source (Patch), Texas's average person is fatter than an average person in 42 other states in the US (Cantu 2018). Figure 10 shows that the rate of adult obesity in Texas increases more than the US rate. The recent statistics indicate that Texas's rate of obesity reached the highest point of 34.8% in 2019 compared to 33% in 2018, far over the national average rate of 30% (United Health Foundation 2020). According to the *Imagine Austin Indicators*, the obesity rate in 2016 was 23.2% compared to 19.1% in 2011. African Americans and the Hispanic populations in Austin had the highest rate between 2011 and 2015 (City of Austin 2018). Since most Hispanics and African Americans reside in East Austin, Obesity is, therefore, an important health indicator to examine in this study. An earlier study by Herrick (2008) identified poverty, food insecurity, and low health insurance rates as the most relevant obesity indicators in Austin. The paper concluded that the prevalence of obesity could be linked to structural segregation that brought "Hispanics and East Austin under the banner of high risk" (Herrick 2008, 2730).

Adult mental health. The psychological impacts of urban renewal programs in the global North and urban clearance policies in the global South usually threaten or mount unhealthy pressure on the vulnerable groups, the lower-income or POC (Lees, Shin, and López-Morales 2016). For example, the urban renewal policy in the 1960s in the US had more significant impacts on the Black community. The perception of

gentrification can "trigger a range of affective responses which, in some cases, are associated with psychological distress, and even post-traumatic stress" (Elliott-Cooper, Hubbard, and Lees 2019, 8).
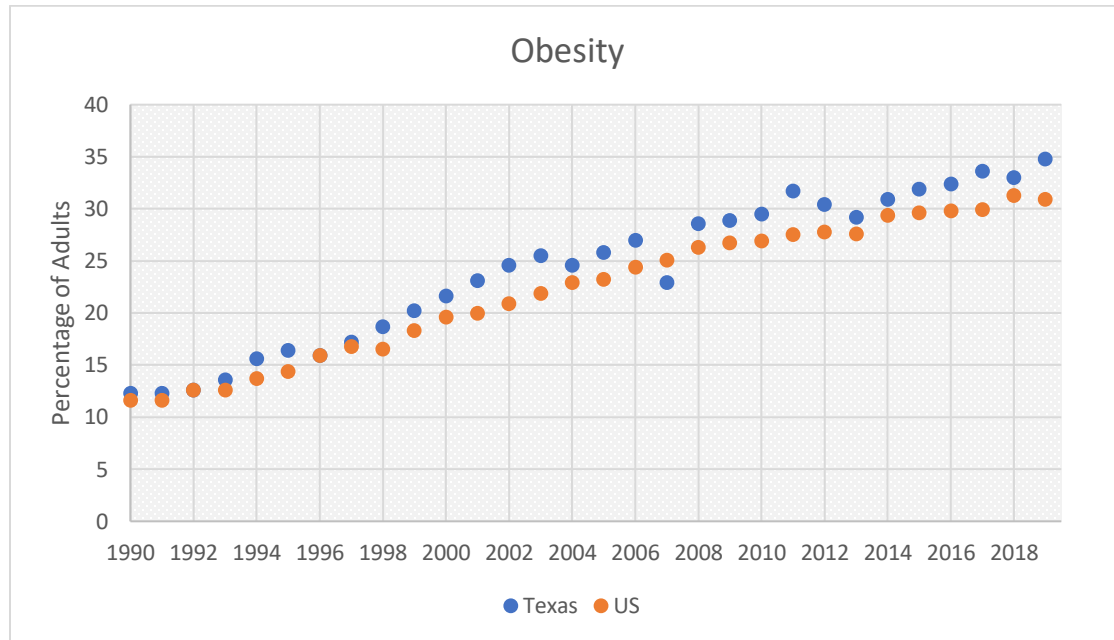
Figure 10. Obesity Rate in Texas, 1990-2019. (Data: CDC, Behavioral Risk Factor Surveillance System, 2018)

More critically, people already living with mental health conditions are more likely to be impacted by gentrification through displacement, leading to aggravated health risks (R. Atkinson 2000, 321). Perrino et al. (2008) observed a critical effect of the gentrifying neighborhood on Hispanic older adult residents' mental health in Miami. Their study showed that increased rent exacerbates the financial burden among the study population that, in turn, impacted their mental health. The authors reported a case of an elderly woman who reported depression due to economic pressure, which happens to be a caregiver to "a dependent family member with a psychiatric disorder" (Perrino et al. 2008, 39). Fong et al. (2019) showed that gentrification (positive change in household

income) was associated with increased mental health problems if they were disidentified with their neighborhood but show lower risk if they were identified with their neighborhood (neighborhood connection). On the other hand, de-gentrification (downward change in income) also have worse mental ill-health when deidentified with their neighborhood while people in de-gentrification, irrespective of their socioeconomic status had improved mental health when identified with their neighborhood (Fong et al. 2019).

There seems to be gender disparity in exposure to the effect of neighborhood change and mental health. A Puerto Rican study found that women are more likely to report mental health symptoms due to a dysfunctional BE (Arrigoitia 2014, 178). Another study found gentrification-induced displacement to increase anxiety, depression, and economic stress among residents, particularly women, in Millers Point neighborhood, Sydney, Australia (Morris 2017).

Gentrification as an Environmental Stressor

Gentrification, deprivation, segregation, and low socioeconomic position are known sources of environmental stressors (Shmool et al. 2015; Wilder et al. 2017). In health inequality research, material deprivation and psychosocial mechanisms are used to explain this phenomenon. From the material deprivation viewpoint, scholars have argued that an individual's health tends to worsen in the absence of family and community resources (such as access to income, housing, or affordable health care) in addition to structural inequality (Keene and Geronimus 2011). On the other hand, psychosocial interpretation of health inequalities "ascribes the existence of health inequalities to the direct or indirect effects of stress stemming from either being lower on the

socioeconomic hierarchy or living under conditions of relative socioeconomic disadvantage" (Kawachi, Subramanian, and Almeida-Filho 2002, 649). The socioeconomic disparity has been argued to be a significant source of stress and a risk factor for health. Similarly, the erosion of social cohesion and social capital has been cited as an additional mechanism underlying the link between socioeconomic disparity and health outcomes. The following paragraph examined the weathering hypothesis and life course perspective to explain the link between gentrification and health outcomes in rapidly changing environments in East and Southeast Austin, Texas.

The weathering thesis posits that repeated exposure to stressor without any intervention— medical or non-medical—deteriorates health (Geronimus 2000; Kinlein, Wilson, and Karatsoreos 2015). Weathering hypothesis was interpreted as the cumulative impact of exposure to, and high-effort coping with, subjective and objective stressors, that is, with psychosocial, economic, and environmental stress (Keene and Geronimus 2011, 381). The concept has been applied in urban research, particularly in urban housing and displacement (Geronimus 2001; Geronimus et al. 2006; Keene and Geronimus 2011). Physiologically, environmental stress can trigger stress hormones (Hill and Angel 2005)—cortisol, epinephrine, and norepinephrine— which can damage blood vessels and arteries, leading to elevated blood pressure (BP). Abnormal BP increases the risk of heart attacks, stroke, and sudden death (Frenneaux et al. 1990; Karatsoreos and McEwen 2011), while excess cortisol increases obesity, hypertension, and hyperglycemia. Accumulating evidence suggests significant links between neighborhood stressors and mental illness symptoms such as anxiety and depression (Brummett et al. 2008; Conway, Rutter, and Brown 2016; Curry, Latkin, and Davey-Rothwell 2008; Gary,

Stark, and LaVeist 2007; Latkin and Curry 2003; C. Mair et al. 2015; Christina Mair, Roux, and Galea 2008; Venzala et al. 2013; Weissman and Paykel 1972). What is more is that the intensity, proximity, duration, and frequency of stressors determine the severity of health outcomes. It has been documented that the duration of exposure to these environmental stressors increases the risk for chronic health conditions, namely cardiovascular disease, asthma, metabolic disorder, cancer, depression, extreme mood change, and isolation (Charmandari et al. 2003; Venzala et al. 2013). During the long weathering process, the body is automatically prepared for pre-disease states (Glei et al. 2007; Gouin 2011; Herts, McLaughlin, and Hatzenbuehler 2012; Juster, McEwen, and Lupien 2010). Dysregulation in metabolism, mental functioning, autoimmune response, and the cardiopulmonary system can secondarily cause anxiety, change in body mass index, and bodily accumulated fat or visceral fat (Fagundes, Glaser, and Kiecolt-Glaser 2013; Gouin 2011).

Curry, Latkin, and Davey-Rothwell (2008), in their study in Maryland, US, employed pathway analysis to investigate the impact of neighborhood effect on residents' psychological distress. The study by Tran et al. (2020) in California indicated that living in a gentrified and the upscaled neighborhood was associated with an increased likelihood of severe psychological distress relative to living in a low-income and not gentrified neighborhood. Venzala et al. (Venzala et al. 2013) found that environmental chronic mild stress (CMS) induced depressive-like profiles, including anhedonia, helplessness, and memory impairment. In their study, Conway, Rutter, and Brown (Conway, Rutter, and Brown 2016) showed that environmental stressors were associated with depression and panic disorder. In a case-control study, Brummett et al. (Brummett et

al. 2008) examined the link between environmental stress and symptoms of depression among the "stressor group" and "non-stressor group." The study found that environmental stress was significantly associated with depression scores among the stressor group for both female and male participants than the non-stressor groups. However, there remain many opportunities for more studies to disentangle the mixed results available on the impact of gentrification and health (G. S. Smith et al. 2020; A. S. Schnake-Mahl et al. 2020).

In the social science research literature, several studies have also applied life course perspective to understand stress, mental health, social relationships (e.g., social capital, social cohesion, social networking), and chronic health conditions in the literature (Tran et al. 2020; Celeste and Fritzell 2018; Ben-Shlomo and Kuh 2002; Goosby 2013; Pearlin et al. 2005; Shoham, Vupputuri, and Kshirsagar 2005; Umberson, Crosnoe, and Reczek 2010). The life course effect refers to how health status at any given age reflects the current condition and the embodiment of prior living circumstances, including previous neighborhoods (Pearlin et al. 2005; Goosby 2013).

According to Kawachi and Almeida-Filho (2002), the life course perspective has three dimensions: latent, pathway, and cumulative effects. The *latent effect* is when the early-life environment (e.g., born and raised in the social and economically deprived environment) affects adult health regardless of intervening experience; *pathway effect* occurs when the early life environment sets individuals onto life trajectories (such as exposure to traumatic situations) that, in turn, affect health status over time. Lastly, the *cumulative effect* is related to the intensity and duration of exposure to unfavorable environments adversely affects health status, according to a dose-response. Tran et al.

(Tran et al. 2020) used respondents' age, marital status, and parental status as proxies for life cycle status to study gentrification and mental health illness in California. Furthermore, extant literature suggests that the health of people who witnessed chronic stress earlier in childhood is worse compared to those who were exposed to stress later in life (Evans and Kim 2007; Fagundes, Glaser, and Kiecolt-Glaser 2013; Hammen, Henry, and Daley 2000).

Scholars including Anguelovski et al. (2019), Gibbons and Barton (2016), Dragan, Ellen, and Glied (2019), and Izenberg, Mujahid, and Yen (2018) have investigated the link between gentrification and health in the US. However, these studies have shown different mixed results. For example, Izenberg and colleagues (2018) in California, after adjusting for covariates in their model, found that individuals living in gentrifying neighborhoods did not have significantly poor/fair self-rated health (SRH) relative to those not living in a gentrifying neighborhood. However, they reported that living in a non-gentrifiable neighborhood was associated with reduced odds of fair or poor SRH. The study also found higher odds of poor health among Blacks, an association not found among other racial/ethnic groups, which is in line with the findings reported by Gibbons, Barton, and Brault's study in 2018.

Earlier, Gibbons, Barton, and Brault's (2018) study indicated that residents of neighborhoods experiencing gentrification reported overall better physical health outcomes than those living in neighborhoods that had not experienced gentrification, irrespective of the stage of gentrification. Studies that investigated children's health in New York showed that the experience of gentrification has no effects on children's diagnoses of asthma or obesity when children are assessed at ages 9–11, but that it was

associated with moderate increases in diagnoses of anxiety or depression (Dragan, Ellen, and Glied 2019). A study that focused on the older population based on validated questionnaires indicated that older adults in gentrifying neighborhoods are more likely to experience symptoms of anxiety and depression (C. Mair et al. 2015; Christina Mair, Roux, and Galea 2008). The study also reported that the symptoms tend to decrease over time in neighborhoods experiencing increases in social cohesion and increased for adults experiencing adverse neighborhood changes.

Summarily, despite the growing evidence between changing environment and health, limited research exists on whether the perception of gentrification has a direct or indirect relationship with mental health conditions (e.g., anxiety, depression) using a complex model.

Socioeconomic Status and Health

Lower and upper-level socioeconomic status (SES) are critical factors in health outcomes. Research investigating the significant impact of social and economic status on health revealed that socioeconomic disparities determine health outcomes. Inequality is ubiquitous in urban studies, and the use of inequality differs markedly, cutting across social, economic, political, geographical, racial, and health research (Park et al. 2020). To better gain a more theoretical and empirical understanding of the extent to which SES may impact health, I reviewed studies that examined the negative aspect of socioeconomic position and health.

Socioeconomic disparities or inequalities are defined as the differences in income, social class, occupational background, educational attainment, and neighborhood deprivation (Park et al. 2020). It is crucial to note that this description is different from

sociodemographic differences. Sociodemographic differences deal with age, gender, ethnicity, marital status, number of children, household composition, and living arrangement. In the context of this study, I subjectively measure socioeconomic resources (ASR) as a supporting variable that can mediate the effect of gentrification. The index was operationalized as access to some vital needs, such as access to healthy food, health care services, social and financial supports, and housing. These items cover the fundamentals of human needs based on Maslow's psychology theory (Maslow 1948). In his hierarchical model of human needs, Maslow group food, shelter, safety (health), rest, and friendship into the first (bottom) two of the three constructs in the model: basic and psychological needs. The topmost need, self-fulfillment, practically depends on the attainment of the first two needs. The disparity in access to these needs is what I referred to as socioeconomic inequality in the context of health. The unequal gain of equal resources has been noted as the structural cause of health inequalities (Kawachi, Subramanian, and Almeida-Filho 2002).

Assari (2018) examined the socioeconomic status (SES) and self-rated oral health among the Hispanic whites based on the Collaborative Psychiatric Epidemiology Surveys (CPES) and operationalized SES as education, income, employment, and marital status. In the study, ethnicity was used as a moderator while controlling for age and gender. The study concluded that differential gain of SES indicators exists between Hispanic and non-Hispanic Whites, with Hispanic Whites more disadvantaged. In a similar study on physical self-rated health, Assari and Kumaar (2018) found that education, employment, and high income were associated with self-rated physical health among six ethnic groups in the US.

The existing studies have broadened our knowledge of the relationship between the living environment and self-rated health with little or no emphasis on the resident's experience of gentrification on health. Hence, there is an additional need to examine self-rated health within the context of the gentrifying environment. To accomplish this in cross-sectional study design, scholars had recommended measuring neighborhood characteristics based on residents' perceptions (Petrová Kafková and Vidovićová 2019; Zenebe, Brown-Robertson, and Mayo 2018; Antunes, March, and Connolly 2020; DeVylder, Fedina, and Jun 2019).

The Gap in the Literature of Gentrification and Health

For the past six decades of gentrification research, so much work has been done on the subject. Despite the replete work on gentrification, there seems to be a wide gap in the literature as minimal attention has been given to its effect on human physiological and psychological, or mental health except in recent times. Based on the survey of existing works, I summarized some of these limitations common to the study of gentrification in the following paragraphs, which amplify the need for this study.

Though there is growing research on gentrification, very few published empirical studies on gentrification have been conducted in Austin despite being one of the US's rapidly developing cities. The majority of the works done on gentrification in Austin are thesis-based (Turner 2015; Ward 1998) and working/technical reports (Way, Mueller, and Wegmann 2018; Tang and Falola 2016; 2017) and lack focus on health implications on the population. To the best of my knowledge, limited study has examined how residents' perception of neighborhood change relates to their health in Austin, Texas. Previously, the city of Austin set up the gentrification steering committee to investigate

the impacts of urban renewal policies in the 1990s and found government urban renewal policy led to the displacement of longtime residents. However, the report failed to report the impact of gentrification on 'stayers' physical and mental health.

Furthermore, studies that have examined gentrification and health are done outside Texas (Izenberg, Mujahid, and Yen 2018; R. J. Smith, Lehning, and Kim 2018; Gibbons, Barton, and Brault 2018; Gibbons and Barton 2016). Explicitly, there are relatively limited studies in the US that consider the chronic health conditions within the framework of gentrification (Anguelovski, Triguero-Mas, et al. 2019; Whittle et al. 2015; Jacobson et al. 2019). Based on this forgoing, there exist a gap in the literature on gentrification and health in Austin. Thus, this study contributes to gentrification literature by examining gentrification and different aspects of health, including self-rated health, mental health, and chronic health.

III. THEORETICAL FRAMEWORKS

Introduction

This section reviews a combination of theoretical concepts to understand the impact of the changing built environment (BE) on health. I focus on one aspect of the BE change referred to as gentrification, which generally implies demographic change between lower- and middle/upper-income groups. In chronological order, I present the three dominant schools of thought related to understanding the link between gentrification and health (Figure 11). These theories are ecological, subcultural, and political ecology; the last two are critical theories. Besides, I also review sub-theories associated with the three main theories. This study particularly explores relevant models under the ecological view, including invasion and succession, filtering, border, and bid-rent models. Under the political ecology perspective, I touched on spatial fix theory (Harvey 1981), rent gap theory (Smith 1979), and growth machine theory (Molotch 1976). Apart from the three broad schools of thought and submodels, this research also draws from the social determinants of health (SDOH) and life course theory (LCT). I first summarize the three major theories before contextualizing the sub-theories relative to gentrification and neighborhood discussion.

Ecological Theory

At the core of the ecological perspective are deterministic models such as those proposed by urban sociologists and urban economists. The earlier followers of the urban ecological perspective believed in the natural environment's deterministic nature in shaping human behaviors and how people agglomerate in space. Though more applied to examine organism responses to physical stimuli, the ecological theories have been

extended to human beings' response to social stimuli. For example, the ecosocial theory argues that the shift in the neighborhood conditions[12] results in health disparity (Krieger 2000; 2012). The theory also emphasizes the role of accountability and agency for social disparities in health and research. Nevertheless, the ecological theory school of thought believes that the change in the human spatial form is through natural and economic forces and disregards the role of human agency (culture) in neighborhood change. Although urban economists rely more on mathematical formulations than urban sociologists, researchers have considered both of them under the ecological perspective (e.g., Weaver 2015; Weaver and Holtkamp 2015; Temkin and Rohe 1996).

Popular among the classical theory of urban change is Burgess's concentric zone theory (Parks, Burgess, and McKenzie 1925). Burgess (1925) applied the competition concept among plants to study how human beings compete for physical space, which he called *invasion and succession*. The concept of invasion and succession has been applied in the study of neighborhood change (Aldrich 1975; Gotham 2002; B. A. Lee et al. 2019; Krase 2016). In an effort to demonstrate the ecological theory, Burgess gave an analogy of a city consisting of six rings that radiate from the innermost to the outermost ring. The innermost space (ring) is the central business district (CBD) surrounded by the industrial sector, slum housing, working-class housing, higher-status dwellings, and the commuter's dwellings located in the outer geographic space. The model assumes a flat terrain without geographic barriers, and housing is segregated by income and ethnicity.

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[12] Neighborhood conditions include sociocultural, economic, demographic, and political than can overturn neighborhood characteristics overtime.

CONSTRUCTS

- Housing Stock
- Rent
- Property Value

- Sense of Commitment
- Community Involvement
- Social Cohesion

- Racial Change
- Cultural Change
- Social Change

CONCEPTS

- State Policies & Built-Environment
- Resources Distribution

- Social Network/Capital
- Cultural Value
- Sense of Community Tie

- Invasion and Succession
- Competition
- Racial/Cultural Change

Political Ecology

Subcultural

Ecological

Figure 11. Theoretical Framework, Construct, and Concepts.

Based on Burgess's proposition, the city only grows outward unilaterally, and each ring exacts pressure on the surrounding ring due to economic need. Over time, neighborhoods in the inner rings deteriorate; thus, lower-income (working class) residents move into the deteriorated neighborhoods as the middle- and higher-income (affluent) residents move toward the suburb, pushing the growth of the city outwardly. Contrary, urban gentrification usually takes a reverse pattern of the concentric model because middle- and higher-income populations tend to return to the central city, a pattern Neil Smith referred to as back to the city movement (N. Smith 1979). At the initial stage of gentrification, single artists usually take the lead, followed by creative professionals in the second wave and students and other residents with nontraditional lifestyles in the third wave (D. P. Smith 2004; Zukin 1987; Slater 2011; Cimino 2011). In the following paragraphs, I present the three dominant models under the ecological perspective.

Subculturalist Models

Scholars that belong to the subcultural school reacted to the economic determinism of the ecological models such as the invasion and succession model. The subculturalists' ideas deviate from the ecological assumption of neighborhood uniformity; they contend that different subcultures vary across communities/neighborhoods. Also, they argue that there are nonecological factors that are also important than the simple economic basis for neighborhood change and racial mobility. The subcultural framework argues that sentiment, cultural value, meaning, symbolism, community participation/involvement, commitment, social networks, sense of community tie, and social capital characterize most contemporary neighborhoods (Pitkin 2001; Fischer 1975). As a result, concepts such as residents' self-fulfillment, satisfaction, and wellbeing are critical in studying neighborhood change. Like contagious diseases, (un)health behavior can diffuse within a social network depending on how strong the community members' connection is (Emch, Root, and Carrel 2017).

Social capital is the benefits derived from community members' connections (Honold, Wippert, and van der Meer 2014). It also refers to the tangible material or psychological resources embedded in social relationships available for community members to access. Furthermore, the construct can be measured as a social connection, social tie, and collective efficacy. Another aspect of social capital that can affect health is collective efficacy, which refers to a group's ability to mobilize to undertake collective action. Through collective efficacy, a community can rally together to protest for change to improve their health (e.g., demand for security, housing, sidewalks, and parks). However, collective efficacy tends to be poor in disadvantaged neighborhoods because of

how people move out of the neighborhoods or due to neighborhood instability. As articulated by Temkin and Rohe (1996, 159), "neighborhood change is not the result of seemingly inexorable ecological forces, nor is it solely a function of economically motivated individuals and institutions acting either alone or in concert." Places change based on the group response to changes in the physical, social, and political stimuli. The propensity of a neighborhood to (resist) change, according to structuralists, depends on the social network, whether it is strong or weak. As a result, residents in gentrifiable neighborhoods can fight to retain their homes if influential opposition groups exist.

In the literature, studies that have examined the role of the social network, social capital, and neighborhood values in the context of neighborhood change include the work by Putman (2000); Butler and Robson (2001); Warner and Burchfield (2011); Chaskin and Joseph (2015); Steinmetz-Wood et al. (2017); and Fong et al. (2019). For example, Putnam (2000) and Steinmetz-Wood et al. (2017) described collective efficacy as a form of social capital that can be defined as the consolidation of neighborhood social cohesion and informal social control. Their study examined the link between collective efficacy and gentrification; the authors referred to gentrification as a disruptive development disrupting collective efficacy. In a study of (de)-gentrification in Australia, Fong et al. (2019), in their paper, argue that individual identity with their neighborhood has a significant impact on the state of their mental health. Their study shows that people who were deidentified had worse mental health conditions, while those identified with their neighborhood reported improved mental health regardless of their socioeconomic position.

Religious Entities, Social Capital, and Gentrification

Gentrification has also been argued to encourage secularization, which involves converting buildings and people from religious to secular (Ley and Martin 1993). Religious organizations such as churches, synagogues, and mosques are important social ecology for fostering neighborhood social ties. Longtime members of the religious organization affected by gentrification, in most cases, are low-income minorities who share similar religious beliefs. The dispersal of old businesses and loss of jobs, increasing rent, and property taxes contribute to the fleeing of longtime minorities in most neighborhoods, including African American and Hispanic populations in East Austin (Tang and Falola 2016). Furthermore, because gentrification brings new businesses to meet the young and liberal newcomers' tastes, this process also affects religious organizations and their financial survival.

With land becoming scarce in the inner-city, religious buildings[13] become the prime target of the deep-pocketed urban developers in gentrifying communities. Due to financial hardship and churches found themselves in the real estate hotspot market, churches that cannot meet up with the financial burden result in selling a portion of the landed property to offset their debts (A. Phillips 2018). In their eyes, those lands are being converted to condos, townhouses, and multiunit luxury apartments. These new developments continue to push the taxes through the roof, and eventually, these churches will have no option other than to sell the rest of the property and move to the suburbs where land is affordable. While some religious organizations tend to be stubborn and

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[13] Goodwill Baptist Church and St. Annie's African Methodist Episcopal Church, both on Newton Street, were an integral part of African American community in East Austin. See details of the story from https://www.statesman.com/NEWS/20160903/African-American-churches-worth-more-to-Austin-than-their-land-value

resist enticement, others consider it as sitting on gold mines and consider the economic opportunities at their disposal (A. Phillips 2018).

According to *Austin American-Stateman*, several churches in East Austin are currently contemplating selling their properties, even when they are eligible for historical landmark status (A. Phillips 2018). The danger of upgrading to a historical land status includes policies preventing them from remodeling the exterior or demolishing any part of the church buildings. The most exciting part is that many of these churches serve not only as social networking; they are a marker for the African American population. The dilemma is if these churches considered selling their properties and moved, it becomes more problematic for African American populations. Their voting rights and access to community resources such as equitable schools and access to public and private accommodations will be in grave jeopardy. Hence, the impact of gentrification is more profound than what we currently know. If it is not well managed, it can result in the minority population's absolute extermination and widens racial and economic inequality.

The relationship between gentrification and congregations is not peculiar only to Austin; it is a common phenomenon across the united states and has been noted in the literature (Ley and Martin 1993). For example, Cimino (2011) examined the role of religion ecology in the process of gentrification in the sections of Williamsburg and Greenpoint, Brooklyn, NY. The author argues that the congregation of LTRs plays a significant role in neighborhood change, which includes "building bridges between residents, providing community services, and injecting a moral tone in their neighborhoods… increasing safety and community standards" while the presence of newcomers weakens congregational ties (Cimino 2011, 157). In sum, gentrification

stiffens religious congregations' survival due to the displacement of LTRs who form the religious organizations' social capital and weakens neighborhood ties.

Political Ecology

Political ecology (PE) evolved from different disciplines such as sociology, geography, environmental science, economics, medicine, political economy, and political science with different methodological approaches to solving social issues. The term political ecology was first used by Frank Thone in 1935, resurfaced in French literature in 1957, used by Bertrand de Jounenel, and was seen in English literature by an anthropologist named Eric R. Wolf in 1972 (Bauler 2013). Because the political economy as a field has tended to reduce everything to social constructions by directly overlooking all that is not human, political ecology expands ecological concepts to respond to this inclusion of cultural and political activity within the purview of ecosystems that are significantly but not always entirely socially constructed (Bauler 2013). Put differently, PE attempts to provide critiques as well as alternatives in the interplay of the environment and political, economic, and social factors.

Traditional ecologists are particularly interested in the interactions between organisms and their environment with a resultant understanding of structural causality rather than individual behavior or characteristics. Hence, no single discipline takes credit for PE; instead, it is a multidisciplinary intellectual effort/ property. Radically, it evolved by creating a common ground for the disparate ideas from different disciplines that study the bio-environmental complex relationships. For instance, at the beginning of the 19th century, medical ecologists emphasize curing diseases rather than improving general societal health (Greenberg and Park 1994). On the other hand, social scientists believe

that the disease's clinical treatment is a cost-inefficient way to maintain health. Researchers believe that PE has a normative understanding that is better, less coercive, less exploitative, and more sustainable ways of doing things (Robins 2005).

In the field of health and medical geography, several researchers build their theoretical framework using PE to understand and explain the relationship between social, economic, and political environments that produce varying health outcomes or health inequality (Jackson and Neely 2015; Kalipeni and Oppong 1998; Mayer 1996; Cutchin 2007; King 2010; Nyantakyi-Frimpong, Arku, and Inkoom 2016). PE researchers believe that health is socially produced, historically determined, and sensitive to history and socio-ecological contexts. The commonest unit of PE analysis has been at the macro-and mesoscale (Birkenholtz 2012), and scholars have advocated for its application for microscale research. The ubiquitous application of PE in social research and health studies is because of the flexibility to combine quantitative and qualitative approaches in investigating social, health, and environmental problems.

Political Economy and Gentrification

The political economy school believes that the political, social, cultural, and economic factors are forged to determine urban development and the subsequent outcomes. The students of the political economy are very critical of the economistic determinism view of the ecological theory. Unlike the subculturalist, the political economy school of thought retains some of the ecologists' ideas but focuses more intensely on how the social production and accumulation of wealth result to change in the socio-ecological context (Harvey 1987; Molotch 1976) and the production of health inequality.

I used Figure 12 to illustrate how the political economy and political ecology serve as upper-level mechanisms combined with the disease triangle at the lower-level to produce health outcomes at the neighborhood level. The government's economic interests in increasing urban portfolio/economic growth have made them a supplier of economic resources (e.g., urban land space to developers for profit) than welfare providers. To a large extent, material relations and uneven resource consumption, concepts of nature, and urban environmental management politics affect gentrification processes in various ways. To a large extent, gentrification is a marketplace controlled by government policies (Zukin 2010), while state policies significantly influence the conditioning of the urban built environment (Dooling 2009; Lees, Shin, and López-Morales 2016). Arguably, gentrification is, therefore, a political tool for reengineering the inner-city (Uitermark, Duyvendak, and Kleinhans 2007), and it serves as a justification for urban sustainability (but to the detriment of vulnerable populations), which has raised critical questions concerning social and environmental (in)justice (Checker 2011; Anguelovski, Connolly, Pearsall, et al. 2019).

Smith's (1979) theory of gentrification lays an essential emphasis on capital movement into the inner-city more than the people. Economic and cultural factors are essential in the investigation and discussion of gentrification (Lees 1994; Ley 1994). Under the cultural perspective of city/neighborhood change, young professionals have a unique taste for historically traditional city centers and utopian housing styles and are believed to be active in transforming urban BE or UBE (Lees, Shin, and López-Morales 2016; Shin 2010). Thus, as the newcomers' population increases around the city center, the demand for housing rises, and prices are inflated due to the high demand in low rent

areas. New middle-income groups become politically influential, and they have resources and connections to positively facilitate change in their neighborhood, such as increasing community policing and new businesses that meet their taste (Lees, Shin, and López-Morales 2016; Brown-Saracino 2013; Zukin 1987).
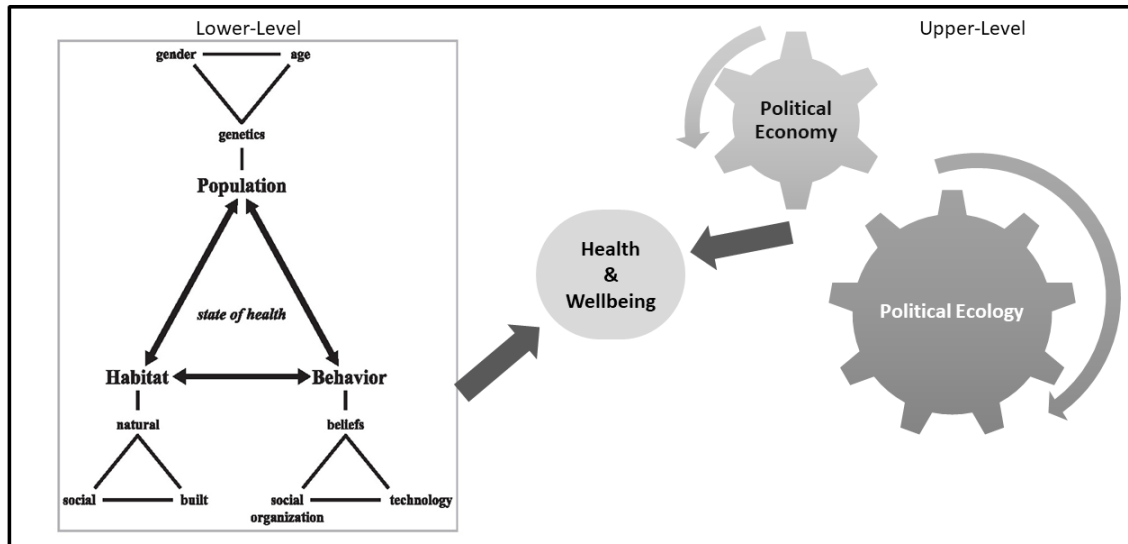
Figure 12. Lower-level and Upper-level Mechanism of Health Based on Diseases Ecology and Political Ecology Framework.

Growth Machine

The urban growth machine thesis formulated by Molotch (1976) posits that urban elites seek to capture and retain economic power primarily by promoting real estate and population growth. He described urban elites as government, businesspeople, private investors, real estate entrepreneurs, and other people who directly benefit from urban growth in general. For growth to take place, certain "conditions" must be met. These conditions include reasonable taxation, guaranteed safety through an oriented policing, friendly business environment, and upgraded built environments such as urban greenery

that attract medium- and high-income workers and other high social classes (Molotch 1976, 312; Tretter 2013b; 2013a).

Border and Rent Theory

The border model of neighborhood change assumes that the potential of having lower-status neighbors is a function of the distance of any neighborhood to a lower-status neighborhood, which affects the value of housing in a community (Temkin and Rohe 1996). On the other hand, bid rent theory posits that as real household income rises, the importance of housing services relative to the convenience of a short commute to work also increases, prompting higher-income families to choose larger houses in more distant neighborhoods over small housing units near the city center. These types of ecological models are used for location and consumer decisions. In the original proposition of boundary or border model (Bailey 1959), Bailey's simple argument was the nuisance produced by humans in the adjacent neighborhood of low and high-income groups X and Y. Bailey writes:

> The particular kind of nuisance with which this note is concerned is the nuisance of people themselves when they live adjacent to other people whose tastes, habits, and income are markedly different from their own. In this case, the nuisance may be unliteral rather than mutual. It is generally true that people consider it unpleasant to live near groups of people with lower incomes and with taste habits "inferior" to their own, while the reverse is sometimes and perhaps generally not the case. (Bailey 1959, 288)

Urban studies had shown that spatial concentrations of low-income residents would precipitate an increase in crime, low educational attainment, and out-of-wedlock births (Temkin and Rohe 1996). To dissolve spatial concentration of poverty and other problems associated with housing, scholars have suggested housing programs that

provide subsidies to encourage inner-city residents to seek out apartments in neighborhoods more distant from the city center of CBD (Bailey 1959, 292; Pitkin 2001).

Rent theory has helped gentrification researchers to understand the change in property ownership, investment, and displacement. Rent theories such as Alfred Marshall's (1961, cited in Clark 1988) and Neil Smith's (1979) rent gap contribute to how urban scholars understand the UBE change. Central to both is the change in the urban land value. Marshall describes land value as the one [it] will have without physical structure when sold in a free market (E. Clark 1988). Ground rent is the amount a buyer is willing to pay for a land base on the estimated value the site will give to the building erected on it and the land's location—Marshall's 'site total value' composed of building value and actually realized ground rent.

Invasion and Succession

The Chicago sociologists first recognized the local population's change as an essential mechanism by which the naturally defined inhabited areas change (Parks, Burgess, and McKenzie 1925). Literarily, the terms "invasion" and "succession" were imported from plant and animal ecology study to describe the process of neighborhood population as well as a change in economic activities such as "dominant land use" (Schwirian 1983; Temkin and Rohe 1996, 160). The concept of invasion and succession has been applied in the study of neighborhood racial change (Aldrich 1975; Gotham 2002; B. A. Lee et al. 2019; Krase 2016). Competition, conflict, and accommodation characterized the process of neighborhood change among culturally different groups of people. Consider that the competition for urban space may translate to conflict as locals and newcomers attempt to devise strategies to succeed in the "[spatial] competition"

(Weaver 2019b, 7). The process of succession has been argued to be inevitable as a natural phenomenon (Wood and Lee 1991), particularly in the discussion of urban growth and diversity.

During the process of neighborhood competition, one group must triumph while the other group becomes relinquished (Quastel 2009; Schwirian 1983); it then becomes "survival of the fittest" (Behrens and Robert-Nicoud 2014; Weaver 2015; Weaver and Holtkamp 2015). In the study of urban succession, scholars have coined the term "tipping point," which is the point at which the dominant population tends to change the highest (Schwirian 1983, 90). However, finding the tipping point has become a central debate. In essence, tipping occurs when the dominant population (e.g., white) moves out when the presence of a minority group (e.g., Black) becomes noticeable. For example, the closer the Black neighborhood gets close to the white neighborhood; the more insecure the white residents become, increasing tension and "racial distance" (Busch 2017; Schwirian 1983; Massey and Denton 1988; Massey 1979a; 1979b). In the next few paragraphs, I discuss some factors contributing to neighborhood "change" and "invasion" and align them in the context of East Austin. Though the application of invasion and succession was prevalent among scholars that studied neighborhood in the hay days (1950- 1960), its widespread application has been contested (Wood and Lee 1991, 618).

In discussing why people move out, one could think that the fear of becoming a minority in a neighborhood may necessitate the move-out of a group away from a neighborhood. Scholars have found that among white movers, the perception of the 'new' neighborhood's future status may determine their decision whether to move or stay (Aldrich 1975). Black/AA movers tend to move to communities where they feel

welcomed and not stereotyped by existing white residents (Hamilton 2014). Another

hypothesis in the studies of urban change and succession at the 'invasion' stage is the

landlord and real estate managers' attitude toward upgrading dilapidating properties in

anticipation of a price hike. Real estate agents' behaviors may discourage prospective

renters and send signals to home buyers or real estate spectators, accelerating the process

of succession for a specific racial group with more economic capabilities.

The economic characteristic of a neighborhood has been documented

as the *raison d'etre* for invasion, usually by a new group with more economic power. For

example, the case of social inequality can be deduced from the representation of median

family income (MFI) presented by the City of Austin's Top Ten Demographic change

(City of Austin 2016). The data indicated an apparent disparity in residents' economic

status in the Eastside compared to the Westside. Almost all the (96%) block groups

within the East Austin boundary had an MFI of $50,000 or lower in 2000. A report in

2015 showed that Austin ranked as the most economically segregated city in the US; it

ranked fourth in occupation segregation and fifth in education segregation (Florida 2015).

Therefore, communities with predominant low SES (e.g., low level of education and

working-class) are likely to witness both cultural and economic invasion, especially when

prospective invaders (gentrifiers or gatekeepers*)* perceive the economic and social

benefits in that locale (Wyly 1999). Therefore, socioeconomic investments in

neighborhoods that are likely to decline are a critical sustainability strategy to "resist"

[outright] invasion (Schwirian 1983). Improved neighborhood socioeconomic position or

capital investment could also attract newcomers of a similar class to replace change in

demography resulting from natural cause (i.e., death) or out-migration or displacement.

At the same time, real estate agents may use this change in neighborhood landscape as a selling point to induce artificial invasion to maximize capital gain.

Any person or group of people could assume the position of an invader. For example, a high-paid Black person is likely to move out to another neighborhood he desires and feel comfortable to cohabit in, assuming there is no artificial restriction in place (Besbris 2016). Thus, an African American community can be invaded by a new group of middle-income African Americans who are likely to displace their low-income peers. Similarly, in a white neighborhood, low-income whites could be replaced by middle- and high-income African Americans. Studies investigating Black invasion in the white-dominant community are vast (Badger 2012; Gibbons and Barton 2016; McFarlane 2009; K. S. Moore 2009).

Filtering

Homer Hoyt (1933) proposed the concept of 'filtering' in his 'Sector Theory' in which he described how neighborhoods decline due to lack of investment in the aging building by property owners because of high maintenance costs. Instead, middle-income earners prefer to abandon the inner-city for new housing in the periphery with more spacious land. The decision to move to the periphery is not necessarily a result of a push factor, as argued by the invasion-succession model. The abandoned housing stock in the center city serves as housing stock for immigrants whose poverty status forced them to settle in the slum part of the city (W. F. Smith 1963). Because the assumption of Hoyt rests partly on class structure, it is still, to some extent, applicable to the study of gentrification. The availability of mortgage credits to the middle class and immigrants has increased access to better housing infrastructure in the US. As argued by Wallace

Smith, there are two factors not available in Hoyt's original proposition: access to mortgage credits and affluent immigrants' presence, thus making Hoyt's neighborhood change theory less valid (W. F. Smith 1963).

According to Temkin and Rohe (1996), "social mobility and spatial mobility are inherently connected" and play into how urban researchers understand the effect of gentrification or neighborhood change, as can be reflected in the rate of displacement and social upgrading. Unlike the invasion-succession model, filtering is usually beneficial for low-income mover into declining middle- or high-income neighborhoods. Summarily, filtering essentially creates high-quality neighborhoods available for the lower-income population in an area where housing was highly unaffordable before.

People move from a changing neighborhood because of the sudden cultural overturn they may perceive and other economic pressure such as structural segregation (Weaver 2019b; 2019a) and persistent effect of neighborhood change leading to increasing rent and property tax. Some old residents may decide to move for economic gain (mobility) after realizing a capital return on their investment in their current home (L. P. Turner 2015; McCarver 2020: Personal Communication). On the other hand, segregation of different sorts can facilitate the displacement of traditional/long-time residents. For instance, in the study of white neighborhoods, anti-black feelings have been implicated as the reason most whites move (Massey and Denton 1988; Aldrich 1975). One would wonder if this attitude will be evident in dominant Black neighborhoods. In Austin's case, some earlier studies have shown that Black neighborhoods are also undergoing substantial racial group invasion (Tang and Falola 2016). Summarily, filtering is being used to stimulate the housing market's supply-side to

attract movers from the old housing stock, thereby providing new housing opportunities for the lower-income class.

Social Determinants of Health and Life Course Theory

In addition to the theories and models I presented above, there are also many other theoretical reasons why neighborhoods may shape health and well-being (Ellen and Captanian 2020), which could vary from social networks to the physical environment and access to services and resources. This study also draws from the social determinants of health (SDOH) framework (World Health Organization 2008) and life course theory (LCT) (Shanahan, Mortimer, and Johnson 2016). The WHO defines SDOH as the conditions in which people are born, grow, work, live, age, and systems shape daily life (World Health Organization 2008). The definition also extends beyond the understanding of health and includes social behavior, global economy, discrimination, crisis, and violence.

LCT posits that people go through different life stages and accumulate experiences (positive or negative), and the experiences vary by social roles within particular social structures over time. LCT takes the social and physical environment, income inequality, family social status, nutrition, lifestyles, gene-environment interaction, and political environment into consideration as pathways linking health outcomes over time. In most cases, the etiology of a disease is unknown, but social determinants of health can be a plausible causal pathway in understanding the changing health pattern.

In social research, both SDOH and LCT intercept (hereafter SDOH-LCT). Consequently, their applications in understanding health have gained enormous importance in social science, public health, and epidemiological research. Other areas

where SDOH-LCT has proven useful include the study of social relationships, stress, chronic disease, and mental health (Pearlin et al. 2005; Shoham, Vupputuri, and Kshirsagar 2005; Umberson, Crosnoe, and Reczek 2010; Ben-Shlomo and Kuh 2002; Goosby 2013; Tran et al. 2020). Shoham et al. (2005) emphasize the role of life-course socioeconomic status in initiating and promoting chronic kidney diseases in the US.

In a cross-sectional study, Goosby (2013) applied the cumulative inequality theory situated within the LCT to investigate the extent to which childhood socioeconomic disadvantage and maternal depression increase the risk of major depression and chronic pain in US working-aged adults (25-64 yr.). The study found that childhood household poverty—operationalized as aid received by household—significantly amplified the risk of adulthood depression, but adulthood SES attenuate the association. In another study of childhood psychological status among cohort children born between 2006 and 2008 and followed for the nine years between January 2009 and December 2017, Dragan et al. (2019) found a significant link between gentrification and anxiety or depression.

SDOH-LCT also applies to the study of gentrification as it explains how generational wealth accumulation, transfer, and loss could explain the health of longtime residents faced with displacement. Property is a transferable wealth through inheritance from one generation to another. As a result of fixed assets in a location, families usually have strong cultural ties (social capital) in their long-resided neighborhoods. However, gentrification can serve as a disruptive factor to the existing social network and social cohesion after a generation has passed. Area-based policies aimed at socially mixing neighborhoods designed to remove adverse social outcomes (e.g., crime) are generally lauded but have also been labeled for their creative-disruptive nature (Ley 2003; Busà

2017; Crosby 2020; E. Clark et al. 2007; Harvey 2006; C. B. Smith 2016). Compared to the gentry (middle or upper class), LTRs in neighborhoods experiencing disinvestment are likely to be at a lower social stratum (low SES), making them more susceptible to displacement—voluntary or forced.

IV. RESEARCH METHODOLOGY

Introduction

This study is guided by the post-positivist research philosophy, which relies heavily on quantitative and complementary qualitative approaches to investigate gentrification and health outcomes in Austin. Post-positivism is a meta-theoretical (philosophy) stance that critiques and amends positivism to unravel the truth. Characterized by the belief that research is broad rather than a specialized endeavor and that theory and practice cannot be kept disparately, it argues that the researcher's motivations for and commitment to research are central to the enterprise (Ryan 2006). Thus, post-positivism jettisons the idea of positivists' objectivism and embraces subjectivism as its fundamental epistemology (Ryan 2006; Durning 1999). Therefore, post-positivism is geared toward emancipatory agenda through an evidence-based approach and not mere number crunching.

Most importantly, post-positivist perspective takes more of a learning role than a testing role; that is, it is also exploratory. Therefore, its approach is more flexible than the duality (i.e., absolute truth/false) assumption of positivism. Despite that post-positivism is a reflexive, deterministic, and exploratory paradigm, post-positivists still rely on numbers to understand a research problem (Creswell 2014). This study was designed to lean more toward the quantitative than the qualitative side, but the latter (qual) complements the former (QUANT) (Morse and Niehaus 2009, 32). In this type of research design, both quantitative and qualitative data are collected almost simultaneously or concurrently. The supplementary qualitative interview's importance is to aid a deep understanding of the meaning and interpretation of gentrification and health

outcomes among the respondents recruited from those (range = 5-10) who participated in the quantitative survey.

Mixed-Method: Quantitative vs. Qualitative Research Methods

Mixed methods help me to combine the two methods explained above in this project. Several reasons have been argued for the use of mixed methods in geographic investigations. Mixing multiple data types and modes of analysis has several benefits in research, including validating different forms of data, generating insights from complementary approaches, or integrating to create new knowledge. On data validation, researchers argue that mixed methods offer opportunities for validating findings from either arm—quantitative and qualitative methods. This means that a multiple or mixed methods approach detects discrepancies in research findings.

In mixed-method research, one method can serve as a complementary arm of the other method to increase the research's explanatory power. Additionally, qualitative research illuminates the meaning, expands the relationships and interactions or patterns that are not in-depth captured in quantitative analysis. Meanwhile, quantitative data analysis may reveal patterns that point to broader structural relationships at different levels (Creswell 2014; Elwood 2010).

Quantitative research is defined as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques to support or refute existing knowledge on a subject matter (Fowler 2013; C. Williams 2007; Creswell 2014). Quantitative research takes the form of an experimental, quasi-experimental, and non-experimental (e.g., correlation analysis). A correlational/explanatory analysis examines the relationship between an outcome and a

86

set of independent variables that can be expanded to complex forms (e.g., structural equation models, hierarchical linear modeling) (Creswell 2014). Quantitative research collects information from existing sources or identified groups that are key to understanding the problem of study. Various techniques are used for gathering data from an identified sample or population of interest (POI). Conventionally, the quantitative approach employs surveys or experimental design method. In this study, I used survey data collected directly from the residents in the study area.

Qualitative research is a social science research method that focuses on obtaining data through open-ended and conversational communication. Qualitative research's primary goal is to deeply describe individual experiences, perceptions, and beliefs, unlike quantitative research. Several tools employ in investigating an issue include stakeholders or key informant interviews, one-on-one interviews, participant observation, historical narrative, archival exploration, focus-group discussion, case study, record keeping, and ethnographic research. Text analysis is the most common data analysis used for qualitative data. In this research, I used Nvivo® and Voyant tools to articulate key information from the interview transcripts. First, I generated several nodes, and I collapse the nodes to prominent themes according to the study's focus in Nvivo. Through this approach, information gathered from the field or participants is raw and unadulterated. Explicitly, researchers usually present information verbatim. Ethically, personal information that can expose the participant to public ridicule and risks, be it emotional/psychological, economic, or physical, is removed. The common practice is to code the names of the participant by using pseudo names, if necessary.

Data Collection

This study primarily relies on the survey data through the administration of a close-ended questionnaire. The survey instrument collected respondents' demographic information, perception of their neighborhood, and information on their health.

Data collection usually follows a logical approach for identifying appropriate targeted groups from the entire population. Various sampling methods are available, and the optimal choice is based on the analyst's experience, training, and available resources, audience, including the timeframe of the study (Creswell 2014). One ubiquitous sampling method used in identifying sample size is simple random sampling accompanied by the suitable mode of data collection, including sending out online surveys, online polls, questionnaires, phone calls, or mailing. Typically, there are two stages of sampling methods—probability and nonprobability (Fowler 2013; Cornesse et al. 2020). However, due to the study's nature and the challenges associated with the random sampling method, this study adopted a nonprobability convenience sampling method through social media. In order to have a sample similar to probability sampling, I weighted my sample, which I gave a detailed explanation below. Specifically, to adequately identify and increase owner-residents participation, I used the Facebook campaign tool to target only people who reside within the six zip codes that fall in East and Southeast Austin.

Participant Recruitment from the Online Platform

In the early planning of the project, I contacted some organizations/representatives who were supposed to serve as contact points between the researcher and prospective participants. The initial plan was to recruit participants for the study to give enough sample size to have enough statistical power to conduct different

quantitative analyses supporting the study's research questions. However, due to the impact of COVI-19 on human participants in research, I moved the recruitment process online under the Texas State University Office of Research directive. Consequently, I created a Facebook page for the study through which participants living in East and Southeast Austin were recruited through the Facebook page, messenger, and Instagram accounts. The campaign advert purposely targeted residents in six zip codes: 78702, 78721,78722,78723,78741, and 78744 (see Figure 9). To ensure that the sample size is well-represented of the underlying population characterized by race/ethnicity, I computed the population's sampling weight at the zip code level (Table 3).

Furthermore, I classified the six zip codes into regions. Zip codes in East Austin were classified as region 1, and zip codes in Southeast Austin as Region 2. These two regions formed the study area; participants who attempted to participate in the survey outside the two regions were automatically excluded from the survey. Data collection was conducted between June 12 and November 30, 2020. Three hundred and forty participants (n = 340) took the survey, but only 340 completed questionnaire surveys after removing the incomplete responses. According to the mixed methods literature, a sample size of 64 participants for a one-tailed hypothesis or 82 for a two-tailed hypothesis is sufficient for correlational analysis (Hesse-Biber 2010, 53). For a qualitative research design, the sample size depends on whether the study is a Case Study, a phenomenological, grounded theory, or ethnography: the recommended sample sizes are 3-5 participants, ten interviews, 20-30 interviews, and 30-50 interviews, in that order (See Table 2.1 in Hesse-Biber 2010).

Criteria for Participation

The only criteria in selecting participants include the minimum age of 18 at the time of the survey and residency in East or Southeast Austin. In the online survey, the first two questions filtered eligible participants automatically based on these two criteria. Volunteered participants had the choice to complete the electronic questionnaire in English or Spanish language. However, all participants took the survey in the English language. The study received ethical approval from the Texas State University Office of Research (IRB #7134: see Appendix B).

Funding the Research

This research was supported by the Department of Geography research award and Doctoral Research Support Fellowship from the Graduate College. The funding covered data collection and incentives. Participants who gave their contact information and agreed to participate in the second phase of the interview and gave their contact address were compensated with an HEB gift card.

General Description of Survey Instruments and Measures

This study used a set of questionnaires to gather information on participants' sociodemographic status, neighborhood perception and psychosocial factors, and adults/children's health information. I present the survey instrument in the Appendix. Below, I presented the detail of some of the essential measures collected with the questionnaires. Essentially, there are three major parts. The first part collected the respondent's demographic information, followed by neighborhood and psychosocial information, and the last part collected information on respondents' health.

Longtime Residents and Gentrifiers

A set of questions is posed to determine how long a respondent has lived in his/her neighborhood, whether they move recently from outside of Austin, and whether they have any plan to move very soon. This was used to filter and identify recent residents defined as those who have lived less than ten years and longtime residents (LTRs) as those who have lived in either East or southeast Austin for more than ten years. This is tied to the ecological model, particularly the model of invasion and succession. It also demonstrates the effect of power tussle under the political ecology discourse.

Demographic Characteristics

In addition to the first question used to identify gentrifiers and LTRs, the respondents' characteristics were also used to categorize them. Scholars have argued that apart from gentrification's potential effect, residents' personal SES exposes them to the effect of gentrification (Fong et al. 2019). Gentrifiers are usually identified as single men and women, divorced, relatively younger (24-49 yrs.) than long-time residents, and are likely to have quaternary occupations (e.g., work in High-tech, health care, sales and marketing, industry). They are more likely to have pets than children, earn high incomes than the original residents, and are highly educated. This set of variables under measured as demographic characteristics are linked to social determinants of health or structural factors on neighborhood change.

Access to Socioeconomic Resources (ASR)

I developed eight questions to measure social and economic support, which is a reverse of inequality. These questions asked participants on how easy they can access

mortgages at a low rate, can rent an apartment, enroll a child or self into a school, can use a park or playground, can have access to a credit card, get a bank loan, get a car financing, and access health care service for any health condition. I aggregated these items to form the ASR score. Social epidemiologists and community researchers have argued that access to social and economic supports protects vulnerable residents from the negative impacts of neighborhood factors such as gentrification.

On the other hand, scholars have hypothesized that social and economic disparity may pave the way for gentrification. Here, I used it in a positive form and mostly as a possible mediator. I used this variable in different multivariate analyses, including multiple linear regression, structural equation modeling, path analysis, and mediation models, to examine the direct and indirect effect of gentrification on health outcomes. This variable is tied to the social determinant of health in this study.

Neighborhood Change Awareness

I asked specific questions about new constructions, demolition, and buildings' refurbishing to determine the neighborhood change. Respondents were also asked whether the observed changes threaten them physically (displacement) and psychologically (emotion). The purpose of this question was to understand whether the participants are concern about the change in their neighborhood as opposed to the general belief of neighborhood change in East/ Southeast Austin. The question was followed by five questions to measure and develop the gentrification index from the participant's perception. This construct is directly tied to the ecological model.

Table 3. Determination of Sample Weight by Race/Ethnicity.												
	East Austin					Southeast Austin			Ground Total	Race/Ethnicity *	Sample	Weight
Race /Ethnicity	78702	78721	78723	78722	Total	78741	78744	Total	Row Total	(%)	(%)	
Asian	415	184	575	195	1,369	293	2435	2,728	4,097	2.37	14.1	0.17
Black	2034	3749	6233	973	12,989	3676	5479	9,155	22,144	12.81	7	1.83
White	7455	2379	11600	1036	22,470	7565	14100	21,665	44,135	25.53	56.3	0.45
Hispanics	11300	5574	13600	4728	35,202	35100	28700	63,800	99,002	57.27	18.7	3.06
Others (mixed)	440	267	504	360	1,571	585	1334	1,919	34,90	2.02	3.1	0.65
					73,601			9,926	172,868	100		

*This represents the percentage of race/ethnicity in the study area by zip code based on the 2010 U.S. Census Survey. Note that the Weight was assigned using the syntax program in SPSS.

Perceived Gentrification Scale (PGS-5)

Five items were used to compute the gentrification score based on the common impact of gentrification in the literature. Studies that used administrative data construct gentrification index from at least a decade change in rent, property tax, percent of the population with a university education or more, and family/household income. However, scholars have also suggested that respondents' perception of the change in their neighborhood could serve as another viable measure of gentrification in survey research (Wyly and Hammel 1998; Freeman 2005; K. Newman and Wyly 2006; Lees, Slater, and Wyly 2013). Hence, I combined the five items as a perceived gentrification score following a similar approach used in DeVylder et al.'s (2019) study (2019). The five items cover rent, property tax, displacement, increased spending, and social ties. Specifically, I asked how residents feel that an increase in rent, the property tax may cause them to move (displacement), and increase spending on bills and groceries, and the likelihood to sell their property due to the increasing property tax and lose their longtime connections/ friendships due to new people moving into their neighborhoods. I used the 5-Point Likert scale, '1' = very unlikely to '5' = highly likely. Note that perceived gentrification increases along the scale; a lower score indicates a low perception of gentrification, while high scores indicate a higher perception level. The five items were aggregated to form a gentrification index with a moderate Cronbach's alpha of 0.678 higher than the alpha ($\alpha = 0.64$) reported by DeVylder et al.'s Neighborhood Change and Gentrification Scale. This index is linked to the political ecology model.

Neighborhood Ties and Social Cohesion

Residents whose parents or grandparents lived in the same neighborhood they live in are more likely to have a sense of belonging and attachment than those who recently moved into the community. Similarly, the level of neighborhood attachment may serve as a cushion effect to poor health in a gentrifying neighborhood. I also adopted Buckner's (1988) Neighborhood Cohesion Instrument (NCI) to measure neighborhood ties and social cohesion. The NCI has three dimensions: attraction to the neighborhood, neighboring, and psychological sense of community (PSC). In the original instrument, each of the dimensions has 10, 15, and 15, respectively.

Attraction to the neighborhood is defined as the eagerness to remain a resident in the neighborhood, and it can be used to assess residents' attachment to a particular neighborhood. Neighboring, instead, measures the degree of interaction within the neighborhood. The third dimension measures shared emotional connection that people may experience toward others in their community.

In the early test of NCI, Buckner found that 37 of 40 items loaded under one factor yielding a unidirectional scale of *sense of community/cohesion* with Cronbach's alpha of 0.97 (Buckner 1988, 779). In order to avoid redundancy and burden on the participants, the final version of NCI consists of high correlated 18 items that represent a unidirectional sore of the three dimensions with the coefficient alpha of 0.95 depicting a strong internal consistency (Buckner 1988, 783). I used the 15 items (out of the 18 items) in my study. Note that I reverse-coded the response scale to be consistent with the design of the survey instrument. In the original coding, the response scale was based on 5-Point Likert Scale 1= strongly agree to 5 = strongly disagree. NCI has been successfully

95

applied and validated in other geographical settings (Li, Hsu, and Hsu 2011). These three dimensions of NCI can be used to weather the effects of gentrification among LTRs, and it is expected that a high score of each dimension will be positively correlated with gentrification indices and mediate the direct impact of gentrification on health. These constructs are tied to subcultural models presented in Figure 11 under the 'Theoretical Framework.'

The Measure of Health: Self-Rated Health

I used standardized self-rated questionnaires to solicit participants' physical health, mental health, and general health. Self-rated mental health is more closely related to subjective well-being. For example, Levinson and Kaplan (2014) showed that self-rated physical health and self-rated mental health were strongly related to each other, but the latter was not related to chronic physical conditions. Respondents were also asked to retrospectively rate their health and their parents' health when growing up. The historical self-rated health was included to account for the confounding effects of past health history on the current health conditions and proxy variables for life course theory.

The Measure of Health: Depression, Anxiety, and Stress

A standardized scale for measuring the emotional state of Depression, Anxiety, and Stress Scale DASS-21 was adapted for this study. The DASS has 21 items, with seven items measuring depression, anxiety, and stress, respectively. The scale has extensively applied in several neighborhood studies investigating mental health (Hale et al. 2013; Beyer et al. 2014), and its reliability has been tested across cultural settings (Henry and Crawford 2005, 21; Le et al. 2017, 21; Norton 2007; Oei et al. 2013, 21; Andreou et al. 2011). More specifically, the *depression scale* assesses dysphoria,

hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The *anxiety scale* assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The *stress scale* is sensitive to levels of chronic nonspecific arousal (Lovibond and Lovibond 1996). It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive, and impatient. Scores for depression, anxiety, and stress were calculated by summing the items for each aspect of the scale (Lovibond and Lovibond 1996). Following Lovibond's approach, the derived scores were multiplied by a constant of '2' to obtain the final score. The severity level was determined using the recommended cut-off for each of the DASS scales (Lovibond and Lovibond 1996): normal (0-9), mild (10-13), moderate (14-20), severe (21-27), and extremely severe ($\geq$ 28).

Chronic Health Condition (CHCs)

In addition to a score on mental health, respondents were asked to report whether they have ever been clinically diagnosed with any chronic condition in recent times. Specifically, respondents were presented with a list of ten chronic health: asthma, diabetes, cancer, depression, anxiety, heart problem, chronic pain, musculoskeletal disorder, hypertension, and high blood pressure, following the approach used in a population study (Eriksson, Undén, and Elofsson 2001). In the study, the authors asked: "Are you suffering from any of the following chronic diseases?".

Medical Visits Score

Questions on the frequency of hospital or emergency room visits were also asked to estimate the relationship between neighborhood stress, such as the pressure of displacement due to gentrification, neighborhood safety score, and neighborhood

97

physical development (aka gentrification). Four items were used to measure

hospitalization, and these items were aggregated to form hospitalization scores,

respectively.

Power Calculation

I used G*Power 3.1 version to calculate the required sample sizes for different

statistical analyses. G*Power is a free power analysis program for various statistical tests

available for both Windows and Mac OS X platforms (Faul et al. 2007; 2009). It is a

stand-alone power analysis program for many statistical tests commonly used in the

social, behavioral, and biomedical sciences. Five types of power analysis can be

conducted in the 3.1 version: A priori analysis, Compromise analysis, criterion analysis,

post hoc analysis, and sensitivity analysis. Figure 13 indicates that I need at least 215

total sample size at 0.05 significance level and 0.3 effect size to do ANOVA or its sister,

Kruskal-Wallis test. Figure 14 also shows that I have a sufficient sample size to

successfully conduct a z-test, such as logistic regression, with a power of 0.9908 based on

the critical z-score of 1.96. Figure 15 indicates that I need a minimum of 30 sample size

when the effect size is 0.5, α error probability is 0.05, and power (1- α error prob) is

0.95, and the total predictors are set to 10.
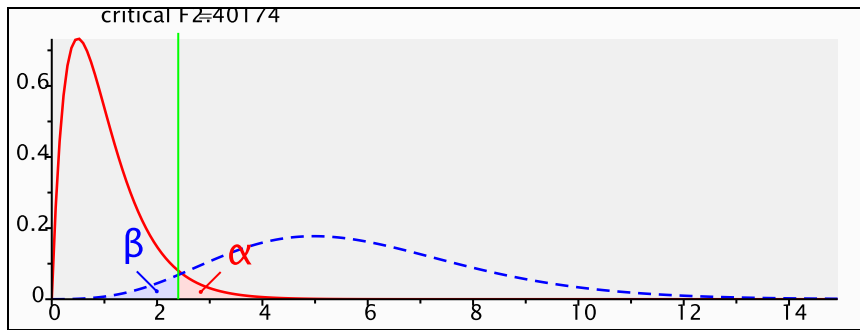
Figure 13. Power Calculation for Variance in Nominal Variables.
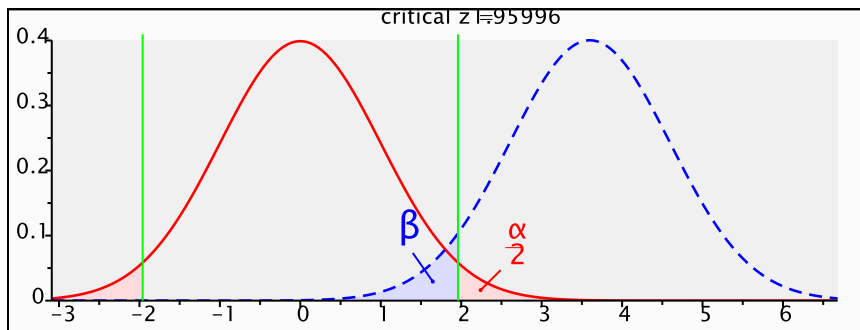
Figure 14. Power Calculation for Determining Sample Size for 'Logistic' Regression.
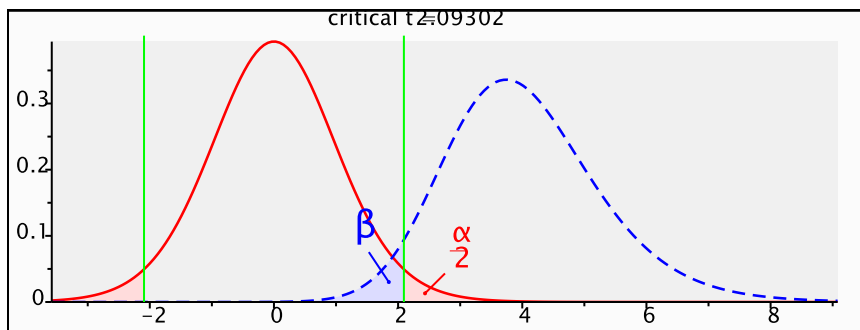
Figure 15. Power Calculation for Determining Sample Size for 'Multiple Linear' Regression.

Qualitative Interview

In order to document the perception of owner-residents on the impact of gentrification in terms of physical and mental health, I randomly selected nine participants from the pool of quantitative interviews for the second stage using a semi-structured script (see Appendix C). Next, I conducted one-on-one electronic interviews via the Zoom conference, and each participant gave verbal consent to participate in the study and approved that their voices be recorded for verbatim interpretation. I adopted rapid community appraisal in the interview section, partly to assess residents' perceived concerns in their neighborhood (Pain et al. 2006). I created transcripts from the interview using the otter interpreter embedded in Zoom and analyzed using the narrative method. The range of duration of the interview was between 12-25 minutes. The video and transcript were analyzed in Nvivo 12 Pro and visualize in Voyant (Stéfan and Rockwell 2016).

V. STRUCTURAL DETERMINANTS OF SELF-RATED HEALTH

Introduction

Abundant evidence has shown that living in a socially disadvantaged neighborhood reduces total life expectancy and general health, including physical and psychological health (Avendano and Kawachi 2014; Gaskin et al. 2019). The city government's primary aim is to ensure the quality of health for all citizens irrespective of social class or race/ethnicity. Therefore, urban renewal policies are a tool for improving neighborhood physical, social, and economic conditions. Such policies typically improve security and safer streets, better mobility, improved neighborhood aesthetics, and encourage stronger social cohesion, all of which are linked to positive health outcomes. From a political ecology point of view, urban renewal programs can also negatively impact the target communities by subsequently increasing property values, rent, and the cost of living. Hence it could result in social exclusion, gentrification, and displacement of long-term residents, mostly in lower socioeconomic status (SES) (Mehdipanah et al. 2018; Quastel 2009).

Urban gentrification is one dimension of neighborhood study. It has gained enormous interest among scholars in the last six decades (A. S. Schnake-Mahl et al. 2020). Its physical evidence is commonly seen in inner cities when neighborhoods strive to reverse the decline and disinvestment through urban (re)development programs that often involve the significant sociospatial rearrangement of landscapes (C. B. Smith 2016). Accordingly, urban researchers have synonymously coin gentrification as the quest for a sustainable city and new urbanism (Busch 2015; Helbrecht 2016; Sharifi 2016; Steiner and Almy 2010). In the process of gentrification, the property value goes

up, so does tax, rent, and living costs. With the revival of these neighborhoods that manifested due to the increase in population and socioeconomic activities, residents in disadvantaged neighborhoods welcome or receive residents from higher-income classes different from the original residents. Unfortunately, many LTRs in the gentrified neighborhoods may or may not benefit from the neighborhood change. In most cases, LTRs are forced to move out of the neighborhoods. If they (longtime residents) are lucky to stay, their quality of life is generally impacted, and their lifestyle and culture are significantly interrupted.

Despite the considerable accumulated knowledge of gentrification and the related social injustice, the research on gentrification and health remains inconclusive on its direct impact on health (A. S. Schnake-Mahl et al. 2020). What is more is how the gentrification process impacts vulnerable residents' health, particularly the longtime residents (LTRs), is not yet clear. This research domain largely remains underexplored and has not been investigated systematically. Given the rapid development of Austin, Texas, understanding the health impact of gentrification in East Austin for its longtime residents is especially important, not only for academic research but also for developing appropriate urban management policies and public health interventions. Theoretically, there is a direct link between gentrification and inequality, be it spatial, racial, social, or economic inequalities (Chapple 2017; Cocola-Gant 2019). However, how they directly or indirectly relate to the self-rated mental, physical, and overall health of residents in gentrifying neighborhoods have been understudied, notably in Austin, Texas.

Social and Structural Determinants of 'Self-Rated' Health

According to the World Health Organization, social determinants of health (SDOH) are the conditions in which people are born, grow, live, work, and age (World Health Organization 2008). They include socioeconomic status, education, neighborhood physical environment, employment, social support networks, and healthcare access. These circumstances are shaped by the distribution of money, power, and resources at global, national, and local levels. The SDOH are mostly responsible for health inequities – the unfair and avoidable differences in health status seen within and between countries (World Health Organization 2008). By extension, SDOH includes structural determinants, including age, race/ethnicity, age, family structure, main activity, education, occupation, income, and social support, and the root cause of health disparity (Crear-Perry et al. 2020).

In the past few decades, researchers have taken a keen interest in examining the influence of neighborhood characteristics (e.g., gentrification) on health based on self-rated health (SRH) measures (Izenberg, Mujahid, and Yen 2018; Gibbons and Barton 2016; Gibbons 2019; Gibbons, Barton, and Brault 2018). SRH measures are recommended as short and cost-effective tools for estimating population health in epidemiologic and public health research (Zajacova and Dowd 2011; Haddock et al. 2006). The global SRH is a non-clinical assessment of general health, physical health, and psychological or mental health (Levinson and Kaplan 2014). The description of self-rated mental health (SRMH) usually suggests that it is more closely related to subjective well-being. Compared to self-rated physical health (SRPH), research on SRMH is generally limited due to its subjective measure of psychological status (Fleishman and

Zuvekas 2007). Nevertheless, several studies have co-examined the association of SRPH and SRMH, chronic physical health (Levinson and Kaplan 2014; Perruccio et al. 2011), adults' functional decline and mortality (Y. Lee 2000; Benyamini et al. 2003), chronic diseases and disability (Galenkamp et al. 2013), and perceived social support (Caetano, Silva, and Vettore 2013).

A preponderance of studies had Investigated the association between neighborhood characteristics and SRH (Izenberg, Mujahid, and Yen 2018; Gibbons and Barton 2016; Gibbons, Barton, and Brault 2018). However, much of this research focused more on the negative impact of the environment and less on the positive aspects (E. S. Kim, Park, and Peterson 2013). The positive characteristics of neighborhood measures include social capital, social efficacy, neighborhood attraction, and social cohesion (E. S. Kim, Park, and Peterson 2013; E. S. Kim and Kawachi 2017; Clark Cari Jo et al. 2011; Lagisetty et al. 2016). For instance, the review study by Silva, Loureiro, and Cardoso (2016) on neighborhood characteristics and mental health found that a high social capital level was significantly associated with a low risk of mental health.

The Emphasis of the Current Chapter

Social researchers have considered the social and environmental impact assessment of urban projects such as housing and neighborhood improvements. However, this body of work tends to overlook the health impact assessment (HIA). Therefore, this study investigates the impact of gentrification on residents' health in East and Southeast Austin, Texas.

Accordingly, this chapter aimed to seek empirical support for two research questions. First, I seek to know whether neighborhood characteristics such as

gentrification and cohesion are significantly associated with SRH. If yes, to what extent can these associations be retained after controlling for demographic factors and chronic health conditions? Second, to what extent can ASR influence the association between gentrification and SRH? Does self-rated health change with age and educational attainment as a measure of socioeconomic status? I tested three hypotheses: (1) SRH varies by SES and demographic characteristics, (2) Neighborhood characteristics (i.e., gentrification, neighborhood cohesion, attraction, and neighborhood interaction) are associated with SRH, controlling for residents' age, race/ethnicity, duration of residence, and CHCs, (3) Access to socioeconomic resources (ASR) is positively related to and also mediate the link between neighborhood characteristics (e.g., gentrification, cohesion, attraction, and neighboring) and SRH, (4) Historical childhood health is associated with and influences the effect of neighborhood characteristics on SRH.

Measure

Although I already gave a general description of some of the variables and constructs I used in this chapter in 'Chapter Four,' it is also important to re-present them here again because they present information not presented earlier. This description includes the internal consistency of some of the items I used to construct some of the variables. Hence, it is necessary to present them again.

The Outcome Variable

Self-rated health. The outcome of interest here is the subjective measure of health (self-rated health). Self-rated health uses a single item to elicit how respondents perceive their health: I asked each respondent to rate his/her general health (overall), physical health, and mental health based on a single question: "On a scale of 1-10, '1'

being the lowest and '10' being the highest, rate your overall health, physical health, mental health, health while growing up and parents, and respondent's health while growing up." The last two questions were included in order to control for historical health on current health. Following other studies that have dichotomized SRH variables (Levinson and Kaplan 2014; Caetano, Silva, and Vettore 2013; Galenkamp et al. 2013), I re-coded values ≤ 7 as 'poor/low' SRH and values greater than seven as 'high/good' SRH to fit logistic regression. Note that only the self-rated overall/general health, physical health, and mental health were treated as the dependent variables (DVs) in the statistical analyses.

Predictors of Self-Rated Health

Perceived gentrification score (PGS). This study used the perception of residents on the physical and socio-cultural changes in Austin, Texas, similar to the approach used in the measure of perception of gentrification in a different study (DeVylder, Fedina, and Jun 2019). DeVylder and colleagues attempt to develop a Neighborhood Change and Gentrification Scale (NCGS) that can substitute the quantitative measure of gentrification. In this study, I used a single item to verify whether or not participants were aware of the changes in their neighborhood: Have you noticed new structures, heavy renovations, demolitions, and building remodeling in your neighborhood? This question captures several questions asked by DeVylder et al. (2019) in their study. Out of the ten items proposed on the NCGS scale, only four items capture neighborhood gentrification: (1) I have experienced improved access to neighborhood amenities and city services. (2) I have seen an influx of affluent or nonminority residents

moving into the neighborhood. (3) Crime has decreased in my neighborhood, and (4) I have observed a lot of renovation activity in the neighborhood.

I constructed the gentrification index from five items based on a five-point Likert scale (1= Extremely unlikely to 5= extremely likely). These items asked questions on increase tax or rent, displacement, loss of property due to gentrification, difficulties in paying for bills and groceries, and loss of social connection/social capital. These items were derived based on the existing literature on gentrification's impact (Wyly and Hammel 1998; Freeman 2005; K. Newman and Wyly 2006; Lees, Slater, and Wyly 2013). I combined them as a perceived gentrification score following a similar approach used in DeVylder et al.'s (2019) study. Note that perceived gentrification increases along the scale; a lower score indicates a low perception of gentrification, while high scores indicate a higher perception level. The five items were aggregated to form a gentrification index with a moderate Cronbach's alpha of 0.678 higher than the alpha ($\alpha = 0.64$) reported by DeVylder et al.'s Neighborhood Change and Gentrification Scale.

Neighborhood cohesion score. I adopted Buckner's (1988) Neighborhood Cohesion Instrument (NCI) for measuring neighborhood ties and social cohesion. Kim et al. (2013) suggest that it is essential to measure the individual-level perception of neighborhood social cohesion and its relationship to health. Buckner's instrument has three core dimensions: attraction to the neighborhood, neighboring, and psychological sense of community (PSC). Similar to the earlier internal consistency reported by Buckner (1988), NCI consists of high correlated 18 items that represent a unidirectional score of the three dimensions with the coefficient alpha of 0.95. However, I only used 15 of the 18 items in the survey and produced strong Cronbach alpha of 0.824. High scores

were an indication that individuals had a strong sense of cohesion, and low values represent individuals with a low sense of neighborhood cohesion.

Exploratory factor analysis (EFA) was used to extract the three constructs from the 15 items. The Kaiser-Meyer-Olkin measure of sample adequacy was very high (KMO = 0.870, p< 0.001). The total variance explained by the three factors was 64% distributed among them accordingly: cohesion (28.39%), interaction (18.95%), and attraction (16.33%). Neighborhood mean values for East Austin and Southeast Austin were computed from the individual neighborhood cohesion scores, and analysis of variance was used to determine the significant group mean variation.

Access to socioeconomic resources. The access to socioeconomic resources (ASR) index was constructed using a set of eight items related to social and financial access. The items assessed individual'' access to healthy food, health care services, employment, housing, child/adult school enrollment, mortgage/financing with a low rate, car financing/loan, and a bank loan at a low rate. The responses were coded on a 5-point Likert scale: 1 = Extremely difficult and 5 = Extremely easy and summed up to develop the ASR index. Before constructing the index, I tested for internal consistency and reliability for the eight items, which yielded an acceptable Cronbach's alpha of 0.877.

Other/control variables: Similar to studies investigating self-rated health, I controlled for respondents' age, race/ethnicity, educational attainment, and existing chronic health conditions in the multivariate analysis. Also, I assessed how self-rated health might vary by age, race/ethnicity, and socioeconomic characteristics. I used age as a categorical variable as well as a continuous variable depending on the nature of the analysis.

Analytical Procedure

I used descriptive statistics such as the mean, standard deviation, and quartile to describe my data. Pearson' Chi-square was also used to examine the sample's distribution by region of residence—East and Southeast Austin. Further, I used both *t*-test and one-way analysis of variance (ANOVA) to examine the disparity of self-rated health (overall health, physical health, mental health) for the categorical variables (e.g., region, gender, race/ethnicity, educational attainment, duration of residence, ownership, and threat from gentrification) at 95% confidence level. I dichotomized the self-rated health using the mean as the cutoff-point to high/good and poor/low SRH following several similar studies in the literature (see Table 4 below). Next, I used a cross-tabular examination of age groups by poor/good SRPH, poor/good SRMH, and poor/good SRGH to show how these measures change with age. To do the cross-tabulation, I transformed age in its continuous form into five categories: 18-29, 30-39, 40-49, 50-59, and 60+. Furthermore, I used multivariate logistic regression to test hypotheses 3-5—all analyses controlled for the age, race/ethnicity, and residence duration. A survey weight, constructed from the population distribution of race/ethnicity, was applied to ensure representativeness. All analyses were conducted in SPSS v20.

Results

Descriptive Results

Tables 4 and 5 summarize the descriptive statistics of continuous and categorical variables by region, respectively. The median age, duration of residence, and total year of education of the respondents were 44 years (SD 13.41), 9 years (SD 13.41), and 16 years (SD 4.39), respectively. The statistical means of the self-rated health range between 7.26-

8.38, lowest for self-rated physical health and highest for self-rated childhood health.

Table 5 shows that 61% of the participants lived in East Austin (n= 188), compared to those who lived in Southeast Austin, and 69% of the sample were women (n= 211).

Overall, a larger proportion of the respondents were married 143 (43.0%), 77 (24.9%) were widowed/divorced/separated, and 99 (32.0%) of the sample were single. More than half of the respondents self-identified as Hispanics (n = 180, 58.4%), few were Black (n = 27, 12.0%), 79 (25.6 %) were White, 2.3 % (n = 7) were Asian, and only 6 (1.6%) were identified as mixed race/ethnicity. About one-third (37.2%) had lived in the study area for more than 15 years, and 91.9 % (n = 260) were aware of neighborhood change. The majority of the respondents (73.2%) did not plan to move out of their respective neighborhoods anytime soon, 20% said they were not sure, and only 7% declared they wanted to move. Among those who said they were aware of the changing neighborhood, 40.3 % said that change in their neighborhood threatens them.

Table 5 shows the distribution of SRH in East and Southeast Austin. More residents in East Austin rated their physical health high (69.3%), mental health high (64.7%), and general health high (64.1%) than residents in Southeast Austin. This means that residents in Southeast Austin are more likely to perceive their physical health, mental health, and general health as poor compared to residents in East Austin. The data also indicates a disparity in the quality of health between the two regions. Table 5 also shows whether the variables vary by region or not based on Pearson's Chi-square result.

Table 4 Descriptive Statistics of Continuous Variables.									
Variables	N	Mean	S.E	SD.	Min.	Max.	Percentiles		
							25th	50th (Median)	75th
SRGH	258	7.543	0.1207	1.732	1	10	7	8	9
SRPH	257	7.269	0.1142	1.833	1	10	6	8	8
SRMH	257	7.609	0.1092	1.750	2	10	6	8	9
Childhood health	258	8.381	0.110	1.772	3	10	8	9	10
Parent health	255	7.782	0.111	1.787	2	10	7	8	9
PGS	315	15.306	0.231	4.114	5	25	12	15	18
Residence (Years)	313	16.51	1.020	18.061	0	72	3	9	24
Age (years)	313	48.765	0.757	13.409	22	86	36	44	59
Years in school	306	15.48	9.251	4.395	0	30	12	16	18

Note: SRGH self-rated general health, SRPH self-rated physical health, SRMH self-rated mental health, PGS perceive gentrification score

Table 5. Distribution of Categorical Variables by Region of Residence.			
	East Austin n (%)	Southeast n (%)	Total n (%)	Sig.
Gender				ns
Male	66 (35.1)	31 (25.8)	97 (31.5)	
Female	122 (64.9)	89 (74.2)	211 (68.5)	
	188 (100)	120 (100)	308 (100)	
Marital status				ns
Married	84 (48.7)	49 (40.60)	133 (43.0)	
Divorces/Widow/Separated	50(26.6)	27 (22.3)	77 (24.9)	
Single	54 (28.7)	45 (37.20)	99 (32.0)	
	188 (100)	121 (100)	309 (100)	
Race/ethnicity				ns
Asia	5 (2.7)	2 (1.7)	7 (2.3)	
Black	15 (8.0)	22 (18.3)	37 (12.0)	
Hispanics	116 (61.7)	64 (53.3)	180 (58.40)	
White	49 (26.1)	30 (25.0)	79 (25.6)	
Other	3 (1.6)	5 (1.70)	5 (1.6)	
	188 (100)	120(100)	308 (100)	
Educational attainment				< 0.05
High School or less	47 (25.7)	16 (13.3)	63 (20.8)	
2-year degree /equivalent	17 (9.3)	20 (16.7)	37 (12.2)	
4-year degree/equivalent	68 ((37.2)	42 (35.0)	110 (36.3)	
Graduate Degree	51 (27.9)	42 (35.0)	93 (30.7)	
	183 (100)	120 (100)	303 (100)	
Employment status				<0.001
Employed	150 (82.0)	73 (62.9)	223 (74.6)	
Not employed	33 (18.0)	43 (37.1)	76 (25.4)	
	183 (100)	116 (100)	299 (100)	
Tenancy status				ns
Rent	56 (29.8)	39 (32.50)	95 (30.80)	
Owner	132 (70.20)	81 (69.00)	213(69.20)	
	188(100)	120 (100)	308 (100)	
Residence				ns
Longtime (>15 years)	77 (41.0)	38 (31.4)	115 (37.2)	
Recent (<14 years)	111 (59.0)	83(68.6)	194 (62.8)	
	188 (100)	121 (100)	309 (100)	
Plan to move				ns
Yes	17 (9.2)	10 (8.3)	27. (8.8)	
Maybe	31 (16.8)	34 (28.1)	65 (21.2)	
No	137 (74%)	77 (63.6)	214 (69.9)	

	185 (100)	121 (100)	306 (100)	
Feel threatens				ns
Yes	94 (53.7)	47 (55.3)	141 (54.2)	
No	81 (46.3)	38 (44.7)	119 (45.8)	
	175 (100)	85 (100)	260 (100)	
Self-rated physical health				0.001
Poor/Low	47 (30.7)	53 (52.5)	100 (39.4)	
Good/High	106 (69.3)	48 (47.5)	154 (60.6)	
	153 (100)	115 (100)	254 (100)	
Self-rated general health				<0.001
Poor/Low	55 (35.9)	59 (58.4)	114(44.9)	
Good/High	98 (64.1)	42 (41.6)	140 (55.1)	
	153 (100)	101 (100)	254 (100)	
Self-rated mental health				ns
Poor/Low	54 (35.3)	45 (45.0)	99 (39.1)	
Good/High	99 (64.7)	55 (55.0)	154 (60.9)	
	153 (100)	100 (100)	253 (100)	

Note: ns not significant

Self-Rated Health Varies by Socioeconomic Status and Demographic Characteristics

Table 6 presents the results of the analysis of variance (ANOVA) and indicates that self-rated general health $F_{(3)} = 6.226$ (p < 0.001), self-rated physical $F_{(3)} = 2.809$ (p < 0.040), and self-rated mental health $F_{(3)} = 7.463$ (p < 0.001) significantly vary by educational attainment. Brown-Forsythe[14], which does not assume equal variance corrected and produced a robust test than Levene's test, which assumes equal variance. The robust test also confirms that the three self-rated health were significant. Multiple comparisons of the mean of self-rated general health indicate a significant difference between high school education or less and graduate degrees (Mean Difference = ±1.248, p < 0.004). The mean of self-rated physical health varies between high school level of education and bachelor's degree (Mean Difference = ±1.020, p < 0.035) and master/doctorate (Mean Difference = ±1.414, p < 0.001). There is also a significant mean difference in self-rated mental health between high school education attainment and master/doctoral degree (Mean Difference = ±0.854, p < 0.018).

The same test that I ran for the difference in educational attainment for the three SRH was repeated for race/ethnicity. However, the ANOVA test did not show significant differences in the scores of SRH. Further examination through the post-hoc test indicates the report of self-rated physical health significantly varies between Black and White (Mean Difference = ±0.927; p < 0.023) in the sample.

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[14] The Brown-Forsythe test attempts to correct for this skewness by using deviations from group medians. The result is a test that's more robust. In other words, the B-F test is less likely than the Levene's test to incorrectly declare that the assumption of equal variances has been violated.

Self-Rated Health by Age Group and Residence (Longtime vs. Recent)

Figures 16 and 17 show that SRH varies by age groups. Good/high SR-physical health increased until about 49 years, reduced around age 50, and declined significantly more among the older population above 60 (Figure 16). SR-physical health peaked at 73% among 40-49 and fell by 8% among 50-59 years ($\chi^2 = 11.564$; $p < 0.05$). The percentage of high SR-mental and SR-general health does not differ among the younger age group (18- 29). High self-rated mental health decreased in the 30-39 age group but continues to peak with increasing age, indicating that the older population is more likely to rate their mental health better than the younger population ($\chi^2 = 14.160$; $p < 0.01$).

Table 6. Analysis of Variance Test of Self-Rated Health by Educational Attainment and Race/Ethnicity.

Self-Rated Health:		SSS	df	MSQ	F-test	Sig.	Robust test Brown-Forsyth	SSS	df	MSQ	F-test	Sig.	Robust test Brown-Forsyth
		Educational attainment						Race/ethnicity					
General	BGs	52.178	3	17.393	6.226	0.000	5.803 (<0.001)	12.402	4	3.101	1.053	0.381	0.955 (>0.05)
	WGS	695.592	249	2.794				733.444	249	2.946			
	Total	747.77	252					745.846	253				
Physical health	BGs	68.446	3	22.815	7.463	0.000	6.609 (<0.001)	21.435	4	5.359	1.655	0.161	1.627 (>0.05)
	WGS	758.209	248	3.057				802.972	248	3.238			
	Total	826.656	251					824.407	252				
Mental health	BGs	24.834	3	8.278	2.809	0.040	2.681 (0.049)	13.621	4	3.405	1.135	0.34	1.277 (>0.05)
	WGS	730.795	248	2.947				740.947	247	3.00			
	Total	755.629	251					754.568	251				

SSS: Sum of Squares; MSQ Mean Square; df Degree of Freedom, BGs Between Groups; WGs Within Groups

Table 7. Self-Rated Health by Residence Status: Longtime vs. Recent.

Self-rated:	t-test	df	Sig. (2-tailed)	MD	Std. Error of MD	95% C.I. of MD Lower	Upper
Overall	2.833	148.486	0.005	0.6778	0.23927	0.204	1.151
Physical	3.233	157.763	0.001	0.79562	0.24611	0.309	1.282
Mental	-1.786	206.537	0.076	-0.39835	0.22303	-0.838	0.041

MD mean difference
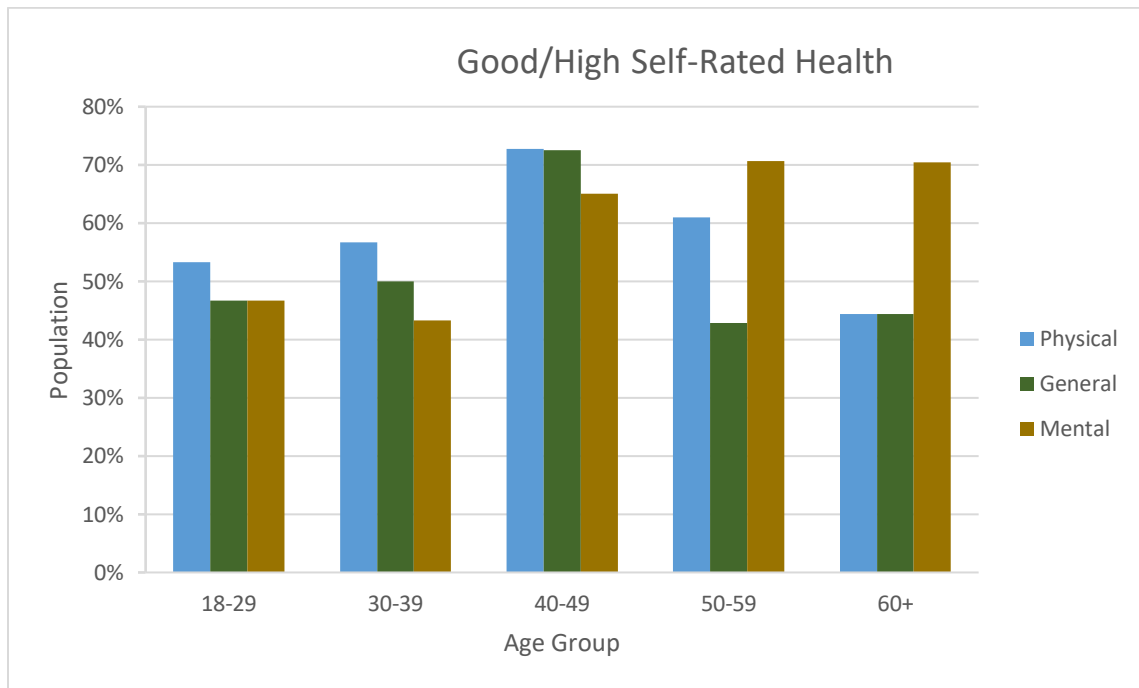
Figure 16. Distribution of 'Good/High' Self-Rated Physical, Mental, and General Health in Five Age Groups.

Ratings of good/high self-rated general health in the sample also vary by age group (χ^2 = 15.873; p < 0.01). Self-rated general health increased from 47% in the 18-29 age group to 50% in the 30-39 age group and moved to 73% in the 40-49 age group. On the other hand, Figure 17 shows poor/low SRH among participants. There seems to be a similar pattern of poor/low SRH as those who reported good/high SRH, but the three SRH was generally lower in the 40-49 age group than the rest of the group; however, the percentage of poor/low SRMH was noticeably higher in this group. Older age groups reported a higher percentage of self-rated physical and general health (Figure 17).

A *t*-test was run to examine the difference in the mean of SRH by residence status (i.e., longtime vs. recent). There are significant disparities in SRH among long-time residents and recent residents in East and Southeast Austin neighborhoods (Table 7).

First, LTRs had a lower mean of SRGH (M= 7.158; SD 2.117) than recent residents (M =7.836; SD 1.353). Second, SRPH was also lower among LTRs (M = 6.829, SD 2.127) than recent residents (M = 7.625, SD 1.495). Third, the mean of SRMH among LTRs was surprisingly higher (M = 7.885, SD 1.729) than recent residents (M = 7.486, SD 1.724).
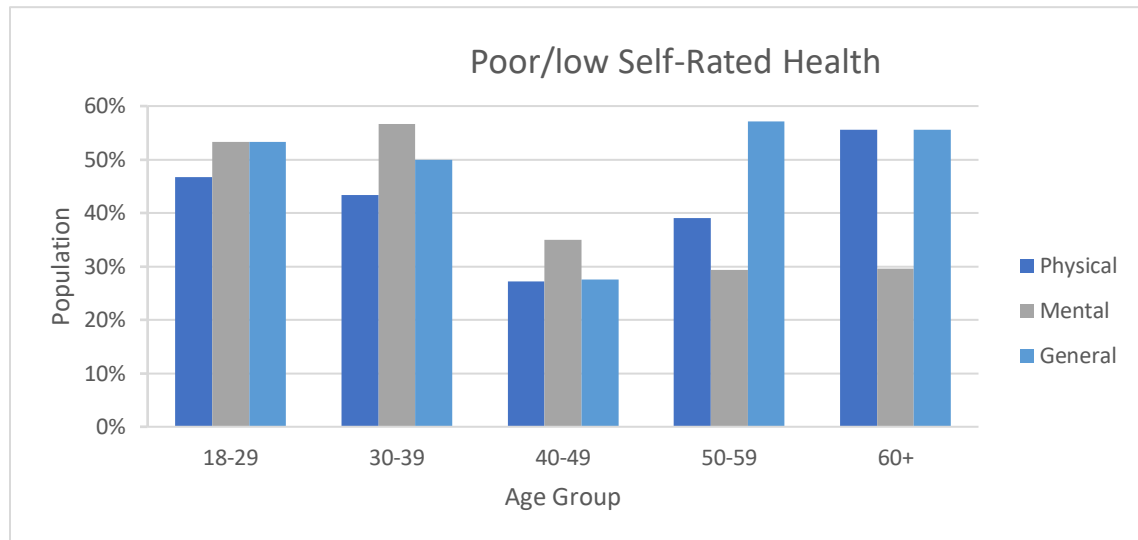
Figure 17. Distribution of 'Poor/Low' Self-Rated Physical, Mental, and General Health in Five Age Groups.

Multiple Logistic Regression of Self-Rated Health[15]

Table 8, Table 9, and Table 10 summarize the association between SRGH, SRMH, and SRPH. Multivariate logistic regression was used to test the fourth hypothesis that gentrification, neighborhood cohesion, attraction, and neighborhood interaction would significantly be associated with good/high self-rated health after controlling for residents' age, race/ethnicity, duration of residence, and CHCs. The odds ratios presented were adjusted in the logistic model for the variables age, residence, education, ethnicity,

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[15] To check for the robustness of the logistic regression, I performed a linear regression analysis for all the three self-rated health outcomes and the result were not different from the result of the logistic regression.

and chronic health conditions. The fifth hypothesis also states that ASR will influence the link between gentrification and SRH.

In Tables 8 and 9, gentrification was significantly associated with high/positive SRGH and SRMH, but the significant association disappeared when ASR was introduced in the model, confirming the fifth hypothesis. Furthermore, Table 10 shows that the model with ASR indicates that gentrification has a strong positive association with high SRPH (aOR= 1.167, 95% CI: 1.067-1.227), while it has a significant positive but weak association in the model without ASR (aOR = 1.089, 95% CI: 1.009-1.175). The result implies that ASR acts as a potential mediator in the model but did not completely remove the association between gentrification and the report of good/high self-rated health. It is worth noting that having at least one chronic health condition reduces the report of high self-rated health throughout (See Tables 8, 9, and 10). Finally, the inclusion of ASR in the logistic models produces better models, as indicated by the Nagelkerke pseudo-R-squared—the range of the pseudo R^2 was 31% - 40%.

The fourth hypothesis stated that historical childhood health would be associated with self-rated health and influence the link between gentrification and self-rated health. Historical childhood health significantly predicts the report of good/high self-rated general and mental health (Table 11). Conversely, historical parental health significantly predicts the odds of reporting high self-rated physical health in the sample by 30.3% (aOR = 1.303, 95% CI: 1.008-1.685) than gentrification (aOR= 1.11, 95% CI: 1.022-1.205).

Table 8. Predictors of Self-Rated General Health.								
	Self-rated general health with ASR				Self-rated general health without ASR			
	B	aOR	95% CI		B	OR	95% CI	
			LB	UB			LB	UB
Gentrification	0.146**	1.157	1.061	1.26	0.07	1.073	0.997	1.154
Cohesion	-0.121	0.886	0.652	1.203	-0.081	0.922	0.689	1.235
Attraction	0.362*	1.437	1.041	1.982	0.423**	1.527	1.132	2.06
Neighboring	0.29	1.337	0.995	1.797	0.244	1.277	0.96	1.698
ASR	0.093***	1.098	1.049	1.149	-	-	-	
Age (continuous)	-0.01	0.991	0.965	1.018	-0.009	0.991	0.965	1.018
Race/Ethnicity (Mixed [R])								
Asian	0.922	2.414	0.138	42.317	0.881	2.414	0.138	42.317
Black	0.153	0.907	0.086	9.596	-0.097	0.907	0.086	9.596
Hispanics	1.062	2.092	0.222	19.713	0.738	2.092	0.222	19.713
White	0.775	2.373	0.245	23.009	0.864	2.373	0.245	23.009
Education (Graduate degree [R])								
High School or less	-1.147*	0.328	0.138	0.78	-1.116*	0.328	0.138	0.78
2- year degree	-1.138*	0.242	0.087	0.672	-1.419**	0.242	0.087	0.672
Bachelor's degree	-0.761*	0.568	0.274	1.178	-0.566	0.568	0.274	1.178
Residence (New [R])	0.32	1.3	0.626	2.702	0.262	1.3	0.626	2.702
Chronic health conditions	-1.445***	0.323	0.163	0.642	-1.129**	0.323	0.163	0.642
Diagnostic parameters								
Nagelkerke R^2	0.31				0.231			
Cox & Snell R^2	0.232				0.173			
-2 Log likelihood	276.728				295.128			
Omnibus Chi-Square (sig.)	65.495 (<0.001)				47.096 (<0.001)			

H-L Chi-square test	11.662 (p = 0.286)	11.662 (p < 0.167)

*** p < 0.001; ** p < 0.01; * p < 0.05. aOR model adjusted for ASR (access to socioeconomic resources). OR odd ratio; [R] referent

Table 9. Predictors of Self-Rated Mental Health.								
	Self-Rated Mental Health With ASR				Self-Rated Mental Health Without ASR			
	B	aOR	95% CI		B	OR	95% CI	
			LB	UB			LB	UB
Gentrification	-0.017	0.983	0.902	1.072	-0.098*	0.907	0.838	0.982
Cohesion	0.000	1.000	0.725	1.378	-0.003	0.997	0.727	1.368
Attraction	-0.020	0.981	0.714	1.347	0.121	1.129	0.84	1.518
Neighboring	0.269	1.309	0.951	1.802	0.204	1.227	0.903	1.666
ASR	0.111***	1.118	1.066	1.172	-	-	-	
Age (continuous)	0.039**	1.040	1.01	1.071	0.035*	1.035	1.007	1.064
Race/Ethnicity (Mixed [R])								
Asia	1.286	3.618	0.161	81.136	1.371	3.939	0.211	73.686
Black	2.389	10.905	0.876	135.807	2.045	7.728	0.668	89.365
Hispanics	2.377	10.771	0.987	117.581	2.082	8.02	0.79	81.443
White	2.050	7.770	0.68	88.736	2.139	8.492	0.802	89.961
Education (Graduate degree [R])								
≤ High School degree	1.431**	4.184	1.537	11.385	1.112*	3.04	1.209	7.647
2- year degree	0.410	1.507	0.481	4.727	-0.119	0.888	0.303	2.598
Bachelor's degree	-0.035	0.966	0.436	2.14	0.107	1.112	0.531	2.332
Residence (New [R])	0.347	1.414	0.637	3.14	0.164	1.178	0.55	2.524
CHCs	-2.32***	0.098	0.042	0.231	-1.981***	0.138	0.063	0.302
Diagnostic parameters								

Nagelkerke R^2	0.391				0.292		
Cox & Snell R^2	0.289				0.216		
-2 Log likelihood	248.745				272.923		
Omnibus Chi-Square (sig.)	84.522 (p < 0.001)				60.344(p < 0.001)		
H-L Chi-square test	22.320 (p=.004)				18.745 (p < 0.016)		

*** p < 0.001; ** p < 0.01; * p < 0.05. aOR model adjusted for ASR (access to socioeconomic resources); OR odd ratio; [R] referent

Table 10. Predictors of Self-Rated Physical Health.							
	Self-Rated Physical Health With ASR				Self-Rated Physical Health Without ASR		
	B	aOR	95% C.I.		B	OR	95% C.I.
			LB	UB			LB	UB
Gentrification	0.155**	1.167	1.067	1.277	0.085*	1.089	1.009	1.175
Cohesion	-0.278	0.758	0.548	1.048	-0.239	0.787	0.577	1.075
Attraction	0.051	1.053	0.762	1.454	0.153	1.165	0.862	1.575
Neighboring	0.251	1.285	0.946	1.745	0.234	1.264	0.936	1.708
ASR	0.079**	1.083	1.035	1.132	-	-	-	
Age (continuous)	-0.019	0.981	0.954	1.009	-0.018	0.982	0.956	1.009
Race/Ethnicity (Mixed [R])								
Asia	0.349	1.417	0.046	43.41	0.373	1.451	0.055	38.169
Black	0.027	1.027	0.055	19.026	-0.105	0.901	0.054	15.083
Hispanics	0.351	1.42	0.085	23.693	0.163	1.177	0.079	17.605
White	0.688	1.991	0.114	34.755	0.774	2.168	0.138	34.111
Education (Graduate [R])								
≤ High School degree	-1.109*	0.33	0.131	0.832	-1.053"	0.349	0.142	0.857

2- year degree	-1.731**	0.177	0.055	0.573	-1.957***	0.141	0.047	0.424
Bachelor's degree	-1.146**	0.318	0.137	0.737	-0.903*	0.405	0.184	0.891
Residence(1)	0.899*	2.458	1.117	5.408	0.792*	2.208	1.021	4.773
Chronic health conditions	-2.104***	0.122	0.052	0.287	-1.783***	0.168	0.077	0.367
Diagnostic parameters								
Nagelkerke R^2	0.332				0.276			
Cox& Snell R^2	0.245				0.204			
-2 Log likelihood	265.39				278.55			
Omnibus Chi-Square (sig.)	70.158 (p <0.001)				56.997			
H-L Chi-square test	8.854 (p < 0.355)				15.669 (p < 0.47)			

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; aOR model adjusted for ASR (access to socioeconomic resources); OR odd ratio; [R] referent

Table 11. Historical Health and Self-Rated Health.

	SRH-General			SRH-Mental			SRH-Physical		
	OR	95% CI		OR	95% CI		OR	95% CI	
		Lower	Upper		Lower	Upper		Lower	Upper
Bivariate model:									
Gentrification	1.009	0.952	1.069	0.913	0.858	0.971	1.024	0.965	1.086
Multivariate model:									
Gentrification	1.088	1.006	1.175	0.899	0.827	0.978	1.11	1.022	1.205
Childhood health	1.378	1.069	1.777	1.513	1.154	1.984	1.273	0.983	1.648
Parent health	1.167	0.921	1.479	1.168	0.893	1.528	1.303	1.008	1.685

OR odds ratio; CI Confidence Interval

Discussion and Conclusion

Since 1928's separation of people of color from the Westside of Austin, systemic inequality remained a hallmark in the physical and social landscape. In part, the historical segregation has also led to a contested place in the Eastside of Austin of today (Way, Mueller, and Wegmann 2018; Tretter and Sounny-Slitine 2012; Busch 2017). The impact of segregation combined with today's urban renewal policies targeted at inner-city neighborhoods has increased urban space competition. One of the many outcomes of structural segregation is gentrification. In order to contribute to the existing research on social determinants of self-rated [urban] health, this study had examined the relationship between gentrification and three categories of self-rated health (mental health, physical health, and overall health) in gentrifying neighborhoods in East and Southeast Austin, Texas.

In this study, I observed a significant disparity in self-rated health among the residents based on age, educational attainment, and race/ethnicity. This study shows that the report of 'good/high' self-rated general and physical health was lowest among the older population (60+), lower than middle-aged adults (40-49). More than expected, older adults reported better self-rated mental health, which contrasts a similar study among older residents in California's gentrifying neighborhoods (Tran et al. 2020). I found that self-rated physical health varies between Black and White residents in the study sample. In line with the national debate on health disparity between minority groups and the dominant group (White), this study's findings suggest a similar pattern of black-white disparity occurs at the neighborhood level. This study shows that White residents are

more likely to rate their health better than Black. This, thus, reveals the microscale dimension of health disparity.

Furthermore, the results of the analysis of variance also show that self-rated health differs significantly by respondent's educational attainment. Respondents with high school education reported lower/poorer self-rated overall health than those with graduate degrees. In contrast, respondents with high school education or less reported good/high self-rated mental health than those with graduate degrees. Job responsibility may account for the low ratings of mental health among those with advanced degrees. Furthermore, residents who obtain only a high school level of education reported poorer self-rated physical health than those with at least a bachelor's degree in this study. The findings suggest that residents in the lower social class in gentrifying neighborhoods may be more likely to feel the negative impact of the changing environment than those in higher social strata. This is because their socioeconomic position is more likely to predisposes them to poorer health because they are more likely to experience financial hardship. Increasing rent or property tax and spending on bills means they may not have enough to spend on their health properly.

The bivariate logistic regression shows that perceived gentrification reduced the odds of reporting high self-rated mental health. However, the association was not significant for self-rated general and physical health, which aligns with the findings reported by Gibbons, Barton, and Brault (2018). Put in a more understandable context, gentrification seems to connote positive implications with respect to health. Probing the association further in a multivariate analysis, gentrification contributes significantly to the report of good/high self-rated physical health when access to socioeconomic

resources and other chronic variables were included in the model, but the effect decreased with the removal of ASR. More interestingly, ASR completely removed the significant impact of gentrification on the report of good/high self-rated health when introduced. This implies that access to socioeconomic resources, a proxy for community support/welfare, improves self-rated health.

Most true for longtime residents, the distress associated with the rapidly changing environment (and probably the feeling of disappointment and helplessness) might have outweighed positive changes in the neighborhood and contributed to the report of poor self-rated health. Another plausible explanation for these differences is the upward social and cultural upturn in East Austin. The demographic characteristics of East Austin had changed drastically in the past two decades. According to a report published by the Institute for Urban Policy Research and Analysis (IUPRA) at the University of Texas, Austin, minority neighborhoods saw a 60% decrease in Black and 33% decrease in the Hispanics/Latino population between 2000 and 2010. The proportion of the white population increased by 442% in the same period (Tang and Falola 2016, 3). Nevertheless, the findings keep with previous research that found a similar association between gentrification and self-rated health based on statewide or national cross-sectional and longitudinal data (Izenberg, Mujahid, and Yen 2018; Gibbons and Barton 2016; Gibbons, Barton, and Brault 2018; Gibbons 2019; R. J. Smith, Lehning, and Kim 2018; A. Schnake-Mahl et al. 2020)

This study is original when measured in a few aspects. First, this study was designed as a community public health research that targeted neighborhoods actively gentrifying in Austin, Texas. There was no such study that has accounted for the health

implication of gentrification in Austin, Texas. Most of the studies done to date in Austin were limited to displacement and general debate on gentrification (Way, Mueller, and Wegmann 2018; Tang and Falola 2016; Busch 2013; Turner 2015; Lavy, Dascher, and Hagelman 2016). However, none of these studies considered the possible health implications gentrification might have on residents. Second, most of the studies to date used secondary data, which were already collected for reasons other than identifying the impact of gentrification on health. Third, the measure of gentrification has been based on decennial socioeconomic and demographic change. However, the method is not stable due to the lack of universal operationalization of the gentrification index (K. Williams 2015; DeVylder, Fedina, and Jun 2019). Consequently, residents' perception of neighborhood change has instead been recommended as a viable alternative (DeVylder, Fedina, and Jun 2019); hence, this study developed a gentrification index based on this recommendation. Fourth, most of the studies that examined the effect of gentrification on health only considered general self-rated health or together with other chronic health conditions (e.g., BMI, diabetes, mental health). Here, I exhausted the three forms of self-rated health— overall, physical, and mental— following a similar study conducted in Israel (Levinson and Kaplan 2014). Compared to existing studies, this present study also accounts for historical health despite using a cross-sectional design approach following the life course status (Tran et al. 2020). Thus, it attempted, for the first time, to control for historical health, which theoretically may influence current health conditions. Gentrification research that controls for historical childhood health remained scares. Therefore, the study took a step toward gentrification and health research and contributed to the growing evidence of urban gentrification on self-rated health.

In summary, this study showed the importance of social and economic support for residents living in gentrifying neighborhoods. The rigorous regression analyses conducted for each of the three self-rated health (Overall, physical, and mental health) indicate that ASR significantly reduces the effect of gentrification on residents' self-rated health status. Thus, this finding has policy implications for reducing economic disparity and improving access to social and economic resources in minority neighborhoods in East and Southeast Austin, known for historical and structural segregation. Historically, East Austin has witnessed tremendous racial and economic segregation since 1928's zoning policy that moved people of color to Austin's present Eastside (Busch 2013; 2017; Tretter and Sounny-Slitine 2012). Nevertheless, the study's findings support several other studies investigating the effects of neighborhood change or gentrification on health in other settings within the socioeconomic inequality framework (A. S. Schnake-Mahl et al. 2020). However, it is also essential to mention some of the limitations inherent in studies like this one. First, the cross-sectional design adopted in this study limits the inference of causality. Second, cross-sectional suffer from recall bias, which may affect participants' responses. Lastly, studies that have tested the self-rated tool's reliability based on the test-retest technique indicated that the measure could be highly unstable among people in low socioeconomic positions (Zajacova and Dowd 2011).

Furthermore, this study has several potential policy implications in line with some of the existing studies and filled critical gaps in the literature. The study is the only and current research that attempted to assess gentrification's health impact based on the perception of residents in the communities experiencing neighborhood change or gentrification in Austin, Texas. The results show that improved access to social and

economic supports will bridge the inequality among residents in East and Southeast Austin, leading to better physical, mental health, and overall health. It is also essential to consider residents' sociodemographic characteristics while planning for mental health interventions among residents. This study also demonstrated that Black residents and those with low-level of education have poorer self-rated physical health. It is crucial to continue to examine the health of longtime residents, which will help provide mental health support for longtime residents, particularly the older population. This is because cross-sectional data may not capture the effect of gentrification on their health within a short time. To empirically establish whether gentrification continuously affects residents' health in these neighborhoods, there is a need for longitudinal data collection. Hence, collecting health data on people living in gentrifying neighborhoods should be considered in Austin, along with the changing physical environment.

VI. MENTAL HEALTH IN GENTRIFYING NEIGHBORHOODS[16]

Introduction

Depressive disorders are a public health issue worldwide. They are syndromes of mental health illness characterized by the impairment of mood regulation such as feeling blue, feelings of helplessness and hopelessness, feelings of guilt, worthlessness, loss of appetite, loss of sleep, and psychomotor retardation (Beck, Koenig, and Beck 1998; Hammen, Henry, and Daley 2000; Venzala et al. 2013). Though chemical imbalances might cause depression, adverse life experiences can also trigger it. The modifiable risk factors include female sex, divorced or separated living situation, low socioeconomic status, poor social support, recent adverse and unexpected life events (e.g., death, homelessness, or eviction), severe medical illness with functional impairment, and chronic diseases (Siefert et al. 2007; Coiro 2001; Pollack, Weiss, and Trung 2016; Yen and Kaplan 1999).

The literature has highlighted the impact of a rapidly changing environment on general health, including mental health. Having poor mental health can be life-threatening, and problems tied to it are prevalent in communities across the US. The Centers for Disease Control and Prevention (CDC) estimates that more than 50% of Americans are diagnosed with a mental illness or disorder at some point in their lifetime (Center for Disease Control and Prevention 2018). Based on empirical research, CDC rated mental health illness (MHI) such as depression, the third most common cause of hospitalization in the US among adults aged 18-44 years old, and adults living with serious mental illness die on average 25 years earlier compared to those without MHI (Center for Disease Control and Prevention 2018).

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[16] This Chapter has been published as Iyanda, A.E. and Lu, Y., 2021. Structural equation modeling of mental health in gentrifying neighborhoods in Austin, Texas. *Open Health*, *2*(1), pp.21-39.

Accumulating evidence suggests significant links between neighborhood stressors and mental illness symptoms such as anxiety and depression but with mixed results (Brummett et al. 2008; Conway, Rutter, and Brown 2016; Curry, Latkin, and Davey-Rothwell 2008; Gary, Stark, and LaVeist 2007; Latkin and Curry 2003; C. Mair et al. 2015; Christina Mair, Roux, and Galea 2008; Venzala et al. 2013; Weissman and Paykel 1972).

Other components of the neighborhood environment, such as social capital and social network, play significant roles in determining residents' health (Versey 2018; Honold, Wippert, and van der Meer 2014). Social capital— social network, trust, and norm—is the tangible material or psychological resources embedded in social relationships available for community members (McKenzie, Whitley, and Weich 2002). Scholars have measured social capital in various forms: social cohesion, collective efficacy, and psychological sense of community (Nyqvist and Forsman 2015; E. S. Kim, Park, and Peterson 2013; Uitermark, Duyvendak, and Kleinhans 2007; Steinmetz-Wood et al. 2017; Sampson, Raudenbush, and Earls 1997). Using gentrifying contexts as a theoretical backdrop, Versey (2018) investigated whether gentrification promotes social capital among Black seniors in Central Harlem. The study reported "a breakdown between youth and older adults in norms, respect, and behavior"(214), indicating a conflict between gentrification and social capital. In Canada, Steinmetz-Wood et al. (2017) found a significant association between gentrification and collective efficacy. However, the perceptions of collective efficacy did not vary between longtime and recent residents. In a systematic review, De Silva, McKenzie, Harpham, and Huttly (2005) found mixed results of the association between social capital and mental health. Of the 31 studies reviewed, 14 studies showed inverse relationships between social capital and mental health measure, and

another study found a positive association with suicide as mental health outcome (De Silva et al. 2005, 624).

This present study examines the report of mental health among residents in gentrifying neighborhoods identified by existing studies (Way, Mueller, and Wegmann 2018; Y. Su 2019) to add to the existing literature on the impacts of gentrification on health. This study is essential for two reasons: first, for intervention policies, and second, to respond to the need for continued research on the impact of urban renewal and development policies on health (Geronimus 2000, 870). Hence, I tested three research hypotheses visualized in Figure 18.
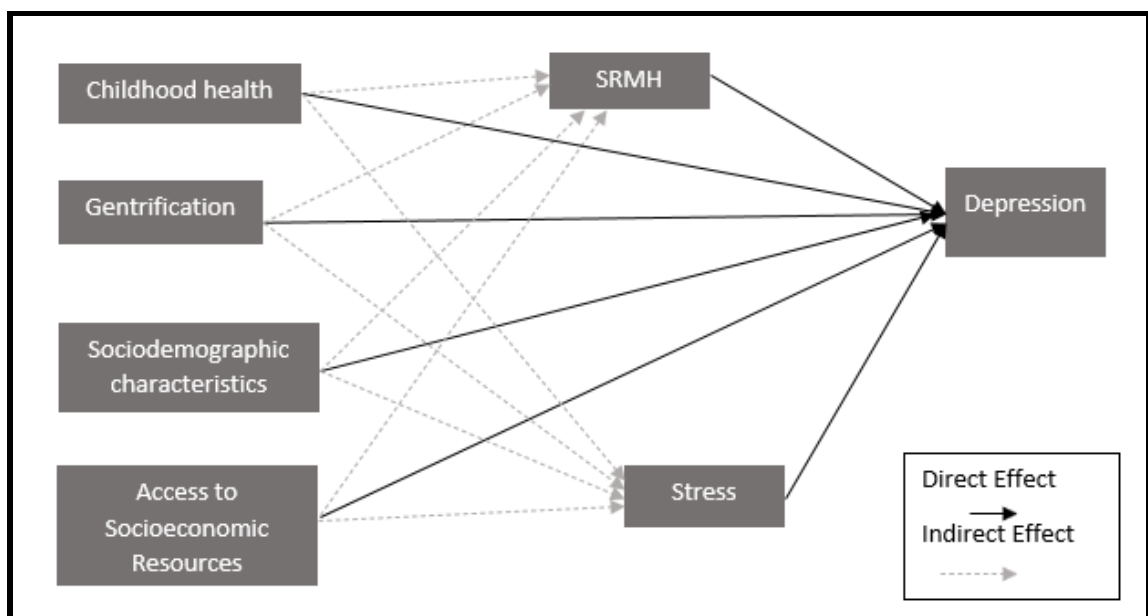
Figure 18. Hypothetical Pathways to Depression.
Note: SRMH is Self-Rated Mental Health; ASR Access to socioeconomic Resources. Sociodemographic characteristics include neighborhood attachment, interaction, cohesion, duration of residence, age, education, and household status.

Hypothesis

(1) Residents' perceived gentrification and sociodemographic characteristics are

significant predictors of stress and mental health symptoms.

(2) Historical childhood health is associated with self-rated mental health, stress, and depression.

(3) Neighborhood resources such as access to socioeconomic support, attraction, interaction, and cohesion are associated with self-rated health, stress, and depression.

Measure

Outcome Variable

Three relevant mental health variables were selected in this chapter: Depression, stress, and SRMH. Details of the variables have been presented in Chapter 4 under the general description of variables. Note that depression is the end-point outcome variable.

Predictors of Mental Health Symptoms

The main predictor of mental health symptoms was the perceived gentrification score (PGS), which I also already described in Chapter 4. Other covariates that could predict mental health include social environment factors (attraction, neighboring/interaction, and cohesion), socioeconomic factors (number of years spent in school), and sociodemographic factors (age in continuous form, number of household members, proxied for family structure, duration of residence in years), and historical childhood health.

Note that the region of residence, a dichotomous variable, was included for descriptive analysis and was not used in the multivariate linear regression/ path analysis.

Analytical Procedure

Descriptive and bivariate analyses were conducted as exploratory steps before conducting the path analysis. Correlation and multiple regression analyses were

implemented to test the association between the end-point variable, depression, and predictors. The univariate analysis was used to examine the linearity and normality of all the variables included in the model (Appendix D). Of all the 13 variables used in the structural equation model, including the outcome variable (depression), only the year of residence (Duration) was log-transformed (Log x +1) due to skewness. I also examined the multivariate normality among the variables, and I found no sign of multicollinearity. The studentized residual that indicates no multicollinearity exists is presented in Appendix D. I used a *t*-test to determine the difference between each score between the two neighborhoods (East and Southeast Austin). Based on logic and prior empirical evidence, the causal model was developed. Hence, the structural equation model was developed in JMP® v15 to examine the complex factors for predicting depression among residents in gentrifying neighborhoods. The best model or model goodness-of-fit index (GFI) was determined based on some standard parameters such as the low value of Root Mean Square Error of approximation (RMSEA), the highest comparative fit index (CFI > 0.95), and the lowest value of corrected Akaike Information Criteria (AICc) in cases of multiple models (Oflus 2020; Xia and Yang 2019). The model whose CFI value was closed to the perfect model (CFI = 1) was finally selected. Lastly, the Macro Process was used to test variable interactions and determine the direct and indirect effects of predictors on depression. The 95% confidence interval (CI) and standard error (se) of the model effect were calculated based on 5000 bootstrapped estimation (Preacher and Hayes 2005; 2008).

Results

Descriptive Results

Table 12 shows the correlation between depression and other independent variables. All variables but cohesion and attraction were significantly associated with depression. Meanwhile, in East Austin, three variables were not significantly associated with depression, while four variables were not statistically associated with depression in Southeast Austin. This indicates that factors contributing to depression in the two regions differ. However, the perception of gentrification was positively and significantly associated with depression in the total sample ($r = 0.33$, $p < 0.001$), supporting the first hypothesis.

Table 12. Mean Scores, Correlation, and T-test Results for Depression and Predictors.							
	Total		East Austin		Southeast Austin		T-test [a]
	Mean	(r)	Mean	(r)	Mean	(r)	Sig.
Depression	23.95		23.22		24.71		ns
Gentrification	2.98	(0.329***)	2.86	(0.300***)	3.10	(0.353***)	*
Stress	29.5	(0.523***)	29.43	(0.517***)	30.05	(0.530***)	ns
Cohesion	20.92	(-0.068)	21.36	(-0.023)	20.43	(-0.133)	ns
Interaction	16.71	(-0.148*)	17.27	(-0.236***)	16.05	(-0.003)	**
Attraction	15.20	(-0.104)	16.01	(0.033)	13.96	(-0.257***)	***
ASR	26.75	(-0.313***)	28.67	(-0.225***)	25.21	(-0.406***)	***
Age (years)	48.8	(-0.201***)	46	(-0.189*)	48.61	(-0.228*)	ns
Duration of residence	11.59	(-0.137*)	11.19	(0.183)	10.06	(-0.171)	ns
Childhood health	6.46	(-0.278**)	8.72	(-0.318**)	8.19	(-0.219*)	*
Self-rated mental health	7.5	(-0.723**)	7.70	(-0.685**)	7.24	(-0.765)	*

[a] Equal variance not assumed. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ns is not significant

Values in the ( ) are the correlation coefficient of association between depression and other factors.

Multivariate Analysis of Depression

Consistently, the perceived gentrification score was positively related to depression in a simple bivariate linear regression (B = 0.453, p <0.01, 95% CI 0.168-0.738) in model 1 (Table 13); however, its association disappeared in the multiple linear regression in model 2. Only ASR, neighboring, SRMH, and measured stress were significantly associated with depression). Note that Table 13 shows no issue related to multicollinearity among the predictors. However, because there are complex pathways to health outcomes such as depression, I examined all the 12 variables specified to predict the end-point outcome (i.e., depression) in the SEM.

Table 13. Multivariate Linear Regression for Depression.							
			T	Sig.	95% CI		
Model 1	B	Std. Error			Lower Bound	Upper Bound	VIF
(Constant)	15.309	2.318	6.603	0.000	10.742	19.875	
Gentrification	-0.453	0.145	3.131	0.002	0.168	0.738	1
Model 2							
(Constant)	33.805	5.406	6.253	0.000	23.155	44.456	
Gentrification	0.11	0.117	0.941	0.348	-0.121	0.341	1.375
Duration	-0.044	0.034	-1.271	0.205	-0.112	0.024	1.863
Age	-0.022	0.043	-0.5	0.618	-0.107	0.064	1.767
YrSCHL	-0.127	0.096	-1.324	0.187	-0.316	0.062	1.137
ASR	0.125	0.059	2.124	0.035	0.009	0.241	1.523
Stress	0.434	0.082	5.282	0.000	0.272	0.595	1.811
Cohesion	-0.65	0.462	-1.405	0.161	-1.56	0.261	1.231
Attraction	-0.527	0.454	-1.16	0.247	-1.422	0.368	1.152
Neighboring	-0.91	0.429	-2.124	0.035	-1.755	-0.066	1.062
Household member	0.139	0.305	0.456	0.649	-0.462	0.74	1.212
SRMH	-2.721	0.332	-8.205	0.000	-3.375	-2.068	1.838
Childhood Health	-0.189	0.283	-0.667	0.505	-0.746	0.369	1.429

Pathway Analysis of Depression

Compared to conventional multiple linear regression presented in Table 13 above, SEM tests for multiple relationships simultaneously. Hence, there are multiple dependent variables aside from the major dependent variable. To examine the complex pathways to depression, the causal model was implemented in the JMP Pro program using a maximum likelihood (ML). Table 14 presents the parameters used in selecting the best model. Several model specifications[17] were developed in the JMP environment based on the combinations of variables, variances, and covariances to render the final model. A model that has a CFI close to 1 and has relatively the least RMSEA among other parameters is selected as the optimal model. Hence, model 1 was a better choice compared to others in the table because of the low RMSEA (0.049) and comparative fit index (CFI = 0.953), revised goodness-of-fit (RGFI = 0.981), Tucker-Lewis Index (TLI = 0.930), and the adjusted revised GFI (AGFI = 0.962). The complex diagram presented in Figure 19 shows the pathway of the predictors of depression in the study area only for the total sample. Issues related to small samples prevent the analysis by region. As seen in Table 15, stress and self-rated mental health are directly associated with depression, consistent with the multiple linear regression in Table 13. It is important to mention that the structural model produced seven endogenous[18] variables with associated R^2:

Depression ($R^2 = 44.77\%$), SRMH ($R^2 = 21.147\%$), stress ($R^2 = 17.04\%$), childhood

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[17] There are seven covariances and 19 regression equations. Each of the variables has its intercept and variance. No latent variable were developed in the model.

[18] Endogenous variables are variables in a statistical model that are determined by their relationships with other variables within the model. They are synonymous with a dependent variable. While exogenous variables are not being predicted by any other variable within the model, instead, they are being determined by external variables.

health ($R^2 = 1.80\%$), PGS ($R^2 = 23.19\%$), cohesion ($R^2 = 1.54\%$), and ASR ($R^2 = 4.96\%$). Note that depression is the end-point variable in the SEM model.

Figure 19 shows the pathway of the predictors of depression. Measured stress and self-rated mental health (SRMH) are directly linked to depression (Table 15). Contrary to the proposed association, perceived gentrification score, ASR, neighborhood cohesion, attraction, and neighborhood interaction had no direct association with depression. Five variables, including the perception of gentrification, total years in school (YrSCHL), historical childhood health, age, and ASR, were directly linked to SRMH and stress score. This indicates that both self-rated mental health and measured stress serve as intermediate variables and directly predicted depression in the model. At the same time, attraction and ASR were significantly associated with gentrification, while total years spent in school, neighborhood attraction, and interaction were associated with ASR in the causal model, and age was a significant determinant of neighborhood cohesion.

The interactions between gentrification, stress and SRMH were further tested in Macro Process (Preacher and Hayes 2005; 2008). The interaction between gentrification and stress was not significant, but the interaction between SRMH and gentrification was significant (p <0.008). The total effect explained by the model was 0.472. The distribution of the indirect effect of gentrification via stress was 0.133 (Bootstrap se = 0.45, 95% CI 0.05-0.23); via SRMH was 0.237 (Bootstrap se 0.077; 95% CI 0.101-0.401); and through stress and SRMH was 0.101 (Bootstrap se = 0.031; 95% CI 0.046-0.168).

Parameter	Model 1[a]	Model 2	Model 3	Model 4
	Index	Index	Index	Index
-2 Log Likelihood	26225.522	26229.097	26220.902	26220.899
AICc	26349.349	26350.108	26359.122	26365.024
BIC	26527.232	26525.005	26551.623	26563.223
Chi-Square	94.022	97.597	89.402	89.399
DF	52.000	53.000	47.000	45.000
Prob > Chi-Square	0.000	0.000	0.000	0.000
CFI	0.953	0.950	0.953	0.950
TLI	0.930	0.927	0.921	0.914
NFI	0.903	0.900	0.908	0.908
Revised GFI	0.981	0.980	0.981	0.980
Revised AGFI	0.962	0.960	0.957	0.953
RMSEA	0.049	0.050	0.052	0.055
Lower 90%	0.033	0.034	0.035	0.038
Upper 90%	0.065	0.066	0.069	0.071
RMR	3.818	3.988	2.028	2.028
SRMR	0.058	0.059	0.053	0.053

Table 14. Comparing Goodness-of-Fit Indices.

[a] Preferred model
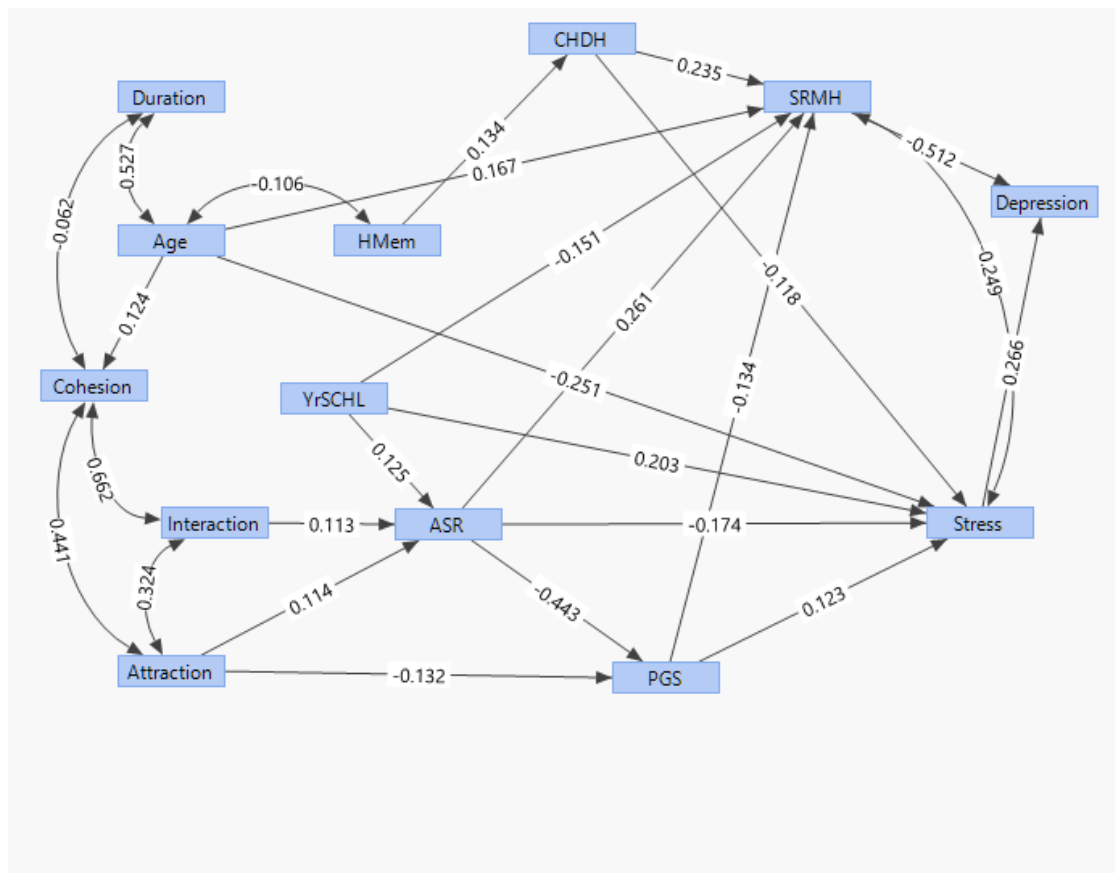
Figure 19. Structural Pathways to Depression through Self-Rated Mental Health and Stress.[19]

Note: PGS perceived gentrification score, ASR access to socioeconomic resources, CHDH self-rated childhood health, YrSCHL total number of years in school, HMem number of household members, and Duration is years of residence in a neighborhood.

Discussion and Conclusion

This study examined the direct and indirect pathways to mental health symptoms (i.e., depression) in neighborhoods in East and Southeast Austin, Texas. The theoretical formulation developed in this study revealed a potential for a causal association of depression. Two theoretical perceptions guided this study—weathering hypothesis and life course perspective. Based on all the parameters used to measure the model's

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[19] Please refer to "Appendix IV" for externally studentized residual with 95% simultaneous limits (Bonferroni) of the variables used in the multivariate/path analysis.

goodness-of-fit, all the variables and covariances included in the model specified a correct final model. Hence, the findings of the specific relationships uncovered in the study warrant discussion.

Table 15. Unstandardized Regression Coefficients of the Determinant of Depression from the Structural Equation Model.

Regressions[20]		Estimate (β)	Std Error	Wald Z	Sig.
Depression	←SRMH	-2.599***	0.227	-11.452	<.0001
	←Stress	0.281***	0.048	5.897	<.0001
SRMH	←YrSCHL	-0.069**	0.022	-3.071	0.002
←Childhood		0.234***	0.049	4.742	<.0001
	←PGS	-0.063*	0.026	-2.423	0.015
	←Age	0.022**	0.007	3.381	0.001
	←ASR	0.071***	0.015	4.694	<.0001
Stress	←PGS	0.279*	0.129	2.160	0.031
←Childhood		-0.564*	0.243	-2.317	0.021
	←YrSCHL	0.445***	0.111	4.014	<.0001
	←ASR	-0.228**	0.075	-3.042	0.002
	←Age	-0.159***	0.032	-4.951	<.0001
PGS ←Attraction		-0.042**	0.015	-2.717	0.007
	←ASR	-0.256***	0.028	-9.101	<.0001
Childhood	←HMem	0.186*	0.076	2.465	0.014
ASR	←YrSCHL	0.209*	0.090	2.333	0.020
←Attraction		0.062*	0.031	2.006	0.045
←Interaction		0.112*	0.056	1.990	0.047
Cohesion	←Age	0.084*	0.027	3.152	0.002

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; $R^2 = 0.47$; β unstandardized beta coefficient

The bivariate correlation/regression analysis showed that perceived gentrification (or neighborhood change) was positively and significantly associated with depression before the causal analysis. This, in part, confirms the first hypothesis (H1) and is supported by a California study that showed that adults living in gentrified

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[20] Note, these are not bivariate regression, they are path regressions as shown in Figure 19.

neighborhoods were likely to report severe psychological distress (Tran et al. 2020). In this study, the positive association indicates that as the perception of gentrification increases, the report of depression increases. However, the relationship disappeared when measured stress and self-rated mental health were introduced in the model, suggesting a spurious relationship between gentrification and depression. This result indicates that gentrification, on its own, may not necessarily have a direct impact on depression per se but serves as a latent/nuance factor that impacts residents' health. Furthermore, this study's findings showed that the relationship between gentrification and health outcomes depends on the context in which the relationship is being studied. It also implies that complex factors determine mental health, particularly in a rapidly changing neighborhood environment. As shown in this study, gentrification was directly associated with health outcomes in a simple model, whereas its association disappeared in a complex model.

This study uncovered several other relationships in the causal model. I found a direct link between perceived gentrification, historical perception of childhood health, age, access to socioeconomic resources, the number of years spent in school, and stress. The result on gentrification and stress indicated that as residents perceived physical and sociodemographic shifts in their neighborhoods, their stress level significantly increased and aligned with other studies (C. Mair et al. 2015; Weissman and Paykel 1972; Cooper et al. 2014). The results also supported the second hypothesis; perceived gentrification was associated with access to socioeconomic resources (ASR). Judging from the dimension of the relationship between gentrification and ASR, it can be inferred that increasing access to social and economic resources could reduce the negative perception

144

of gentrification. Experts have argued that equitable access to community resources[21] can reduce depressive disorders (G. S. Smith et al. 2020; Assari and Kumar 2018; Honold, Wippert, and van der Meer 2014; Nyqvist and Forsman 2015). For example, gentrification, arguably is a good thing but its product should be beneficial to those who have lived in the neighborhood for long. The negative impact of gentrification, such as increased property tax, should be controlled. Programs that can mitigate the displacement of longtime and low-income residents should simultaneously be planned as gentrification unfolds.

As expected, residents who reported better childhood health significantly had a lower score of measured stress in adulthood (H2), supporting the life course effect on chronic health like depression (Celeste and Fritzell 2018; Pearlin et al. 2005). Consistent with other studies that found significant associations between childhood health and adverse health outcomes in adulthood (Kawachi, Subramanian, and Almeida-Filho 2002; Evans and Kim 2007; P. Kim et al. 2013; S. Su et al. 2015; Suzuki et al. 2014), this study found that adulthood stress tended to decrease by a factor of 0.56 when childhood health is considered in the equation. Hence, this study contributes to research that has documented the accumulated effect of adverse childhood experiences on adulthood health. On the other hand, the number of years spent in school increased stress by a factor of 0.45. This means that advanced degrees contribute to increased stress and the level of stress tended to reduce with increasing age. The plausible explanation for this observed relationship is that stress coping skills among the study population increase with age,

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[21] An example of community resources includes health care resources, parks, housing, and healthy food.

probably due to past life experiences, and conformed with previous findings (Diehl and Hay 2010; Stawski et al. 2008).

In support of the third hypothesis, improved access to socioeconomic resources significantly reduced stress as a risk factor for depression. Studies had indicated that social supports buffer all kinds of stress toward improving well-being (Hostinar and Gunnar 2015; McIntosh, Shifflett, and Picou 1989; Mulia et al. 2008; Simons et al. 1993). Contrary to expectation, this study did not find any significant association between social environment (e.g., neighborhood attraction, interaction, and cohesion) and depression. Following a recent systemic review of the impacts of gentrification on health (G. S. Smith et al. 2020), this study found the mediating effect of access to socioeconomic resources in the association between gentrification self-rated health and stress. In the context of these findings, access to socio-economic support for residents in the gentrifying neighborhoods, to a greater extent, reduces stress, which, in turn, would reduce depression. This finding reiterates the need to continuously provide welfare support to longtime residents who are most affected by gentrification. The most viable support would be in the form of reduced property tax for longtime homeowners who are probably retired, unemployed, disabled, or with limited income to cope with the rapidly changing environment.

Like the factors related to stress as a risk factor for depression, those factors were also directly associated with self-rated mental health but with a different dimension of association. Gentrification was inversely associated with self-rated health, meaning that as perceive gentrification increased, self-rated mental health decreased. Participants might perceive gentrification as a malicious process posing stress to them through several

146

outcomes such as increased property tax and fear of displacement. Due to the indirect measure of gentrification, there is less possibility that gentrification's negative connotation might bias the perception of gentrification in this study. The relationship between gentrification and the subjective measure of health aligns with the existing evidence of the association between neighborhood change and self-rated mental health (Centers for Disease Control and Prevention 2017; Gary, Stark, and LaVeist 2007; Izenberg, Mujahid, and Yen 2018; Latkin and Curry 2003). However, it deviates from a Canadian study (Steinmetz-Wood et al. 2017). According to the CDC, residents' mental and physical health in a gentrifying neighborhood is worse than those living in non-gentrifying neighborhoods (Centers for Disease Control and Prevention 2017).

Neighborhood investment, no doubt, brings new amenities such as big stores into the neighborhoods; however, research has indicated that most of these benefits related to gentrification are less likely to be enjoyable by longtime low-income residents (Tran et al. 2020). Aside from loss in socio-cultural networking and increase rent and tax, these factors may unknowingly interact to elevate stress that can, in turn, contribute to mental health among low-income residents. Because research on the association between gentrification and mental health is still unfolding, the direct impact of gentrification on mental health remains inconclusive.

This study's limitations include its cross-sectional design that examined depression at a point in time, making it difficult to establish causation. Hence, readers should apply caution when interpreting the results. Second, it is also important to note that several other factors apart from the living environment and other sociospatial processes such as gentrification may not necessarily be the reason for the findings on

147

respondents' poor mental health in this study. The data collection and the whole research happened amid the COVID-19 pandemic, affecting people's emotions and psychological health status. Globally, the fear of infection and loss of relatives, friends, family, and co-workers spurs mental health. Third, the current study did not control other stress sources and the latent period effect of gentrification, which might also confound the observed associations. The impact of gentrification, taken at a single point in time, may be concealed during this study because, as an environmental stressor, this effect needs to be studied and followed over a more extended period. Hence, longitudinal data is necessary to control historical exposure to stress from various sources such as living environment, work, and familial or marital relationships. Nevertheless, this study's findings contribute to the growing knowledge of gentrification on mental health in the US.

In conclusion, this study found a significant association between gentrification and symptoms of mental health and stress. However, I found no direct association between perceived gentrification and depression among residents living in gentrifying neighborhoods in our complex model. The lack of direct association may suggest gentrification as a latent[22] environmental factor which may take various pathway in affecting one's health. Besides, our study indicates that stress was directly related to depression among residents in gentrifying neighborhoods in East and Southeast Austin. These findings build on the current evidence on environmental stress and mental health. It also supports the weathering hypothesis. Therefore, it is essential to buffer stress sources by improving access to social and economic resources, particularly for residents in gentrifying neighborhoods.

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[22] Gentrification is regarded as latent because its direct effect on health cannot be directly measured.

Many scholars and policymakers believed that introducing the affluent population in low-income neighborhoods improves the physical environment of disinvested neighborhoods. However, gentrification may not necessarily improve access to community resources if the social status of low-income minority residents is not improved to match that of the gentry. This study indicates that stress from the changing environments may increase poor mental health considering other sources of life stress from a relationship and work that are not covered in this study. Gentrification plays a passive role, while stress plays an active role in contributing to residents' mental health status in this study. For gentrification's benefits to be fully realized, factors causing stress such as displacement and increasing property tax should be addressed, particularly for low-income earners with fixed incomes. Lastly, accessible housing is a crucial part of ensuring social equity, whether it be through policy initiatives for affordable housing or affordances to housing costs. Therefore, implementing and guaranteeing social equity of resources will improve residents' health and will eventually reduce healthcare spending at the household and local levels.

VII. CHRONIC HEALTH CONDITIONS IN GENTRIFYING

NEIGHBORHOODS[23]

Introduction

Chronic diseases and health conditions (CHCs) are a type of health situation that lingers for at least six months and require ongoing medical attention or limit daily living activities or both (Centers for Disease Control and Prevention 2020; Bernell and Howard 2016). Put together, they are responsible for 71% of all deaths globally, and 15 million people between the ages of 30 and 69 years die from CHCs annually (World Health Organization 2018a). According to the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), chronic diseases such as heart disease, cancer, and diabetes are the leading causes of death and disability in the US (Centers for Disease Control and Prevention 2020). They tend to exact and have gruesome financial implications; for example, they account for $3.5 trillion in annual health care costs in the US.

Some important factors motivated and justified this chapter. First, the cross-examination of existing work suggests that studies specifically designed to examine the impact of gentrification on residents' health are limited, and most studies depend on secondary data (e.g., census data) to measure gentrification. Second, an extensive review of the literature survey also indicates that scant research focusing on gentrification and chronic health conditions exists in the literature. Supporting this assertion is a recent

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[23] This chapter has been accepted for publication as Iyanda, A.E. and Lu, Y., (In Press 2021). 'Gentrification is not improving my health': a mixed-method investigation of chronic health conditions in rapidly changing urban neighborhoods in Austin, Texas. *Journal of Housing and the Built Environment.*

systematic review of the impacts of gentrification on health found that very few studies have documented the relationship between gentrification and health (G. S. Smith et al. 2020). Though not necessarily mutually exclusive, Smith et al.'s study found that most studies within the gentrification framework focused on self-rated health; limited research exists on chronic health conditions. Another important point highlighted in the review study was the lack of universal operationalization of gentrification, which contributed to the considerable variation and inconclusive findings on the association between gentrification and health in the US.

Chronic Health Conditions and Gentrification

Complex factors such as behavioral, gene-environmental interaction, and biosphere, interact to create disease ecology such as CHCs. Due to these complex factors, an individual could have multiple diagnoses of CHCs (m-CHCs). Having a CHC can elevate the risk for another chronic disease leading to comorbidity of diseases. Evidence has shown that poor psychological health status could elevate the risk of heart diseases[24]. According to a recent scientific report, "negative psychological health conditions include depression, chronic stress, anxiety, anger, pessimism, and dissatisfaction with one's current life" (American Heart Association 2021). These conditions are associated with potentially harmful biological responses, including irregularities of heart rate and rhythm, increased digestive complaints, increased blood pressure, inflammation, and reduced blood flow to the heart (CDC 2020). The changing sociocultural and physical environment could play an important role in developing these conditions. Drang, Ellen, and Glied (2019) examined the relationship between gentrification and the prevalence of

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[24] Heart Disease and Mental Health Disorders | cdc.gov

four chronic disease diseases, including overweight/obesity, asthma, and two categories of mental health (attention deficit hyperactivity disorder/conduct disorder and anxiety/depression). The authors reported that gentrification was not associated with asthma and obesity. However, they found that living in gentrifying neighborhoods increased diagnoses of anxiety or depression.

One of the common indicators of gentrification is the restaurant and grocery stores that follow the gentrifiers into their new neighborhoods. A term referred to as culinary gentrification (Burnett 2014) or omnivorous gentrification (Hyde 2014; Zukin, Lindeman, and Hurson 2017). Hence, the food environment within the gentrifying neighborhood plays a significant role in developing chronic diseases. Because of gentrification, poor residents may struggle to access quality food due to financial constraints. In San Francisco, Whittle et al. (2015) examined the impact of gentrification among chronically ill patients. The study found that people living with chronic diseases face serious food insecurity because a larger share of their income is expended on paying rent, limiting access to adequate, nutritional, and safe foods. In another study, Rhodes-Bratton et al. (2018) study the relationship between childhood obesity and neighborhood food ecology within the context of gentrification in New York. The study reported a complimentary view of gentrification on health because it is believed that gentrification ushers in new services and amenities that are once lacking in the gentrified neighborhoods. Specifically, their study suggests that gentrification was associated with "contemporaneous changes in the food environment and lower rates of obesity among children (Rhodes-Bratton et al. 2018).

Among the adult population, food and nutrition are linked to diabetes, and one crucial risk factor for diabetes is obesity. Klein et al.'s (2006) study reported a higher rate of diabetes and obesity among low-income/poor residents in gentrifying/gentrified neighborhoods in Philadelphia. The association between gentrification and diabetes prevalence holds after controlling for demographic variables like age (Klein et al. 2006). However, in a systematic review of 36 peer-reviewed journal articles, Bhavsar, Kumar, and Richman (2020) noted that those living in neighborhoods experiencing gentrification[25] have a lower rate of diabetes.

Gentrification is notably known to affect most minority neighborhoods, and minority groups tend to have poorer health, including CHCs, than their White counterparts. Smith, McCleary, and Thorpe (2020) examined the racial disparity in hypertension prevalence within the US gentrifying neighborhoods using the 2014 Medical Expenditure Panel Survey data. The study found that Blacks living in gentrifying neighborhoods are less likely to be insured, have a higher rate of obesity than White. The study reported that Blacks living in gentrifying neighborhoods have a 26% higher prevalence of hypertension (95% CI 1.02-1.56) than White, after adjusting for age, education, income, employment status, and insurance status (G. S. Smith, McCleary, and Thorpe 2020).

Research Questions

1. What is the relationship between perceived gentrification and report of chronic health conditions among residents in East and Southeast Austin?

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[25] The original study refers to gentrification as neighborhoods experiencing declining SES, new housing, and improved SES (Bilal, Auchincloss, and Diez-Roux 2018).

2. Does historical health condition significantly predict the report of CHCs among residents in East and Southeast Austin?

3. Is there a significant relationship between medical facility visits and reports of CHCs?

4. To what extent can sociodemographic characteristics (ethnicity, marital status, household income, and educational attainment) predict the report of CHCs?

Measure

Dependent Variable

The primary variable of interest is chronic health conditions. Data on chronic health conditions were collected based on a question that asked whether participants had been diagnosed with any of the ten listed health conditions in Table 15 (response: Yes, Maybe, or No). The outcome health conditions include diabetes, depression, asthma, chronic pain, hypertension, chronic migraine, difficulty breathing, panic attack, high blood pressure, and chronic stress. The count of all those who selected 'Yes' was used to form the chronic health condition index. The count variable ranged from 0 to 10.

Explanatory Variables

The primary explanatory variable was the perceived gentrification score (PGS), which I already described in Chapter 4. According to the life course theory on chronic health conditions in adulthood, this study explores the possible pathways and associations of childhood health and parents' health conditions with CHCs. Each respondent was asked to rate his/her general health(overall), physical health, and mental health based on a single question: "*On a scale of 1-10,* '1' being the lowest and '10' being the highest, rate your overall health, physical health, mental health, health while growing up and parents;

health while growing up." The last two SRH were only used for this present study. In addition, I also explored the frequency of Medical Facility Usage in the last six months: (1) Hospital/clinic visit for any health reasons. (2) Used Mental Health Care. (3) Visit Emergency Room (ER) based on a 5-point Likert scale (1= Never, 2 = Less often, 3= Neutral, 4 = Often, 5 = Very Often). Each of the three questions on medical facility usage was standardized, as previously described above. Other sociodemographic covariates respondents' age (continuous), duration of residence measure as a continuous variable, household income measure as an interval variable, numbers of school years (continuous), educational attainment (ordinal: High school or less, associate degree, four years college, Masters/ Doctorate), and ethnicity (nominal: Asian, Black/African American, Hispanics/Latino, Others).

Analytical Procedure

Since the outcome is a count variable and chronic health conditions are not common events, a Poisson distribution is assumed. Hence a nonlinear estimation was the best choice. Poisson regression and negative binomial (NB) regression are used to predict count outcomes with those counts occurring within a given space or span of time. Unlike the ordinary least squares regression (OLS), both Poisson and NB regression do not assume a linear relationship between the independent and dependent variables. Poisson regression assumes that the conditional mean and variances of the count distribution of CHCs, as it appears in this case, are equal, a condition commonly referred to as equidispersion. The descriptive analysis of the m-CHCs index indicated that the variance (δ^2 = 12.872) was three times larger than the mean (M= 4.024, SD= 3.587, 95% Confidence Interval [CI] 3.636, 4.412), which indicated overdispersion. Figure 20 shows

the distribution of CHCs, which displays a skewed distribution. When overdispersion is detected—a situation that typically occurs when there is a failure to include all causes of variation in the counts—the Poisson model can underestimate standard errors leading to an increase in the likelihood of type I error (Dean and Lawless 1989; Berk and MacDonald 2008). Hence, NB is best used to handle overdispersion. I compared Poisson and two versions of NB models based on the Akaike Information Criterion's values (AIC) and interpreted the model with the best minimum ratio of the deviance or chi-square to the degree of freedom. The values of the two indices closer to 1 indicate equidispersion.

I developed four different models for the estimation of CHCs in gentrifying neighborhoods. Model 1 included the key variables on neighborhood change (i.e., gentrification index, awareness of neighborhood change, duration of residence). The second model used self-reported historical health conditions to test life course theory, and the third model included variables on the frequency of medical facility usage. Lastly, the fourth model included only the sociodemographic variables—ethnicity, marital status, household income, and educational attainment. I controlled for age (LnAge) as an exposure (offset) variable of chronic health conditions. The exposure variable will allow me to capture the between-person differences in the degree of risk/opportunity for event counts to accrue.

Model fit in both Poisson and NB regression was evaluated based on the likelihood ratio (LLR) chi-square test results. The full likelihood function is used to compute the information criteria in SPSS. A significant chi-square result of the LLR (Omnibus $p < 0.05$) indicates a significantly improved model relative to the null. The LLR test was chosen over the Wald test because the latter can be overly conservative

when testing the regression coefficient against the null. The Likelihood ratio test is a more robust test of the regression parameters because it involves testing the full model without that predictor. This study interpreted the incidence rate ratio (IRR) for both Poisson and NB and their associated 95% confidence interval.
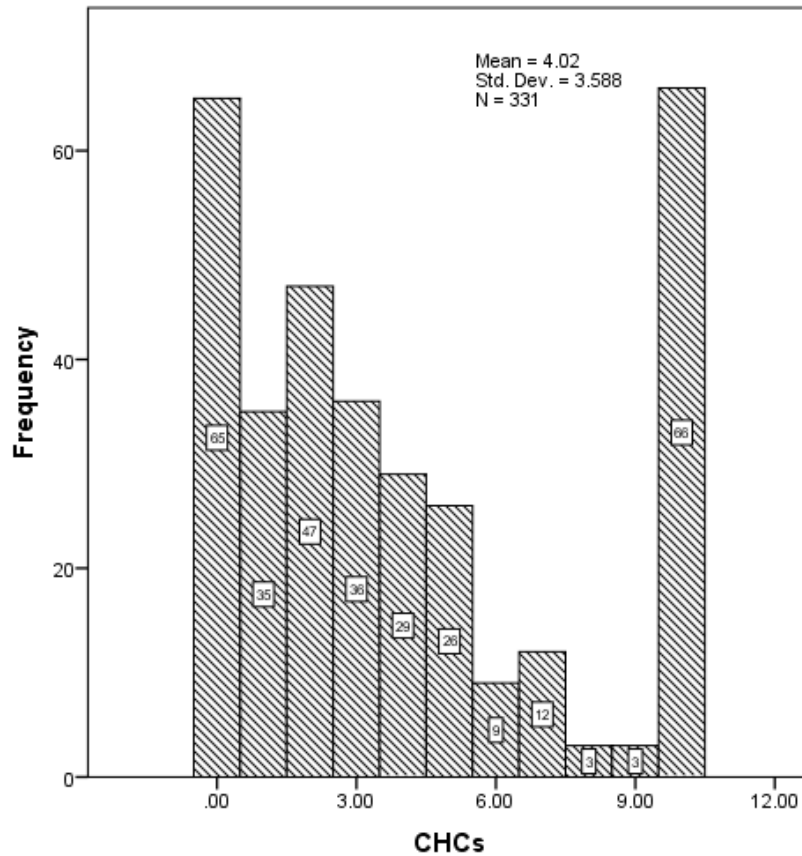
Figure 20. Frequency Distribution of Count of Chronic Health Conditions.

Results

Descriptive Results

The median count of chronic health conditions among the participants was 3 (mean = 4.024, SD = 3.587, 95% CI 3.636, 4.412), while the mean age, duration of residence, and total year of education of the respondents were 46 years (SD = 13.69), 12 years (SD = 13.95), and 16 years (SD 4), respectively. The majority of the participants

lived in East Austin (n = 197, 59.5%), and more women than men participated in the survey (n = 222, 69.8%). The larger proportion of the respondents were married 146 (45.5%), 74 (23.1%) were identified as being widowed/divorced/separated, and 101(31.5%) were never married/single. Over half of the respondents identified themselves as white (n = 181, 56.7%), few were black (n = 23, 7.2%), 59 (18.5%) were Hispanics/Latino, 46 (14.4%) were Asian, and only ten (3.1%) were identified as other race/ethnicity. About one-third (36%) had lived in the study area for more than ten years, and 264 (91%) were aware of neighborhood change (gentrification). The majority of the respondents (73.2%) did not plan to move out of their neighborhood anytime soon, 20% were not sure, and only 7% declared they wanted to move. Among those who said they were aware of the changing neighborhood, 40.3 % said that change in their neighborhood threatens them. Table 16 presents the frequency distribution of the ten CHCs and other covariates.

Table 16. Frequency Distribution of Key Variables.		
	Frequency	Percentage
Neighborhood change awareness		
Yes	264	79.8
No	25	7.6
Total	289	87.3
Missing	42	12.7
Threat		
Yes	106	32
No	157	47.4
N	263	79.5
Missing	68	20.5
Increase tax or rent		
Extremely unlikely	12	3.6
Somewhat unlikely	9	2.7
Neither likely nor unlikely	9	2.7
Somewhat likely	76	23
Extremely likely	179	54.1

N	285	86.1
Missing	46	13.9
Move out (displacement)		
Extremely unlikely	51	15.4
Somewhat unlikely	65	19.6
Neither likely nor unlikely	54	16.3
Somewhat likely	80	24.2
Extremely likely	33	10
N	283	85.5
Missing	48	14.5
Sell property due to tax		
Extremely unlikely	44	13.3
Somewhat unlikely	61	18.4
Neither likely nor unlikely	65	19.6
Somewhat likely	65	19.6
Extremely likely	45	13.6
N	280	84.6
Missing	51	15.4
Unable to pay for bills and groceries		
Extremely unlikely	105	31.7
Somewhat unlikely	84	25.4
Neither likely nor unlikely	47	14.2
Somewhat likely	35	10.6
Extremely likely	14	4.2
N	285	86.1
Missing	46	13.9
Lose your connections/relationships		
Extremely unlikely	100	30.2
Somewhat unlikely	60	18.1
Neither likely nor unlikely	63	19
Somewhat likely	41	12.4
Extremely likely	21	6.3
N	285	86.1
Missing	46	13.9
Diabetes		
No	231	69.8
Yes	100	30.2
Depression		
No	150	45.3
Yes	181	54.7
Chronic Stress		

No	187	56.5
Yes	144	43.5
Hypertension		
No	223	67.4
Yes	108	32.6
High Blood Pressure		
No	210	63.4
Yes	121	36.6
Chronic Pain		
No	195	58.9
Yes	136	41.1
Panic Attack		
No	196	59.2
Yes	135	40.8
Migraine (chronic)		
No	217	65.6
Yes	114	34.4
Anxiety		
No	143	43.2
Yes	188	56.8
Difficulty Breathing		
No	226	68.3
Yes	105	31.7

Multivariate Results

Table 17 presents the association between CHCs index and perceived

gentrification score (PGS). There is a significant positive association between PGS and

m-CHCs in all three probability models—Poisson, NB (default), and NB estimated with

maximum likelihood (NB-MLE). Further investigation of the AIC value indicates that the

NB-MLE model has the lowest value, making it the best model. There was no significant

association between residence duration and awareness of change in the physical and

cultural environment and CHCs.

Model 2 tests the effect of the historical health of participants based on their retrospective health condition. Self-reported childhood health was significantly and inversely associated with multiple chronic health status reports supporting the life course theory. Retrospectively, a high rating of childhood health reduces the report of chronic health conditions in the study sample. Interestingly, all three models support the significant association (See model 2 in Table 17). Similarly, the frequency of the medical facility usage model in Table 16 indicates that NB-MLE has the lowest AIC value. There is a significant positive association between the frequency of hospital/clinic visits (IRR= 1.180, 95% 1.063,1.309), mental health facility visits (IRR = 1.197, 95% CI 1.099,1.304), and m-CHCs. Though there was a significant association between the Poisson model and the default NB for the frequency of emergency room visits and m-CHCs, the association failed to reach the level of significance in the NB-MLE model.

The fourth model assessed the association between CHCs and sociodemographic variables. Being Asian was associated with reporting multiple CHCs among the resident in gentrifying neighborhoods in East and Southeast Austin in the Poisson model. However, I tended to downplay the significant association found in the Poisson model because the preferred model (NB-MLE) with the relative lowest AIC value of 1090.5 indicates no significant association between the categories of ethnic groups and CHCs. Marital status seems to play a significant role in reporting multiple CHCs. The NB-MLE indicates that being married (IRR = 0.727 0.549, 0.962) or Widowed/Separated/Divorced (IRR = 0.648 95% CI 0.474,0.885) reduced the likelihood of reporting CHCs, relative to single/never married. There is also evidence of the participants' socioeconomic status in reporting multiple CHCs. Residents with a substantially low level of education and

income were more likely to report m-CHCs. In contrast, high social-economic status

(IRR = 0.957, 95% CI 0.919, 0.997) serves as a protective factor for reporting multiple

CHCs (Table 17).

A sensitivity analysis of the perceived gentrification score and CHCs was also

conducted (Table 18), which combined all the individual models in Table 17. The model

includes the Lagrange multiplier test of scale parameters or negative binomial ancillary

parameters, which tests the null hypothesis that the negative binomial distribution

ancillary equals 1. The overall test was significantly robust based on the Likelihood Ratio

Chi-Square value of 91.836 (p <0.001) and Deviance value of 0.736. The results indicate

that the frequency of hospital visits and self-rated mental health were competitively

associated with multiple chronic health reports. Neither gentrification and access to

socioeconomic resources were significant in this model, substantiating the power of self-

rated mental health and hospital visits on the report of CHCs.

Table 17. Comparison of Poison and Negative Binomial Regression of Chronic Health Conditions.						
	Poisson		NB-MLE		NB-Default	
	B	IRR [95% CI]	B	IRR [95% CI]	B	IRR[95% CI]
Model 1: Neighborhood factor						
(Intercept)	-3.505***	0.030 [0.021, 0.042]	-3.415***	0.033 [0.018,0.06]	-3.404***	0.033 [0.017, 0.066]
Gentrification score	0.236***	1.266 [1.166, 1.374]	0.224**	1.251 [1.085, 1.442]	0.223**	1.249 [1.062,1.469]
Duration of residence	-0.003	0.997[0.993-1.002]	-0.003	0.997 [0.989,1.005]	-0.003	0.997 [0.988,1.006]
Change awareness	0.116	1.123 [0.885,1.426]	0.105	1.111 [0.724,1.703]	0.103	1.109 [0.68,1.808]
(Negative binomial)	-	-	0.683	-		-
Deviance	2.889	-	1.183	-	0.960	-
AIC	1491.232	-	1291.762	-	1297.515	-
Likelihood ratio test	33.034***	-	9.979*	-	7.73	-
Model 2: Historical Health		-		-		-
Childhood health	-0.128***	0.880 [0.821,0.943]	-0.154***	0.857 [0.791,0.928]	-0.162***	0.850 [0.783,0.924]
Parent health	-0.020	0.980 [0.992,1.041]	-0.016	0.984[0.921,01.052]	-0.015	0.986 [0.920,1.055]
(Negative binomial)	-	-		-		-
Deviance	2.265	-	1.200	-	0.839	-
AIC	1200.814	-	1114.638	-	1133.738	-
Likelihood ratio test	44.448***	-	21.619***	-	14.442**	-
Model 3: Frequency of medical facility visit		-		-		-
(Intercept)	-3.839***	0.022 [0.017,0.027]	-3.795***	0.022 [0.016, 0.031]	-3.763***	0.023 [0.015,0.035]
Hospital/clinic visits	0.176***	1.193 [1.112,1.28]	0.165**	1.18 [1.063,1.309]	0.158*	1.171 [1.018,1.346]
Mental health facility	0.173***	1.189 [1.125,1.257]	0.18***	1.197 [1.099,1.304]	0.181**	1.199 [1.067,1.347]
Emergency room visit	0.117*	1.125 [1.019,1.241]	0.108	1.114 [0.944,1.313]	0.102	1.108 [0.88,1.394]
(Negative binomial)	-	-	0.392	-	1	-

Deviance	2.105	-	1.243	-	0.826	-
AIC	1146.845	-	1090.55	-	1115.266	-
Likelihood ratio test	102.193***	-	40.970***	-	25.209***	-
Model 4: Sociodemographic		-		-		-
(Intercept)	-2.184***	0.113 [0.077,0.165]	-2.284***	0.102 [0.049,0.212]	-2.297***	0.101 [0.043,0.234]
Asian	0.422*	1.525 [1.044,2.228]	0.548	1.729 [0.838,3.567]	0.56	1.751 [0.76,4.032]
Black/African American	0.144	1.155 [0.76,1.755]	0.303	1.354 [0.611,2.998]	0.32	1.378 [0.552,3.441]
Hispanics/Latino	0.254	1.289 [0.892,1.825]	0.443	1.557 [0.776,3.124]	0.461	1.586 [0.712,3.534]
White	-0.044	0.957 [0.668,1.370]	0.084	1.088 [0.554,2.138]	0.099	1.104 [0.507, 2.400]
Married	-0.339***	0.713 [0.616,0.825]	-0.319*	0.727 [0.549, 0.962]	-0.316	0.729 [0.528,1.007]
Widow/Divorced/Separated	-0.427***	0.653 [0.557,0.765]	-0.434**	0.648 [0.474,0.885]	-0.434*	0.648 [0.452,0.929]
High school or less	0.23*	1.259 1.034,1.532]	0.202	1.223 [0.817,1.832]	0.199	1.220 [0.764,1.949]
Associate degree	-0.01	0.99 [0.802,1.222]	-0.036	0.965 [0.644,1.446]	-0.037	0.964 [0.605, 1.536]
Four years college	0.049	1.05 [0.911,1.21	0.024	1.024 [0.787,1.333]	0.022	1.022 [0.755,1.383]
Household income	-0.044***	0.957 [0.936,0.977]	-0.044*	0.957 [0.919, 0.997]	-0.044	0.957 [0.913,1.004]
(Negative binomial)	-	-	0.687	-	1	-
Deviance	3.244	-	1.216	-	0.982	-
AIC	1725.432	-	1464.796	-	1471.521	-
Likelihood Ratio (Chi-square)	108.165***	-	29.311**	-	23.579**	-
		-		-		-

*** p < 0.001, ** p< 0.01, * p < 0.05

NB-MLE negative binomial is estimated based on maximum likelihood; AIC Akaike criterion information.

Table 18. A Unified Model of Predictor Chronic Health Conditions.					
	B		IRR	95% CI	
		Sig.		Lower	Upper
(Intercept)	3.189	0.006	24.256	2.528	232.691
Gentrification	-0.008	0.766	0.992	0.941	1.046
Graduate degree (ref)					
High School degree	0.461	0.176	1.585	0.813	3.091
Associate degree	-0.239	0.46	0.788	0.418	1.484
Bachelor's degree	-0.151	0.451	0.86	0.58	1.274
Age (years)	0.017	0.059	1.017	0.999	1.035
Duration	0.064	0.76	1.066	0.709	1.602
ASR	0.015	0.312	1.015	0.986	1.046
Single (ref)					
Married	-0.091	0.699	0.913	0.574	1.451
Divorced/Widowed/Separated	0.112	0.685	1.119	0.651	1.923
Asian/others (ref)					
Hispanics	0.456	0.157	1.578	0.839	2.967
Blacks	0.773	0.061	2.166	0.965	4.858
White	0.15	0.551	1.162	0.709	1.906
Household income	-0.041	0.291	0.96	0.89	1.035
Hospital visits	-0.281	0.004	0.755	0.624	0.914
Mental health facility visits	-0.117	0.142	0.89	0.761	1.04
Emergency room visits	-0.005	0.972	0.995	0.746	1.327
SR-Overall health	0.055	0.63	1.057	0.845	1.322
SR-Physical health	-0.091	0.369	0.913	0.748	1.114
SR-Childhood health	0.089	0.249	1.093	0.94	1.27

SR-Parent health	-0.073	0.243	0.93	0.823	1.051
Change awareness	-0.221	0.444	0.801	0.454	1.413

Discussion and Conclusion

This study used Poisson regression to investigate the self-report of chronic health conditions among residents in gentrifying neighborhoods in East and Southeast Austin. I used a count of ten chronic health conditions to proximate the overall health outcome in gentrifying neighborhoods. Scholars have recently examined the probable impact of gentrification on health (Gibbons and Barton 2016; Izenberg, Mujahid, and Yen 2018; Anguelovski, Triguero-Mas, et al. 2019; Bhavsar et al. 2019; Gibbons, Barton, and Brault 2018). However, systematic reviews showed that these studies' results are mixed (G. S. Smith et al. 2020; A. S. Schnake-Mahl et al. 2020). In addition to the existing studies, this research provides additional empirical evidence between CHCs and gentrification.

Consistent with other studies on chronic health conditions in Ontario, Canada (Rooks 2020) and San Francisco, US (Whittle et al. 2015), this study showed that gentrification significantly and positively associated with the report of chronic health conditions among residents living in gentrifying neighborhoods in East and Southeast Austin. Research on gentrification and CHCs have found that food insecurity and social isolation were the biggest issues associated with gentrification and CHCs, particularly for older adults with lower incomes and government disability support. Though gentrification tends to bring 'Big Stores and Restaurants' into the neighborhoods, lower-income residents may not have the resources to access them. In order to save for property taxes and other high bills, residents might not have enough to take care of their health, leading to worsening health. Compared to several gentrification research, this study assessed the frequency report of chronic health conditions while most studies looked at specific chronic health such as cardiovascular diseases at a time. However, the

dissertation's interest was to see how residents in gentrifying neighborhoods report multiple chronic health. This is essentially tailored to facilitate new research opportunities regarding health disparity by further projecting whether the report of multiple chronic health conditions has a spatial dimension compared to the existing knowledge of individual chronic diseases.

Following the life course theory, the model that examined the impact of childhood health conditions indicated that participants who reported having good health while growing up were less likely to report multiple chronic health problems even in the gentrifying neighborhood. This implies that historical childhood health serves as a protective factor for participants in this study sample. Further, the results could also be interpreted in the context of policy implication, arguing that investing in the quality of life early in life may serve as a brilliant investment in future health. The finding of historical health also resonates with other studies that applied life course theory in various health outcomes and relationships in adulthood (Shoham, Vupputuri, and Kshirsagar 2005; Goosby 2013).

The model that examined the association between the frequency of medical health care and mental health care utilization and CHCs found a significant association. However, ER visitation was not significantly associated with the report of multiple chronic health conditions in this study. Extant literature has acknowledged that neighborhood factors (low SES) contribute to poor health conditions and rehospitalization (Zhang et al. 2020; Kind et al. 2014; Liu and Pearlman 2009). However, a study on the frequency of hospitalization among residents in gentrifying neighborhoods remained scarce except for Lim and colleagues' (2017) study, which examined the effect

of displacement on the rate of hospitalization. Thus, using a micro-sample from East Austin, this study contributes to the perception of gentrification and frequency of hospitalization and mental health care facility visits.

Concerning sociodemographic characteristics and reports of multiple chronic health conditions, this study did not find any significant variation among the different self-identified racial/ethnic groups. Put differently, based on the maximum likelihood estimation of the negative binomial model, there was no significant association between race/ethnicity and the count of chronic health conditions. The results negate Smith, McCleary, and Thorpe's (2020) report that found a significant variation of hypertension among different races and ethnic groups. Several factors could contribute to the dispersion in this study's findings and those reported by Smith and colleagues. First, the operationalization of CHCs varies by study. This study used a count of multiple chronic health conditions (physical and mental chronic conditions) while other studies separately examined individual chronic health conditions. Second, the nature of the data used in this study and those used in other studies by design differ. Future study is needed to examine this aspect of research on the report of multiple chronic health conditions among different racial and ethnic groups within the gentrifying neighborhood. However, it was not surprising to find that marital status serves as a protective factor for reporting chronic health conditions among the sample because union may serve as a source of social and psychological supports/buffer for different health conditions. However, the association between divorced/widowed and report of chronic health is counterintuitive. I expected that being single should be a risk factor for reporting multiple chronic health. One

plausible explanation for this is that this group may have other family members that provide familiar support and relief.

As it has been established in the literature of socioeconomic determinants of health or the principle of Marmot's socioeconomic gradient of health (Glover, Tennant, and Hetzel 2004; Kopp et al. 2007), SES had an inverse relationship with the report of CHCs in this study. Essentially, people with a higher level of education reported a lower rate of chronic health conditions. This result seems less complicated, and it could be argued that people who live in a gentrifying neighborhood with high income may have better access to healthy food and health care services than those with low income who may not be able to afford healthy foods and good health care.

In light of the present findings, this study has some limitations which must be acknowledged. First, the study was based on a cross-sectional design, limiting the drawing of a causal relationship between variables. The second, an important limitation of the study, is related to the report of chronic health was only limited to the few ten chronic health listed in the questionnaire; there are other CHCs not captured with the study's design. Future studies should allow extensive inclusion of reports of multiple CHCs. Third, the measure of childhood health was based on a retrospective report, which may not accurately capture historical episodes of health due to recall bias. In order to mitigate these limitations, longitudinal data is best used to capture the historical aspect of individuals' lives.

 Despite the limitations mentioned, this study introduces, probably for the first time, the concept of m-CHCs within the changing urban environment. Prior to this present study, there is insufficient knowledge of the reports of residents' multiple chronic

health conditions in gentrifying or gentrified neighborhoods in the US. A study on the prevalence of multiple chronic conditions needs to be brought forward in public health intervention research. Lastly, policy intervention targeting individuals rather than area-based solutions regarding tax assessment based on individual evaluation will reduce the burden of living in gentrifying neighborhoods, especially longtime residents who wish to age in place.

In summary, this study found less evidence of the effect of gentrification on multiple reports of chronic health conditions among urban residents in gentrifying neighborhoods. However, access to socioeconomic resources further mediates this relationship. Access to socioeconomic resources re-echoed the need for bridging social and economic inequalities and serves as an intervening opportunity for addressing social and health inequality among urban residents. I also found no difference in the report of m-CHCs among different ethnic groups in this study, which instead suggests the importance of socioeconomic status rather than race/ethnicity in understanding health disparity within the urban settings.

VIII. PERCEIVED IMPACT OF GENTRIFICATION ON HEALTH:

QUALITATIVE APPROACH[26]

Introduction

Studies that examined minority health in a gentrifying neighborhood are very controversial (A. S. Schnake-Mahl et al. 2020; G. S. Smith et al. 2020). While some scholars agree that gentrification hurts the existing residents in a gentrifying neighborhood, others believe it improves neighborhoods in distress (Papachristos et al. 2011; Steinmetz-Wood et al. 2017; R. Atkinson 2004; R. M. Atkinson 2002). For instance, Izenberg et al. (2018) found a positive link between gentrification and health, while Gibbons et al. (2018) found a negative correlation. Variance in methodology, design, and contextual nuances may explain the disparity in the mixed reports in gentrification-health research (A. S. Schnake-Mahl et al. 2020).

In resilience research, several coping mechanisms (e.g., social capital, social relations, social identity, bonds, and networks) have been described for mitigating the effect of the changing environment (Pearsall 2012). Systematic reviews have shown consensus evidence that social capital could predict mental and physical health (De Silva et al. 2005; Ehsan et al. 2019), and its indicators are protective against displacement. However, compromised neighborhood social capital by the gentrification process could also harm LTRs, particularly the elderly (Versey 2018). Research on residents' coping mechanisms in gentrifying environments in Austin, Texas, exists. This study explores

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residents' perceptions of the impact of gentrification on health and their coping mechanism.

This present chapter aims to qualitatively investigate the perception of the effect of gentrification on health and wellbeing. It also examines the role of social capital in coping with some of the impacts of gentrification. The study is important for two reasons. First, it strengthens and supports the quantitative arm of gentrification research to which this current project belongs. Second, information from qualitative study can enable local government and policymakers to improve citizens' health and wellbeing, especially those facing uncertainties due to government urban renewal policies—the elderly.

Methods

This section of the chapter presents the findings from the semi-structured in-depth interviews (IDI) conducted with nine volunteers who have lived in East and Southeast Austin for more than a decade. Interviews were conducted in English and loosely following a pre-defined interview guide and a short overview of the study. The interview guide explored several themes related to participants' symbolic meaning of neighborhood change and change actors using the deductive approach. Notably, participants were asked to give their experience on the changing physical, social, and cultural environment, neighborhood diversity, residents' most concerns, as well as topics related to social capital such as community participation and community activism. Other topics related to stress, physical and mental health were also discussed, and coping strategies in the changing environment. The interviews were relatively short and lasted between 30 and 45 minutes.

Interview transcripts were coded and analyzed according to content analysis methods (Downe-Wamboldt 1992). I used text analysis to extract segments that formed several nodes and were collapsed to central themes. The extracted texts in the form of nodes and themes were visualized in different forms, and they guided the discussion throughout this section of this chapter. Table 19 presents nodes that were converged to prominent themes, and Figure 21 shows the most frequently mentioned words such as people, property, and neighborhood. The following section described the interviewees' demographic characteristics, followed by the presentation of the emerged themes. I closed this chapter with a summary of major findings and conclusions.

Table 19. Classification of Themes, Nodes, and Subnodes.

Name	Files	References
Businesses or Economic (A)	4	8
Employment Opportunities (B)	1	1
Environmental issues (A)	3	12
Gentrification makes people sick (A)	9	72
Health ratings (B)	4	4
Health impacts (B)	8	28
Environmental stress (B)	7	22
Mental health (B)	4	5
Self-rated health (B)	4	5
Meaning (A)	8	19
Agent of change (B)	4	6
Perspective of gentrification (A)	9	111
Positive Gentrification (B)	9	47
Benefits (C)	9	25
Negative gentrification (B)	9	63
Concerns (C)	8	36
Political Agency (A)	4	23
Power over resources (B)	2	4
Who is gentrifying Austin Neighborhoods (B)	2	3
Recommendation (A)	7	18
Strategy to retain LTRS (B)	4	7
Resist displacement or gentrification (A)	8	16
Cannot resist gentrification (B)	2	4
Budget and Economic Planning (B)	5	6
Social ties (A)	9	32

Participation (B)	9	15
Duration (B)	6	6

(A) Represents main themes from nodes (B) and subnodes (C)

Figure 21. The Common Referenced Words in the Interview by the Participants.

Participants Demographics

The in-depth interview comprises nine women, aged 26-71, who resided in East and Southeast Austin for more than ten years (range of residence: 12-55 years). Only two of the participants had a full-time job; most of them were retired or working part-time.

One person self-identified as Asian American, three were Hispanic/Latino, two were African American/Black, and three as White (Figure 22).
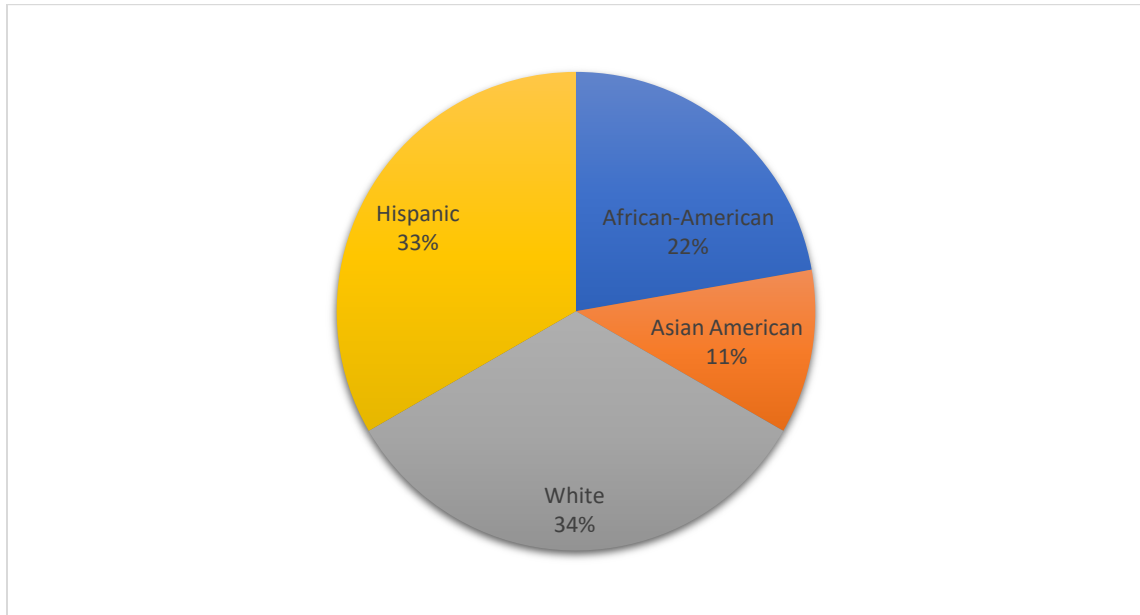
Figure 22. Participants by Race/Ethnicity.

<div align="center">

Interpretation of Transcript

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Gentrification Symbolized as an Agent of Change

With over six decades of gentrification research, there is still no acceptable or universal definition of the process that is changing the landscape of many cities in the world. When asked about their layman's understanding of gentrification, participants offered a wide range of responses primarily related to (1) demographic change: displacement of minority populations and people of color, increase in young White population (2) physical change: vacancy, style, architecture/taste (3) Affordability: increased tax and rent. Some of the interpretations of perceived gentrification or neighborhood change are given below:

Demographic change. Traditionally, gentrification is measured by the tipping of

the demography of the changing neighborhoods. Most participants highlighted how East

and Southeast Austin neighborhoods lost most of the racial and ethnic minorities, as

observed below in the excerpts.

> Well, I guess it means to me, a loss of the historic black community in the area
> and not so much Hispanic but black community. And a loss of the traditional
> neighborhood that has been here for a long time. I see it as a mixed bag. (P08, 71,
> East Austin)

> Um, so gentrification is when people who have the money go and buy a lot of
> property and buildings in an area that it's probably more undesirable based on
> location or crime, and usually the prices there are really low because nobody wants
> to move there. But then once other people start moving in, the nice things start
> developing their like new grocery stores, new restaurants, new housing. Thus, then,
> more people go there to live, and then these new people kind of kick out the people
> who've already been living there for a really long time by driving up the property
> costs and just making it unaffordable to keep living there. So those people, they
> have to, they're just kind of pushed out of the area. (P03, 26, East Austin)

> My understanding of gentrification is that neighborhoods, established
> neighborhoods, start seeing a lot of vacancies and new people, young people often
> Whites move into predominantly neighborhoods of color, and they begin changing
> the character of the neighborhood, the neighborhood becomes less affordable. So
> those are the kinds of things that I would use to identify what I mean or how I
> interpret gentrification. (P09, 63, East Austin)

Change in the business landscape. Other participants' definition of gentrification

also captures not only change in the residential environment; it also includes the

displacement of longtime businesses serving the old residents.

> I understand it very well. I see gentrification occurs when existing folks get driven
> out because other folks move in and change the characteristics of the neighborhood.
> They make the cost of housing increase dramatically so that folks who have been
> here for a long time can no longer afford to live here, even if they own their own
> property. The property taxes increased dramatically, and sometimes folks can't
> even afford to stay in houses that they already own out. As for businesses, new
> folks coming in want different amenities in their neighborhood than what has
> existed for years. [A]good example would be the new Whole Foods Market that
> was just constructed. What's going away our small mom-and-pop shops, groceries,

Entertainment Venues. Just small businesses, in general, are being pushed out for larger businesses because that's what the new folks want. (P05, 55, East Austin)

Change in taste, structure, and architecture. At least two participants mentioned the change in architectural designs in favor of the new urbanism that brings in new people different from the original residents. For example, a participant lamented about the characteristics of new structures replacing the old ones. Some others also mentioned densification and change in land-use code.

And now, a lot of the new ones that are building our two stories and you can tell they're new and not only because the paint spread and stuff, is that the whole style of them are different you have some that are square box, you have some that have weird shapes on them and so not that I don't mind it being my dad. It's just that here in East Austin, it used to be dominant Hispanic. (P04, 59, East Austin)

Benefits of Gentrification

Urban renewal programs generally are with good intentions; however, it raises the question of inequity. Four-fifth of the participants agreed that gentrification ushers in community services and brings in new businesses that were not formerly available in the neighborhoods undergoing gentrification. Others believed it brings about improvement in both the built and food environments, which have consequences for the resident's wellbeing. While the majority applauded some of the benefits it brings, participants frequently mentioned increased property tax and displacement of minority residents. For example, among those who think that gentrification was beneficial, one participant's discussion covers the key benefits of gentrification to the community.

I think it has been beneficial because a lot of new stores have opened here because of gentrification. I know back in 2008 when I moved here. There weren't that many new stores, and I would say it was like, there were no stores. There was like One Dollar store, and they had just opened some restaurants. But then, there wasn't really anything new. Everything was really old, and then they open the new HEB.

I also think it's really beneficial because, for a long time, people in the area [East Austin] didn't have HEB that was close by, but because that opened, people were able to get like food really easily and just unlike before they were going to like a small Mom and Pop grocery store before or the gas station to get milk or something which is a lot more expensive than going to an HEB. (P03, 26, East Austin)

Moreover, when asked about gentrification's personal benefit, there seem to be several ways people in gentrifying neighborhoods have gained from the process of neighborhood change. For instance, one of the participants said she had benefited "in terms of education and knowledge" about the subject matter (i.e., gentrification). Similarly, others mentioned things like reduced crime, property appreciation, the proximity to services, and increasing access to healthcare due to the centrality of East Austin. In terms of neighborhood improvement, one participant feels gentrification has brought more interest "in sidewalks being created and roads being repaired." The improvements brought by gentrification also have a multiplicative effect on the property. It increases the property value and high return on real estate investment for individuals as well as a source of income for the local government through property taxes. Generally, participants think gentrification "probably done more harm than good in terms of families who owned the property for generations"(P07). As mentioned by an African American woman who participated in the online interviewed:

I'm living in a house I paid $80,000 for that it is now worth $400,000, and that is good for me in terms of, you know, if I want to sell. Now property values keep going up at some point, it may be difficult for me to keep up the property taxes, but right now, I am at the point where it has been beneficial. (P07, 68, East Austin)

Environmental Concerns

Environmental concern was another important theme that emerged inductively from the in-depth interviews. Some of the prominent topics include air pollution, tree removal, urban health island, overcrowding, parking space, increased traffic, and environmental hazards from erecting structures directly or close to oil and gas pipelines. A 59-year-old Hispanic woman who had lived in her current home for 22 years attributed neighborhood pollution to traffic and increased human population-induced by gentrification. Similarly, another longtime resident repeatedly referred to poor access to parking space as a big concern due to the increasing number of restaurants popping up in a formerly residential neighborhood. Her current home, which they moved into in 1952, was passed down after both parents died. The house symbolizes the only family tie they have in East Austin. The house is where the remainder of the children (siblings) and grandchildren gather for festivities. The 59-year-old woman also mentioned that her older "neighbors to the left" of her house also often worry about parking space and the noise pollution emanating from the restaurants and other public places in East Austin neighborhoods.

> They [respondent's neighbor] do not also understand how the businesses are just popping up everywhere, and there is no parking, and when her family comes over, and her family is a lot smaller than mine. They have no place to park either, and I know she is worried about the same things I do. (P04, 59, East Austin)

The interviews also brought out environmental degradation issues in terms of urban tree removal. Tree removal, particularly in the urban inner-cities, is attributed to Urban Health Island (UHI) and a host of health impacts, including skin cancer, which I present in detail in the next heading below. Additionally, one of the participants

mentioned how the city government is forcefully taking over green parks, rezoning them

for residence or business purposes.

> There is an area over here near me that is known as the little Pecan Grooves because it is deep lots all together and it has all been planted with the country's, and there's been a fight between the city that wants to build on some of those lots and neighborhood that wants to preserve the Pecan Grooves. (P09, 70, East Austin)

Health Impact of Gentrification

In-depth interviews permitted a more detailed understanding of the question

related to the relationship between environmental change and health in the study area.

Figure 23 indicates the pattern of words related to stress, mental, and physical health

among each participant. For example, participants 3 and 8 seem to refer to stress a lot

compared to other participants. Meanwhile, participants 5 and 7 frequently referenced

mental and physical health more than others. Figure 24 shows the frequently mentioned

keywords under the health discussion. The WordCloud did not only capture the physical

and mental health; it also shows the participants' emotions and feelings. As reflected in

the above quote, the change in the social and physical landscape in East Austin seems to

be a legitimate concern of longtime and older populations in East Austin. When asked

whether gentrification could pose any physical or mental health, many participants gave

examples of how gentrification could contribute to psychological/mental stress that can

eventually lead to physiological health symptoms. For example, a 59-year-old woman

described how the process of gentrification could affect residents' health:

> I would say, yeah, because like I said in the last question is worrying about what is going to happen. What happened if I get sick, day or night? How am I going to pay for the property taxes to pay for this and that? How am I going to fix it at home? So, I think it has caused some stress mentally more than physically, but when it causes you stress mentally, it eventually ends up hurting you physically. (P04, 59, East Austin)

Another participant also mentioned that gentrification leads to the removal of urban green spaces and trees, which could increase stress and, in turn, affect residents' physical and mental health; this assertion supports another participant's view on the possible effect of gentrification on residents' health.

> Well, like I said, if trees are removed, then that makes the air quality go down, and then it makes it hotter. So that is stress, that is a health risk. Also, I've had some skin cancer. So, I mean, the last thing I want is less shade; I want more shade because I spent a lot of time outdoors. I think definitely it [the urban tree] is better for the mental health of the residents in the areas to maintain their little pocket parks. (P09, 70, East Austin)
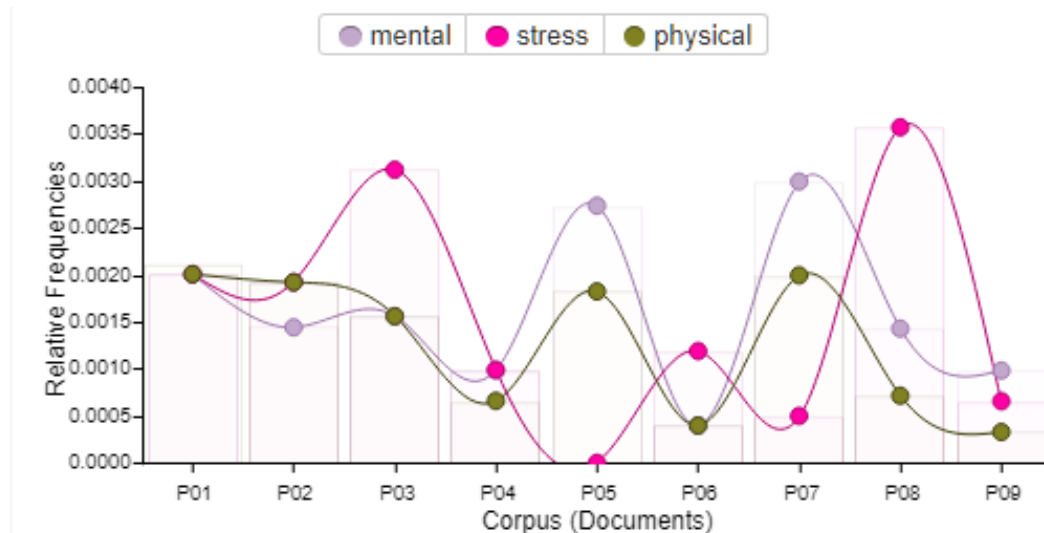

Figure 23. The Frequency of Mentioning Mental, Stress, and Physical Health.

Figure 24. The Frequency of Health-Related Words Used by Participants in the Interview.

Contrary to the other participants who suggest that gentrification could negatively impact residents' health, one resident highlighted some ways that gentrification can and has improved the residents' health:

> I see gentrification as bringing some positive things to a community. It has also brought more interest in healthcare to the community. We have more health clinics; we have more family Physicians in the area. It has brought health care, which I think helps people be, in the long term, healthier, and so, in that way, I think gentrification has been a positive thing for healthcare. (P08, 71, East Austin)

Figure 25 provides a visualization of text relationships (Health + text) from multiple participants. Specifically, the visualization shows how participants tried to

describe their physical and mental health, clustered from their own words. As seen in the word tree, participants variedly rated their physical and mental health between six and nine. Against the argument that gentrification improves residents' quality of life, one participant submitted that "gentrification is not improving my health" (P05), while the older participants think they have better mental health conditions.

Following the conversation about the possible impact of gentrification on health, some were clear that the relationship is possible and gave several insights into how. The majority of the participants think that spending on high rent or saving to pay for exorbitant property taxes could take a toll on other aspects of life, such as being unable to pay medical bills, buy medication, and afford healthy foods. The situation is more likely to impact older residents who depend on fixed incomes from Social Security Benefits or meager pensions. Participants also expressed mixed feelings about the health implication of gentrification. A young Asian American who has lived in East Austin all her life quipped that:

> I think it is because it is so expensive to pay rent, and it keeps on getting more and more expensive. And so, if you only have like $500 or $1,000 for your whole month and you have to keep on paying increased rent, then you have a lot less left over at the end to pay, things like medical bills and healthy foods and medication.

Another participant quipped:

> I think it does not cause me any stress, but maybe it should cause me stress because I think there are a lot of negative things about gentrification. It impacts many people trying to live here and have lived here for a really long time, so it is probably causing them a lot of stress. So, I feel like maybe I should be stressed out because I'm probably contributing to gentrification as well. So maybe I think it should cause me stress, but really is it really causing me stress? For me, posing health risks…I don't think it's posing any health risks to me, but probably to other people. (P03, 26, East Austin)
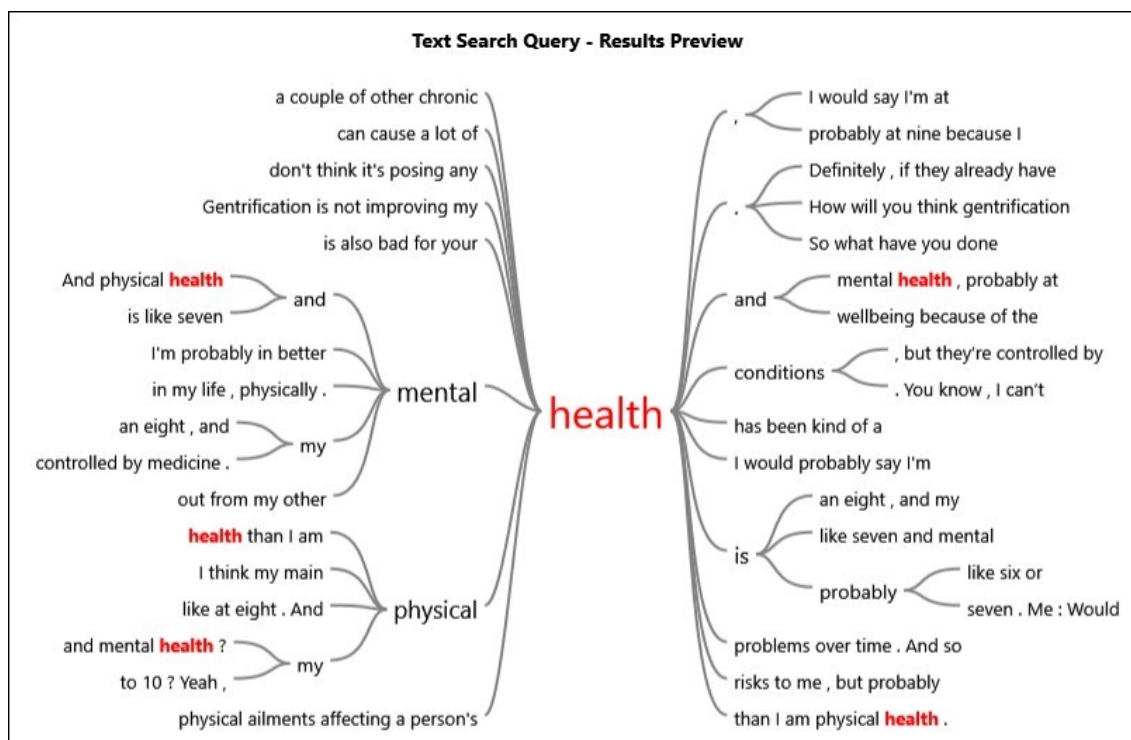
Figure 25. Word Tree of Health-Related Word Used by Participants During the Interview.

Fairness and Inclusive Governance

Participants also expressed disappoints and a sense of social injustice. These include mentions about fairness and inclusiveness in the city government decisions that directly or indirectly affect East Austin residents.

> I've always had a sense that all of us did not do enough, and probably the other agency, the city of Austin in terms of some of its work to bring in new housing and new development and a lot of that was done without the engagement of the people living in the neighborhoods. (P07, 68, East Austin)

Another participant also raised a similar opinion about fair governance, inclusive governance, and citizens' wellbeing. The in-depth interviews also revealed a lack of trust in the government.

> It was very, very frustrating because it was set up in such a way so that you could ask questions and they would say, well, you need to direct your question to here, but they never answered any questions that people came in with. They just said

thank you for having questions. Why don't you take them there? But they did not answer anybody's questions. So, it felt like it was pointless.

So, a lot of times when they have these kinds of events, you get people to come out and talk, you know if you want to contribute because you want to give your input, but then you find out that nobody really wanted your input; they just wanted to act like they want your input because that already decided. It was all just a show. Yes, it was a show. It was shallow. There was never any plan to look at any of that. (P09, 70, East Austin)

Themes regarding whether gentrification was intentional or not were also mentioned among the participants. A participant opined that the process of gentrification in East Austin was intentionally planned against the low-income longtime residents and their families, while others thought otherwise:

I think so because I feel like the local government they do want to attract more people to come to live in Austin because that boosts the local economy. So by making places more attractive to people from out outside of Texas or outside of Austin; for example, increasing the amount of housing and things like that and making little neighborhoods and making new restaurants and a lot of like new housing for new people in Austin. I think that's what they're doing to increase the likelihood that someone will move to Austin. So, to do that, they need space and land. And so I feel like they see East Austin as a lot of undeveloped space that they can use to attract other people to come live there. And so to do that, I feel like they have to buy up a lot of property. To develop the land so that they can boost the economy. (P03, 26, East Austin)

Contrary to the above opinion, another participant's reflection indicated that the city government might have genuine intentions toward neighborhood improvement but felt like there is a mismatch in the urban renewal policies' purpose and outcome.

I think between the taxes and the city wanting to make improvements, and they may have had good intentions, but you have to involve the people in the neighborhoods. You know they [old residents] were there first; you don't just push people out and ask questions later. (P07, 68, East Austin)

Social Capital and Strategies for Resisting Gentrification

Community participation and social capital: Increased community involvement/ participation is expected to increase social capital. Virtually every participant indicated that they have previously been involved in one community or neighborhood organization—formal or informal. The majority of them had served in a position toward the common goal. Some had a direct relationship with the city police department or served on the city board at a point in time. One participant mentioned being part of a neighborhood watch, a form of informal social control, due to neighborhood security issues.

> I'm not anything formal. We at one time in the neighborhood had had various means in regards to, like, neighborhood watch programs, just because we were having some issues, but that's been a good number of years. We still, of course, communicate with some of those neighbors who are adjacent to us. And but I'm not really, again, it's not a formal organization or association, and it's our little powerhouse that we did have once we were having issues, and they've pretty much ended. (P02, 49, Southeast Austin)

Participants also raised concerns about eroding social capital due to gentrification and the displacement of the minority population in East Austin. Despite acknowledging increased diversity, participants had a sense of loss in neighborhood activism compared to when the neighborhoods were less diverse.

> Well, just a lot of the history has been erased from the neighborhood due to gentrification. We don't have a lot of things and activities that we used to have when there was more of African American people. (P06, 35, East Austin)

> It [gentrification] also has changed the overall character of the neighborhood in that it's less friendly and less active as a neighborhood than it used to be… There's not a whole lot of interest or not nearly as much interest in the neighborhood as a neighborhood than there used to be. And I say that because I used to be very involved in the neighborhood association, and it was very active, and now it's not. So, I think it's because younger people are moving in who aren't as interested in a neighborhood as a whole. Some of that activism is gone. (P08, 71, East Austin)

Though not directly related to the interest of this study, participants suggest that weak capital has implications for disease spread at the neighborhood level because some of the recent residents are carefree and have no regard for other residents. A participant mentioned that younger people do not use masks frequently, which can elevate the risk of COVID-19 among older residents: "In terms of health risks, young people who don't wear masks are a source of health risk."

Coping mechanism. A frequently expressed ways in which residents in East Austin resist or have been able to remain in their neighborhood is through employment, partial or full. Even those who are already retired still find something to do to keep up with their bills and taxes. Only three out of the nine people I interviewed were actively employed full-time. Those who intend to remain in the neighborhood emphasized income or budget management as a strategy to resist being displaced.

> I've always been full-time employed. If anything, I've always maintained additional employment. Same for my husband. So, I don't think that we've ever thus far have felt the need to have an increased income or make changes. We have made changes in regards to improvements to our home, just because whether it's needed or we see things that we would like to improve upon, perhaps not necessary, but just because of our functionality. So, I kind of think that when we make those improvements to our home, it kind of anchors us more so here because we're investing in our home. (P02, 49, Southeast Austin)

> My husband works full time, and I have, you know, several sources of income, and I think that is going to be crucial to being able to stay here long term. We cannot just rely on just our income; we constantly have to be looking for new revenue streams to make sure over a long time that we can maintain the property taxes and all the other things that come from homeownership without being a burden on our children. So, I think that is key, just the realization that as long as we can work, we will probably need to work. (P07, 68, East Austin)

> Well, we're both on Social Security. So, we had long careers of working. And so we're careful about how we spend our money. But we're lucky that we're able to take care of our bills and haven't been pressed with the increasing taxes, although

it makes us upset about having to pay them. Um, but, but we really haven't had to make a lot of changes to remain in the neighborhood because of our financial situation. (P08, 71, East Austin)

Resisting gentrification. The majority of the participants had never done anything politically to resist gentrification. Two participants had previously engaged in community activism to resist gentrification through various means, including joining the urban renewal board, write about it in a local newspaper, or serve on community organizations/associations. Some voluntarily attended city meetings to be informed about the new zoning development that might impact them and other East Austin matters. Specifically, one of the participants mentioned that she sometimes attended 'open-to-the-public' city meetings to understand the city government's urban development plans and had protested against some of the city government's decisions, such as allowing developers to buy and put high rising structures in the middle of single-family buildings. Another participant evoked a similar idea that there are occasions that they prevented bringing in Porn store into the residential neighborhood.

> Well, for two years, I was on the city urban renewal board, and that was the board that is in charge of making decisions about how East Austin, particularly East 12th street now, is to be developed, and so I did that, you know, sort of advocacy work for two years. Well, I guess one thing I did years ago I was an editorial writer and columnist for the Austin newspaper, and I used to write quite a bit against gentrification and other things that I saw going on in East Austin. (P07, 68, East Austin)

Other participants with a different opinion think that gentrification is bound to happen anywhere and think it should not be resisted. One participant quipped that:

> I feel like every city there's going to be gentrification, and I think that's probably just how it works— as a population increases people, like for example, people who live in California, their rent or it's not very affordable to live there. So, they come to Austin, and they see like, oh, like the dollar we have can buy so much here and

so they go to somewhere where the property is cheap, and then they buy it. (P03, 26, East Austin)

Discussion and Conclusion

This section of the research aimed to qualitatively explore the meaning, concerns, residents' perception of neighborhood gentrification's effect on health, and strategies or coping mechanisms adopted by residents in the gentrifying environments to weather the effects of gentrification. In doing so, it took a deductive-inductive approach to probe the association between neighborhood effect and health. Theoretically, this research combined subculturalist, ecological with political ecology, and interpretative approaches to explore residents' perspectives of neighborhood change and focus on the meanings, concerns, and strategies to resist the impact of gentrification. The use of a theoretically informed participatory approach created avenues to explore various challenges faced by residents in gentrifying neighborhood environments as well as the quality of social capital and well-being among residents. This study explored concepts of social capital through residents' community participation/engagement, community activism, and informal social control from the subculturalist theoretical perspective. The approach helped advance a more reliable presentation and understanding of people's experiences in gentrifying urban neighborhoods other than mere quantification of data.

Despite no agreed definition of gentrification, it is undoubtedly a global topical discussion among scholars and the media (Brown-Saracino 2013; Lavy, Dascher, and Hagelman 2016). The descriptions or definitions the participants ascribed to neighborhood change were rooted in individualistic opinions socially and contextually dependent but consistent with academic definitions of gentrification: demographic, economic, structural, and cultural changes (Lees 1994; Brown-Saracino 2013). This

implies gentrification has become a community discourse among city dwellers and has a deeper or grassroots understanding and meaning as perceived at the macrolevels—national or global (Lees, Shin, and López-Morales 2016).

Whether termed as a strategy for rebuilding the city or transforming decaying neighborhoods, it was agreed among scholars that gentrification exemplifies unequal power between the 'haves' (gentry, developers) and the 'have not' (minority, working-class) (M. Klingle 2006; N. Smith 2008b). Based on the participants' understanding of neighborhood change, several references were coded from the in-depth interviews regarding the collective meaning of gentrification. From participants' descriptions, it emerged that gentrification symbolizes *power*—political, financial, or resource. Participants also perceived minority neighborhoods as a land of opportunity as well as a 'marketplace' (Zukin 2010). People, companies, or individuals with floating capital invest in areas where land and property has been devalued and where neighborhoods have once been "undesirable" to live for people who later find them habitable when the physical characteristics are reversed (Grifith 1996, 241). Inner-city that undergo gentrification are initially undesirable places to live for most middle- and high-income groups; with increasing demand for urban space, the proximity of inner-city land makes them irresistible for urban pioneers (Ley 1994). Neighborhood neglects[27] usually predate urban restructuring or urban renewal. Additionally, proximity to the city's economic hub and technological expansion contribute to neighborhood overturn in East Austin.

Almost all the participants perceived gentrification as a social agent that causes displacement of longtime homeowners and increases livelihood costs (e.g., housing and

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[27] Neglected neighborhoods are usually occupied by longtime working-class minorities.

bills). Participant's descriptions also capture investment opportunities (Freeman 2005) or the rent gap (N. Smith 1987) in inner-city neighborhoods due to structural inequality. The elements of their description of gentrification aligned with existing academic definitions, highlighting gentrification as a process of 'succession and displacement' described by Lance Freeman (Freeman 2005; Freeman and Cai 2015). Irrespective of the definition, the meaning and symbolism are consistent.

Another important theme that manifested from the interview was structural inequality. Structural inequality prepares the ground for future gentrification (Alkon and Cadji 2020). Hence, there seems to be an emerging consensus among participants denoting gentrification as an agent of change that raises concerns about inequality and displacement. Like other environmental issues, gentrification is usually located where people have the least political power. It is important to note that the meaning of neighborhood change was not hampered by race/ethnicity, age, or duration of residence. All participants, irrespective of social identity, were neutral about their perception of structural inequality, such as displacement of people of color or minority from their long-lived neighborhoods. All the participants agreed that the minority population is most affected.

Consistent with the literature on the advantages and disadvantages of gentrification, most participants agreed that gentrification improves the general physical and social environments. The most frequently mentioned benefit was improved food environment, business, and other services. Particularly, the increased presence of restaurants in previously minority neighborhoods is synonymous with gentrification or cultural change. Several participants identified restaurants and high-end café as a

noticeable change to their neighborhoods over the former traditional restaurants that once served the Black and Hispanic populations. The increasing penetration of restaurants implies "whiteness" in most urban places experiencing gentrification and signals increased development (Alkon and Cadji 2020).

Participants also acknowledged that the process of gentrification brings attention to the physical environment in terms of basic amenities that could improve well-being, such as sidewalks, healthcare services, and reduced crime. Scholars have argued that urban neighborhoods' revitalization causes changes in well-being among disadvantaged neighborhoods (Vigdor, Massey, and Rivlin 2002; Brummet and Reed 2019). A fundamental tenet of urban renewal programs is to enhance social integration, increase economic opportunity, and racial diversity among longtime inhabitants of regenerated neighborhoods alongside the improvement of physical infrastructure and economic growth, mostly through development centers (Mehdipanah et al. 2018).

Participants raised several other concerns; chief among them was increasing tax, which generally characterizes gentrification. Consistent with the process of gentrification on neighborhood environment at the city level (Anguelovski, Triguero-Mas, et al. 2019; Anguelovski, Connolly, Garcia-Lamarca, et al. 2019), participants were also concerned about neighborhood population density, traffic, parking space, urban tree removal, and green space. On the one hand, urban green space has been demonstrated to benefit human health. Counterintuitively, urban densification implies increasing concretization while reducing green spaces. Studies have shown that gentrification removes urban trees that are supposed to regulate urban heat waves. Inductively, it emerged in this study that gentrified neighborhoods in East Austin have lesser trees. Participants in the IDIs

lamented about the impact of gentrification on the removal of neighborhood trees, parks, and the green areas being replaced by condos and multiplex.

Trees are an important environmental indicator used to measure several things because they provide health, ecosystem, and aesthetic services. However, they are unevenly distributed, especially within the urbanized environment. Arial footage of East Austin in Figure 26 confirms this disparity. A more apparent lack of green space/trees can be seen between E. Cesar Chavez Street and E. 7th Street. Neighborhoods in Figure 26 are essentially residential, but this area now mimics downtown in the Westside of East Austin. One could conclude that there is a form of the annexation of Westside. Resident perception of a reduction in urban green spaces due to residential gentrification speaks to the existing literature on environmental gentrification. Green gentrification researchers (Alkon and Cadji 2020; Anguelovski, Connolly, Garcia-Lamarca, et al. 2019) suggest urban green projects as part of political ecology mechanism for transforming urban landscapes and attract affluent white residents into once traditional minority neighborhoods. According to Alkon and Cadji (2020), green gentrification is a" racialized process" of urban redevelopment. However, in East and Southeast Austin, tree removal has become part of a "de-green gentrification," during which a similar racialized process of urban redevelopment occurred. Hence, geographical and regional variances will result in differences in how gentrification occurs.
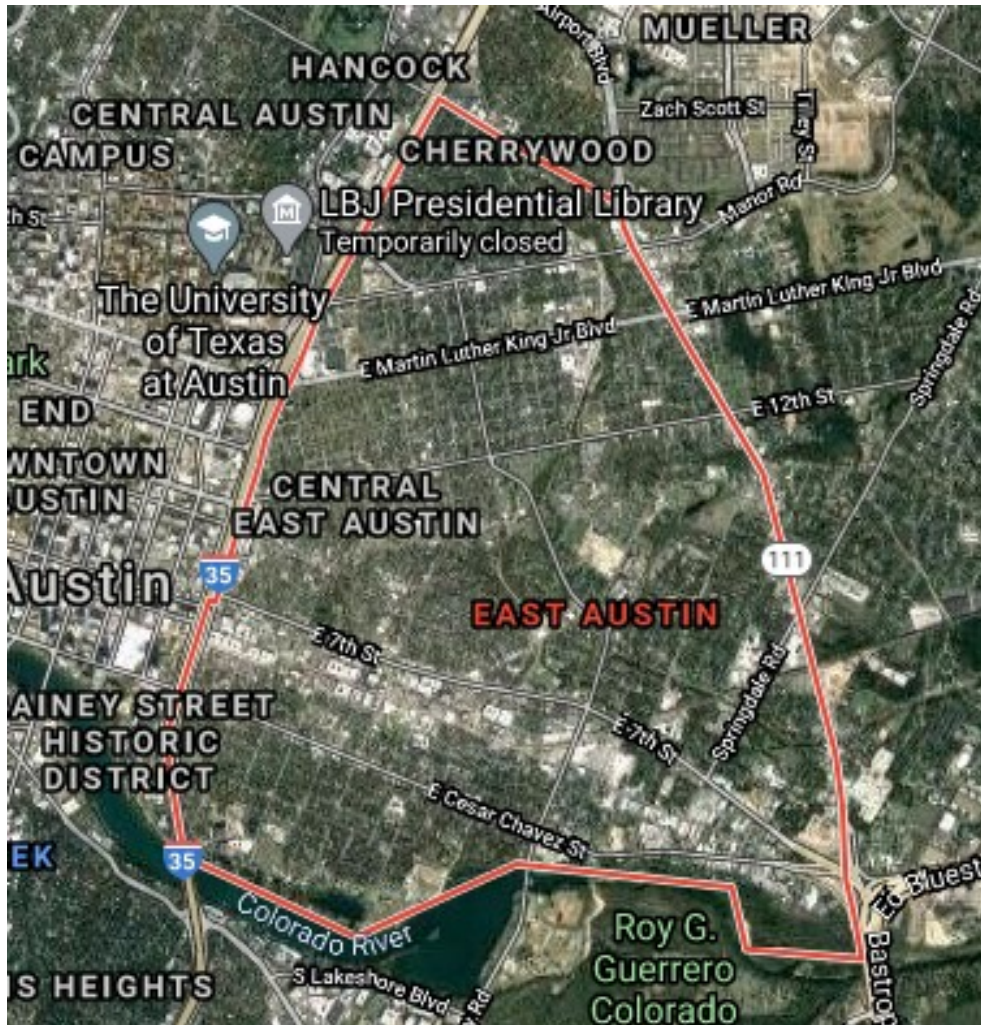
Figure 26. East Austin Showing Areas with Less Green Space Prominent Between E. Cesar Chavez Street and E. 7th Street Similar to Downtown.

There was also no conclusive evidence to support whether gentrification improves residents' financial well-being or household income through employment in this study (Vigdor, Massey, and Rivlin 2002). For example, one participant mentioned that most companies relocated to Austin do not employ the 'local residents' because they bring their employees to Austin. These employees are mostly housed in East Austin, and they are at a higher negotiating end than the low-income residents. This notion has been previously raised by Wilder et al. (2017, 2), who opined that "the introduction of new services and amenities that are outside of the financial buying power of long-term

195

residents can cause resentment." Another participant acknowledged that it brings employment opportunities to the neighborhood. For instance, one participant mentioned that she hardly patronized some new businesses or restaurants coming to the neighborhood. It is expected that the proximity to economic growth and technological expansion should increase opportunities for longtime minority residents without resentment.

Overall, the majority of the participants stated ways gentrification could impact health. However, all the participants mentioned that displacement and increasing property tax could be a source of stress to longtime residents, particularly the older residents. Several studies have identified gentrification as a major source of stress. In a study conducted in New York City, Shmool, Yonas, and Newman (2015) reported residents' perception of neighborhood stress based on focus group discussion among members of different communities. Gentrification was identified as a mechanism that displaces individuals and long-term community structures and a strategy for reinforcing discrimination and racism (Shmool et al. 2015). Similarly, Wilder et al. (2017, 2) asserted that "the consequence of the process of gentrification includes the social exclusion of those who remain in gentrified neighborhoods, neighborhood segregation, and worsened health inequalities."

Another significant theme encountered during the interview was the lack of inclusion of residents in decision-making on city agendas that directly impacted them. Some participants also expressed their feeling concerning the city council's (re)actions toward citizens' involvement in decision-making that directly affects them. They lamented that the city government cares less about the residents' needs, feelings, opinions

and that their concerns are less important. Residents feel that most of the city and community meetings "are all for the show." Therefore, the lack of resident inclusion in the city's development plans seems to have frustrated residents' efforts in resisting gentrification. While the longtime residents in East Austin seem to be concerned about aging in place and struggling to survive the impact of urban renewal policies, the city government may be concerned about the benefit gentrification brings to the city in terms of economic improvements.

Evidence of social capital 'erosion' emerged among residents in gentrifying neighborhoods in this study. Studies have shown that disadvantaged neighborhoods are more likely to have weak social cohesion, and community members are less likely to be committed (Emch, Root, and Carrel 2017). Although many of the participants have previously been involved in community development, residents' commitment toward community social efficacy seems weak (Steinmetz-Wood et al. 2017). For example, some participants mentioned that they have become less involved in community matters more recently than some years ago. The weak community participation/involvement could be attributed to the rapid removal of longtime residents being replaced with young, middle- and high-income residents who may have different interests compared to the interest of longtime residents.

The most strategy adopted by residents in resisting displacement was the knowledge of 'Budgeting and Financial Planning.' The majority agreed that employment and the ability to pay property taxes had been their common coping mechanism. This resounds the importance of social welfare support for longtime residents, especially the elderly on a fixed income.

Even though this chapter's purpose was not to quantify, establish, or make a generalization about the direct impact of gentrification on health, it aimed to strengthen and give support to the quantitative arm of this research. This qualitative research limitation is the relatively small sample size of participants and female-dominated voices in the in-depth interview. Nevertheless, the small sample and the rootedness in settings allowed flexibility in managing the participants. It also enhanced a deeper understanding of people's opinions about the impact of gentrification even though the knowledge might not be generalizable to other contexts; however, the same approach is reproducible. The purposive/convenience sampling technique adopted in selecting participants was to ensure the study captures different voices and opinions from different local contexts (East vs. Southeast Austin; young adult vs. middle-aged adult vs. elderly). This approach complements the previous three chapters based on a quantitative research approach. The second fundamental limitation of the qualitative approach was that all participants were female.

In summary, this study found that East and Southeast Austin residents perceived gentrification as an agent of change— positively and negatively. Based on an in-depth qualitative approach, this study allowed for a deeper understanding of feelings, opinions, concerns, and disappointments expressed by residents in East and Southeast Austin. Policymakers can take several simple but committed steps toward reducing urban renewal policies' impact on the residents. It emerged that the longtime residents' economic empowerment would be a viable strategy to limit the effect of gentrification, including psychological stress and displacement. Even though the purpose of this part of the research was not to quantify, establish, or make a generalization about the direct

impact of gentrification on health, it strengthens and supports the quantitative arm of

gentrification research. Information from in-depth interviews can enable local

government and policymakers to improve citizens' health and wellbeing, especially those

facing uncertainties due to government urban renewal policies. Thus, identifying how

urban renewal policies can 'get under the skin' of the residents will help guide the design,

implementation, and evaluation of such policies. Notably, a place-based approach can

empower local communities and further identify important problems that may be

obscured using quantitative or structured survey designs. One clear thing that seems to be

ignored in urban renewal projects focuses on revitalizing the physical and the built

environments, but the people are largely ignored. To fully attain urban renewal without

displacement, people's lives should be revitalized to reach the city's sustainability goals.

IX. CONCLUSIONS

Introduction

This research investigates the potential impact of gentrification on residents' health in East and Southeast Austin based on a mixed-method research approach. The study's overarching aim was subdivided into two objectives. First, I quantitatively examined the probable effect of gentrification on residents' subjective and objective measures of health. The subjective measure of health includes self-rated health and chronic health conditions, while the objective measure of health examines some symptoms of mental health, including depression, anxiety, and stress. Second, I qualitatively explore the meaning, concerns, coping strategies adopted by residents in the gentrifying environments to weather the effects of gentrification and perception of residents about the possible effect of gentrification on health. To achieve these objectives, I employed structured questionnaires to elicit residents' awareness of the physical, social, and cultural changes, health conditions, and access to socio-economic resources in their neighborhood and interviewed a few residents to gain a subjective perception of their feelings of the effect of neighborhood condition and health.

Summary of Findings

This section of the dissertation gives a summary of the findings. Chapters Five, Six, and Seven in this document present the findings of the first objective, and Chapter Eight presents the result supporting the second research objective stated above.

Chapter Five explored the social and structural determinants of self-rated health—overall, mental and physical—through the lens of social determinants of health. Self-rated health is a grounded measure of subjective wellbeing among a population in

epidemiologic and public health research. Compared to self-rated physical health, research on self-rated health is generally limited due to its subjective measure of psychological status (Fleishman and Zuvekas 2007). Nonetheless, several studies have cross-examined self-rated health with chronic health conditions, functional decline, disability, mortality, and perceived social support (Y. Lee 2000; Benyamini et al. 2003; Levinson and Kaplan 2014; Perruccio et al. 2011; Benyamini et al. 2003; Galenkamp et al. 2013; Caetano, Silva, and Vettore 2013). In my study, I show that perceived gentrification among community members reduced the report of high self-rated mental health but increased the report for self-rated physical health and general health. Longtime residents reported lower self-rated general and physical health compared to recent residents. In contrast, longtime residents surprisingly reported higher self-rated mental health than recent residents. Similarly, older residents in gentrifying neighborhoods rated their mental health higher than middle-aged residents. I also found that the three types of self-rated health significantly varied by socioeconomic status (e.g., educational attainment), but I did not find any significant difference by race/ethnicity. Further observation indicates that access to socioeconomic resources mediates the association between gentrification and self-rated health. These results, therefore, were supported by the social determinants of health framework.

Chapter Six used a triangulation method including univariate, bivariate correlation, and multiple linear regression implemented through the structural equation model to examine the complex pathways to three health outcomes—measured stress, self-rated mental health, and depression symptoms. Bivariate Pearson's correlation indicated a significant positive association between gentrification scores and mental health

symptoms and stress. However, the direct association between gentrification and depression disappeared in the causal/path model. In support of the weathering hypothesis, I found that objectively measured stress was directly related to symptoms of depression among residents in my study area. Therefore, this research builds on the accumulating evidence of environmental stress and mental health in the US's rapidly changing physical and sociocultural environment. Hence, implementing and guaranteeing social equity of resources will improve residents' health and reduce the cost of health care spending at both the household level and the city government level.

Chapter Seven investigates chronic health conditions, an index created from a list of chronic health conditions based on yes or no responses. I collated all the to form a count variable. The chapter draws on the social determinants of health framework and life course theory (SDOH-LCT) to explain chronic health conditions reports. The study employed non-linear techniques suitable for Poisson distribution to estimate the association between gentrification and reports of chronic health conditions. First, I found a significant positive association between the index of gentrification and chronic health condition in all three probability models—Poisson, Negative Binomial (default), and Negative Binomial estimated with maximum likelihood (NB-MLE). Second, there was a significant positive association between historical childhood health and chronic health conditions supporting the life course theory. An additional investigation based on mediation analysis to explore the indirect effect of gentrification through access to socioeconomic resources and historical health conditions explained 54 percent and 11 percent variation in the report of chronic health conditions, respectively. Based on the empirical findings, I recommend both area-based and individual-level policies to

mitigate neighborhood change's impact on residents' health. Finally, the chapter contributes to understanding social determinants of health in understanding chronic health within the changing urban physical and social-ecological systems.

Chapter Eight draws from political ecology, subculturalist, and ecological frameworks to qualitatively explore the perceived impact of gentrification on residents' health and well-being using key informant interviews and in-depth interviews. Several themes related to environmental stress and weak neighborhood interest emerged deductively, while other themes emerged inductively. Regarding the perspective of gentrification on health, many participants discussed how gentrification could contribute to psychological/mental stress that could eventually lead to physiological health symptoms. Increased community involvement/ participation is expected to increase social capital. Virtually every participant indicated that they had previously been involved in one community or neighborhood organization—formal or informal. Yet, participants raised concerns about eroding social capital due to gentrification and the displacement of the minority population in East Austin. Despite acknowledging increased diversity, participants had a sense of loss in neighborhood activism compared to when the neighborhoods were less diverse. A frequently expressed ways in which residents resist or have been able to remain in their neighborhood was through employment—partial or full. The majority of the participants had never done anything politically to resist gentrification.

Limitations and Future Research

One of the challenges of quantitative research based on cross-sectional research design is the inability to infer causation. For example, I was only able to examine self-

rated health, mental health symptoms (e.g., depression, anxiety, stress), and chronic

health conditions at a point in time, making it difficult to establish causation. This is an

important limitation for interpreting these results. Particularly, this study could not

control other sources of stress, health risk, and the latent period effect of gentrification,

which might also confound the observed associations. The effect of gentrification as an

environmental stressor, taken at a single point in time, may be concealed during this

study because this effect needs to be studied and followed over a more extended period.

However, the latent effect of gentrification was partially controlled based on the duration

of residence. This limitation was particularly discussed in each of the result chapters. For

example, Chapter Six, which examined the determinants of mental health symptoms,

found that stress was a significant predictor of depression. Hence, longitudinal data is

necessary to control historical exposure to stress from various sources such as living

environment, work, and familial or marital relationships.

Furthermore, cross-sectional suffer from recall bias, which may affect

participants' responses. For example, asking participants about their historical health may

introduce recall bias in this study by omitting important information that may have

occurred while the respondents were very much younger and could not possibly

remember. Aging is an important factor causing recall bias as a result of memory loss. In

fact, one of the participants mentioned that her acuity has drastically reduced. In addition,

research has shown that people who experienced adverse childhood may likely misreport

past experience due to previous trauma(Raphael 1987). Lastly, studies that have tested

the self-rated tool's reliability based on the test-retest technique indicated that the

measure could be highly unstable among people in low socioeconomic positions (Zajacova and Dowd 2011).

Nevertheless, my research acknowledges some of these limitations, and I do not intend to answer the question of causality here. Instead, I intend to provide additional evidence that the relationship between gentrification and the three aspects of health exists, with the potential to build upon the methods utilized here to begin to address causality in my future research. The knowledge I have gained through this study will help me to forge into future research in conducting a similar but more robust study on the likely impact of neighborhood and environment and health. Public health practitioners are always trying to establish causality in neighborhood research, and research investigating the relationship between gentrification and health is still in its infancy. My research contributes explicitly to this bulging research area. To further address the limitation of the cross-sectional design adopted in this study, experimental research design will be appropriate, though more time consuming and economically costly.

An additional limitation is the convenience sampling techniques, a nonprobability approach used in this study, which may not guarantee the representativeness of residents impacted by the process of gentrification. However, the effort was made to mitigate this limitation in this research by developing survey weight based on the ratio of the proportion of race and ethnic groups at the zip code level and the proportion of the race and ethnic groups who participated in the study.

It is important to recognize the significant impact of the COVID-19 pandemic on the entire research, particularly the aspect of mental health. Several studies reported the psychological impact of the COVID-19 pandemic on people across the globe (Serafini et

205

al. 2020; Xiong et al. 2020; Holingue et al. 2020). Conducting this dissertation research during this time may undeniably, have contributed to how participants responded to some of the questionnaires for the measure and analysis of mental health in the study. Thus, the results should be interpreted, bearing the implication of the pandemic on general health in mind.

Some of the limitations mentioned above about the study's quantitative arm also apply to this dissertation's qualitative aspect. For example, the sample of participants in the in-depth interview was relatively small and were female-dominated voices. Nonetheless, the small sample and the rootedness in settings allowed flexibility in managing the participants helped gained insight into what might exists in a larger sample. This challenge creates a future opportunity for me to continue investigating this topic in a relatively larger audience, depending on the availability of research grants. In addition, it also enhanced a deeper understanding of people's opinions about the impact of gentrification even though the knowledge might not be generalizable to other contexts; however, the same approach is reproducible. The purposive/convenience sampling technique adopted in selecting participants was to ensure the study captures different voices and opinions from different local contexts (East vs. Southeast Austin; young adult vs. middle-aged adult vs. elderly).

This study used a subjective measure of gentrification, which makes it convenient to explore some of the gentrification outcomes to quantify gentrification and examine its impact on health. Moving forward, I intend to continue to expand this research in other settings (1) to validate the items used in this study for a subjective measure of gentrification instead of using secondary data such as Census data to operationalized

gentrification, (2) to be able to compare and contrast how contextual and compositional factors are likely to influence residents' perception of gentrification in different locations, and (3) to continue to explore the impact of gentrification on successful aging closely as it emerged in the in-depth interview for men and women in the US and elsewhere.

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Potential Policy Implications

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This study has several potential policy implications in line with some of the existing studies and filled critical gaps in the literature. The study is probably the only and current research that attempted to assess gentrification's health impact based on the perception of residents in the communities experiencing neighborhood change or gentrification in Austin, Texas. The results show that improved access to social and economic supports will bridge the inequality among residents in East and Southeast Austin, leading to better health and well-being.

Mental Health Intervention and Screening

It is also essential to consider residents' sociodemographic characteristics while planning for mental health interventions among residents, as addressed in Chapter Seven. This study also demonstrated that Black residents and those with low-level of education have poorer self-rated physical health. It is crucial to continue to examine the health of longtime residents, which will help provide mental health support for them, particularly the older population. This is because cross-sectional data may not capture the effect of gentrification on their health within a short time. To empirically establish whether gentrification continuously affects residents' health in these neighborhoods, there is a need for longitudinal data collection. Hence, collecting health data on people living in

gentrifying neighborhoods should be considered in Austin, along with the changing physical environment.

Aging in Place

This research also has significant implications for community planning that can foster successful aging in place (R. J. Smith, Lehning, and Kim 2018). Gentrification is a strategy for improving part of the city undergoing depreciation. Not only should gentrification be targeted at improving the physical environment, but it should also be aimed at improving the well-being of the residents. However, there have been negative outcomes of urban renewal policies that end up displacing longtime residents. This study found that older adults are more likely to be impacted than younger residents, and they are constantly worried about being displaced and paying for bills. Fostering high social capital and economic empowerment programs in communities undergoing rapid neighborhood change such as East Austin will help reduce the stress from gentrification, particularly for longtime residents (unless gentrification is intended to uproot the longtime residents).

Intentional Planning

Also, intentional community planning that involves the people and increasing social welfare can help mitigate the negative effects of urban revitalization that push people out. Based on the interview with the longtime residents, the City of Austin needs to consider the implication of the current taxing system based on the citywide taxation system. Instead, property taxes should be estimated based on an individual's evaluation— each property should be evaluated and tax accordingly. There should be a tax ceiling for older adults living on fixed incomes who may not be able to pay property taxes based on

the citywide taxation assessment. Specifically, the city council and tax office can work together to create tax-free zones or freezing taxes when people get 65, maybe reducing or eliminating taxes for people over a certain age, so people do not lose their homes to taxes.

When planning for urban revitalization, it is important to plan with people in mind (Ganis, Minnery, and Mateo-Babiano 2016). Genuine citizens' participation in matters that concern their neighborhood will create more sense of belonging among residents. This study deduces from the interview that longtime residents feel that the City of Austin makes decisions without vital input from the community members.

Appendix A: QUESTIONNAIRE

Section 1: Demographic Information

Please identify the nearest road intersections (where two roads meet)

_____

1. When did you move into this neighborhood? _____ (Give years)

2. Did you move from outside of Austin into this Neighborhood? Yes _____ No_____

3. Are you planning to move very soon? Yes_____, No_____

4. Respondent's gender_____

5. Gender of the head of household_____

6. Are you currently Married_____, Single_____, Divorced_____ or Widow_____?

7. How would you classify your race/ethnicity? _____

8. What year were you born? _____

9. What is your height _____(feet) and weight _____ (lbs.)?

10. How many are currently live with you? _____

11. What is the total household income for all working adults $_____? (1= <

    25,000; 2 = 25,000-44,999; 3 = 50,000-74,999; 4 = 75,000-99,000; 5 = ≥ 100,000)

12. What is the highest level of education by anyone (You/Adult child/Spouse) in your

    household _____? What is the total number of school years_____ (e.g., 6 yrs.,

    12 yrs., 16yrs.)?

13. Do you own or rent your apartment/house _____?

14. Does anyone in your household currently work in any of these areas:

	Yes	No	Don't Know
High-tech Industry			
Finance Industry (e.g., Bank, Insurance, fundraiser, credit card.)			
Sales/ Marketing/Advertisement			
Government/ Public employment			
Health Industry (e.g., Doctor, Nurse, Pharmacist, Dentist, Physiotherapist)			
Professor (e.g., College/University)			
Teacher (e.g., Elementary, Junior/High School)			
Construction industry/ Landscaper/ Cartographer/Drivers/ Cleaning			
Entertainment Industry (e.g., Artist, Dancer, DJ, Rapper)			
Food Industry (e.g., Restaurant, bar)			
Hospitality (e.g., Hotel, parks, Airbnb)			
Service Provider, general			
Unemployed			
Others (e.g., Students)			

15. On the scale of 1-5, how easy can you get:

1= Very Low, 2 = Low, 3= Moderate, 4= High, 5= Very High	1	2	3	4	5
House Rent					
Mortgage/Financing with a low rate					
Car Financing					
A bank loan with a low rate					
Credit Card					
Health Care Services for any health condition (e.g., mental health, cancer)					
Parks/Playground					
Child(ren) School Enrollment/ Any adult in your household					
Employment					

Section 2: Neighborhood and Psychosocial

The objective of this section is to ask questions about how you perceive your

neighborhood.

1. Have you noticed new structures, heavy renovations, building conversions, and

    building remodeling in your neighborhood_____? If yes, do you feel

    threatened_____?

2. Please, answer the following questions on neighborhood physical development

    (e.g., demolition, new construction):

1= Vey Unlikely, 2= Not Likely, 3= Neutral, 4= Likely, 5= Very Likely	1	2	3	4	5
How likely is increasing in property tax or rent due to the current development in this area affect you?					
Do you think the current developments and newly built apartment/condominiums may cause you to move out of your neighborhood?					
How likely is increasing in property tax or rent due to the current development in this area cause you to sell your property?					
How likely are you to pay more for bills and spend more on groceries because of the new developments happening in your neighborhood?					
How likely are you to lose your connections/relationships with old neighbors due to new people moving in and some old neighbors moving out?					

3. On the scale of 1-5, rate your perspective of your neighborhood or sense of

    community:

	Construct	1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.	1	2	3	4	5
1.	Attraction	Overall, I am very attractive to living in this neighborhood.					
2.	Psychological sense of community	I feel like I belong to this neighborhood.					
3	Neighboring	I visit with my neighbors in their homes.					
4	Psychological sense of community	The friendships and associations I have with other people in my neighborhood mean a lot to me.					
5	Attraction	Given the opportunity, I would like to move out of this neighborhood. (reverse coding)					

6	Psychological sense of community	If the people in my neighborhood were planning something I'd think of it as something "we" were doing rather "they" were doing.					
7	Neighboring	If I needed advice about something I could go to someone in my neighborhood.					
8	Psychological sense of community	I think I agree with most people in my neighborhood about what is important in life.					
9	Neighboring	I believe my neighbors would help me in an emergency.					
10	Psychological sense of community	I feel loyal to the people in my neighborhood.					
11	Neighboring	I borrow things and exchange favors with my neighbors					
12.	Psychological sense of community	I would be willing to work together with others on something to improve my neighborhood.					
13.	Attraction	I plan to remain a resident of this neighborhood for a number of years					
14.	Psychological sense of community	I like to think of myself as similar to the people who live in this neighborhood.					
15.	Neighboring	I rarely have neighbors over to my house to visit.					
16.	Psychological sense of community	A feeling of fellowship runs deep between me and other people in this neighborhood.					
17.	Neighboring	I regularly stop and talk with people in my neighborhood.					
18	Psychological sense of community	Living in this neighborhood gives me a sense of community.					

Section 3: Health Questionnaire

1. Please, rate your health (or anyone in your household) on a scale of 1-

   5 in the box below.

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent	1	2	3	4	5
Overall health?					

Physical health?					
Mental health?					
Health while growing up?					
Parents' health while growing up?					

2. Have you (or anyone in your household) been diagnosed for any of these health conditions: Asthma, Diabetes, Cancer, Depression/ Anxiety, Difficulty breathing, Heart problem, hypertension, High blood pressure, Chronic Pain, and Musculoskeletal disorder? Yes or No

3. If yes to any of these health conditions in '3', how would you rate the seriousness of the condition on the scale of 1 = less serious and 5 = very serious?

Health Condition	1	2	3	4	5
Level of seriousness for any Disease in Q.2					

4. Please, provide answers on adult medical visits for you or anyone in your household.

Medical Visits	None	1-2	3-4	5-6	≥7
How many times in the last 3 months did you visit a hospital for health reasons?					
How many times have you used a mental health facility in recent times?					
How many times in the last 3 months did you visit an emergency room (ER) for health reasons?					
How many times in the last 12 months did you visit a hospital for health reasons?					
How many times in the last 12 months did you visit an ER for health reasons?					

5. Have you ever felt any of these in the last 12 months?

	0= Did not apply to me at all, 1 = Some of the time, 2 = A good part of the time, 3= Most of the Time	0	1	2	3
1s	I found it hard to wind down				
2a	I was aware of the dryness of my mouth				
3d	I could not seem to experience any positive feeling at all				
4a	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)				
5d	I found it difficult to work up the alternative to do things				
6s	I tended to over-react to situations.				
7a	I experienced trembling (e.g., in the hands)				
8s	I felt that I was using a lot of nervous energy				
9a	I was worried about situations in which I might panic and make a fool of myself				
10d	I felt that I had nothing to look forward to				
11s	I felt myself getting agitated				
12s	I found it difficult to relax				
13d	I felt downhearted and blue				
14s	I was intolerant of anything that kept me from getting on with what I was doing				
15a	I felt I was close to panic				
16d	I was unable to become enthusiastic about anything				
17d	I felt I was not worth much as a person				
18s	I felt that I was rather touchy				
19a	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing beat)				
20a	I felt scared without any good reason				
21d	I felt that life was meaningless				

Appendix B: IRB Approval

TEXAS ★ STATE
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In future correspondence please refer to 7134

May 8, 2020

Ayodeji Iyanda
Texas State University
601 University Dr.
San Marcos, TX 78666

Dear Ayodeji:

Your application titled, '*GEOGRAPHIC INVESTIGATION OF GENTRIFYING NEIGHBORHOODS AND CHRONIC HEALTH CONDITIONS IN EAST AUSTIN, TEXAS*' was reviewed by the Texas State University IRB and approved. It was determined there are: (1) research procedures consistent with a sound research design and they did not expose the subjects to unnecessary risk. (2) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (3) selection of subjects are equitable; and (4) the purposes of the research and the research setting are amenable to subjects' welfare and produced desired outcomes; indications of coercion or prejudice are absent, and participation is clearly voluntary.

In addition, the IRB found you will orient participants as follows: (1) informed consent is confirmed by agreeing to participate for the survey; (2) informed consent is confirmed by verbal agreement to participate in the interview; (3) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data; (4) Appropriate safeguards are included to protect the rights and welfare of the subjects. (5) Participants will not receive monetary compensation.

This project was approved at the Expedited Review Level until April 30, 2021
Only research activities that do not involve in person contact are approved due to COVID-19
for patient safety.

2. Please note an amendment will need to be submitted in Kuali addressing how COVID-19 transmission will be mitigated prior to implementation. The institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments, please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Research Integrity and Compliance.

Report any changes to this approved protocol to this office. Notify the IRB of any unanticipated events, serious adverse events, and breach of confidentiality within 3 days.

Sincerely,

Monica Gonzales
IRB Regulatory Manager
Research Integrity and Compliance
Texas State University

CC: Dr. Yongmei Lu

OFFICE OF RESEARCH AND SPONSORED PROGRAMS
601 University Drive | JCK #489 | San Marcos, Texas 78666-4616
Phone: 512.245.2314 | *fax:* 512.245.3847 | WWW.TXSTATE.EDU

This letter is an electronic communication from Texas State University-San Marcos, a member of The Texas State University System.

216

Greetings,

This email message is an approved request for participation in research that has been approved or declared exempt by the Texas State Institutional Review Board (IRB).

I am a doctoral student working on a dissertation about the experiences of residents of East and Southeast Austin in their changing neighborhood and the impact on your health. You have been selected for participation in this research study because you are currently residing in East and Southeast Austin, where we believe there is constant change in the residential and nonresidential settings. If you do not currently live in East or Southeast Austin, please disregard this email. The study is intended to understand better how urban renewal policies have translated to a shift in socio-cultural arrangements, neighborhood cohesion, self-identity, and perceptions of your physical and mental health. Some examples of mental illness are depression, panic, anxiety disorders, bipolar disorder. An example of physical health is hypertension, chronic pain.

Research Questions

The research questions the study will pursue include: (1) How is residents' perception of neighborhood change (aka gentrification) related to their self-rated chronic health conditions (SR-CHCs) and their children? (2) Is there a correlation between gentrification and frequency of hospital visits? (3)Is there a relationship between social inequality and gentrification? (4) Will social inequality mediate the association between gentrification and SR-CHCs? (5) What is the relationship between residents' perceived neighborhood ties and social cohesion (NTSC) and gentrification? (6) Will NTSC mediate the relationship between gentrification and SR-CHCs? (7) How are neighborhood characteristics and individual-level socio-cultural/ demographic factors separately or interactively relate to SR-CHCs in East Austin? (8) How do the longtime residents in East Austin perceive the effect of gentrification on their health?

At the start of the survey, for validation purposes, you will be asked if you have lived in the East or Southeast Austin; if you do not, you will be directed to the end of the survey.

Benefits and Risks of Participation

Although there may not be a direct and immediate personal benefit for participating in the study, your participation will help the researchers understand the potential relationship between urban renewal policies and residents' physical and mental health status. This knowledge is essential to develop further prevention and intervention strategies associated with urban renewal policy that directly affects longtime residents. This study involves no foreseeable serious risks to you.

Confidentiality

You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time without consequences of any kind or loss of benefits to which you are otherwise entitled. By clicking the survey link, you are consenting to participate in this study.

Also, reasonable efforts will be made to keep the personal information in your research record private and confidential.   Any identifiable information obtained in connection with this study will remain

Saludos,

Este mensaje de correo electrónico es una solicitud aprobada para participar en una investigación que ha sido aprobada o declarada exenta por la Junta de Revisión Institucional del Estado de Texas (IRB).

Soy un estudiante de doctorado que trabaja en una disertación sobre las experiencias de los residentes del este y sureste de Austin en su vecindario cambiante y el impacto en su salud. Ha sido seleccionado para participar en este estudio de investigación porque actualmente reside en el este y sureste de Austin, donde creemos que hay un cambio constante en los entornos residenciales y no residenciales. Si actualmente no vive en el este o el sudeste de Austin, ignore este correo electrónico. El objetivo del estudio es comprender mejor cómo las políticas de renovación urbana se han traducido en un cambio en los arreglos socioculturales, la cohesión del vecindario, la identidad propia y las percepciones de su salud física y mental. Algunos ejemplos de enfermedades mentales son depresión, trastornos de ansiedad, trastorno bipolar y TDAH. Un ejemplo de salud física es la hipertensión.

Preguntas de investigación

Las preguntas de investigación que seguirá el estudio incluyen: (1) ¿Cómo se relaciona la percepción de los residentes del cambio de vecindario (también conocido como gentrificación) con sus condiciones de salud crónicas autoevaluadas (SR-CHC) y sus hijos? (2) ¿Existe una correlación entre la gentrificación y la frecuencia de las visitas al hospital? (3) ¿Existe una relación entre la desigualdad social y la gentrificación? (4) ¿Mediará la desigualdad social la asociación entre la gentrificación y los SR-CHC? (5) ¿Cuál es la relación entre los lazos de vecindario percibidos de los residentes y la cohesión social (NTSC) y la gentrificación? (6) ¿Mediará NTSC la relación entre gentrificación y SR-CHC? (7) ¿Cómo se relacionan las características del vecindario y los factores socioculturales / demográficos a nivel individual por separado o interactivamente con los SR-CHC en el este de Austin? (8) ¿Cómo perciben los residentes de East Austin el efecto de la gentrificación en su salud?

Al comienzo de la encuesta, para fines de validación, se le preguntará si ha vivido en el este o sureste de Austin; Si no lo hace, se lo dirigirá al final de la encuesta.

Beneficios y riesgos de participación

Aunque puede que no haya un beneficio personal directo e inmediato por participar en el estudio, su participación ayudará a los investigadores a comprender la posible relación entre las políticas de renovación urbana y el estado de salud física y mental de los residentes. Este conocimiento es esencial para desarrollar más estrategias de prevención e intervención asociadas con la política de renovación urbana que afecta directamente a los residentes de toda la vida. Este estudio no implica riesgos serios previsibles para usted.

Confidencialidad

No es necesario que participe en este estudio si no lo desea. También puede negarse a responder cualquier pregunta que no desee responder. Si se ofrece como voluntario para participar en este estudio, puede retirarse de él en cualquier momento sin consecuencias de ningún tipo o pérdida de beneficios a los que tiene derecho. Al hacer clic en el enlace de la encuesta, usted acepta participar en este estudio.

confidential and will be disclosed only with your permission or as required by law. The members of the research team and the Texas State University Office of Research Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants.

Data will be kept for three years (per federal regulations) after the study is completed and then destroyed. Data will be used for a doctoral dissertation, conference presentations, and publications. If you would like access to the findings of this study, you may contact the Primary Investigator (Ayodeji Iyanda) at (940) 304-6762 or aei11@txstate.edu.

To ask questions about this research, please contact me, Ayodeji Iyanda, at (940) 304-6762 or aei11@txstate.edu. Or my Advisor, Dr. Yongmei Lu.

This project 7134 was approved by the Texas State IRB on 5/8/2020. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Denise Gobert 512-716-2652– (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu)

CONSENTIMIENTO VERBAL

Título del estudio: Investigación geográfica de la gentrificación del vecindario y las condiciones de salud crónicas en el este de Austin

Investigador Principal: Ayodeji Iyanda
      Department of Geography
      9403046762
      aei11@texasstate.edu

Co-Investigador/Asesor de Facultad: Yongmei Lu
      Department of Geography
      512-245-8704
      ymlu@texasstate.edu

Mi nombre es Ayodeji Iyanda, y soy un estudiante graduado en la Universidad Estatal de Texas. Estoy haciendo este estudio porque estoy tratando de entender el impacto del cambio de vecindario en la salud de los residentes. Te pido que participes porque vives en East Austin. Te voy a contar un poco sobre el estudio para que puedas decidir si quieres estar en él o no.

Si aceptas ser parte del estudio, te haré preguntas relacionadas con tu salud mental y física. Esto es para saber si el cambio de vecindario actual tiene algún efecto en su salud. Usted no tiene que responder a estas preguntas si no se siente cómodo respondiendo a ellas. Usted puede decidir dejar de responder a la pregunta en cualquier momento durante la entrevista.

¿Tienes alguna pregunta para mí?

¿Entiendes lo que te dijeron?

¿Quieres estar en el estudio?

APPROVED: 5/8/2020
EXPIRES: 4/30/2021

TEXAS ★ STATE ®

VERBAL CONSENT

Study Title: Geographic Investigation of gentrifying neighborhood and chronic health conditions in East Austin

Principal Investigator: Ayodeji Iyanda	**Co-Investigator/Faculty Advisor: Yongmei Lu**
Department of Geography	Department of Geography
9403046762	512-245-8704
aei11@texasstate.edu	ymlu@texasstate.edu

My name is Ayodeji Iyanda, and I am a graduate student at Texas State University. I am doing this study because I am trying to understand the impact of neighborhood change on residents' health. I am asking you to take part because you reside in East Austin. I'm going to tell you a little bit about the study so you can decide if you want to be in it or not.

If you agree to be part of the study, I will ask questions related to your mental and physical health. This is to know if the current neighborhood change has any effect on your health. You do not have to answer these questions if you feel not comfortable answering them. You can decide to stop answering the question at any time during the interview.

Do you have any questions for me?
Do you understand what was said to you?
Do you want to be in the study?

Formulario de consentimiento

Título: Cambio de barrio y salud

Ayodeji Iyanda, un estudiante de doctorado en la Universidad Estatal de Texas está realizando una investigación para comprender los impactos del cambio del vecindario en la salud entre los residentes del este y sureste de Austin. Se le pide que complete esta encuesta porque vive en el este o sureste de Austin.

La participación es voluntaria. La encuesta tomará aproximadamente 30 minutos o menos para completar. Debe tener al menos 18 años para realizar esta encuesta.

Este estudio no implica riesgos serios previsibles. Le pedimos que intente responder todas las preguntas; sin embargo, si hay algún elemento que lo haga sentir incómodo o que prefiera omitir, deje la respuesta en blanco. Sus respuestas son anónimas y confidenciales. Si considera completar esta encuesta, puede ser seleccionado al azar para participar en una entrevista individual a través de la aplicación Zoom.

Aunque puede que no haya un beneficio personal directo e inmediato por participar en el estudio, su participación ayudará a los investigadores a comprender la posible relación entre las políticas de renovación urbana y la salud física y mental de los residentes. Este conocimiento es esencial para desarrollar estrategias de prevención e intervención asociadas con las políticas de renovación urbana que pueden afectar a los residentes de toda la vida.

Se harán esfuerzos razonables para mantener los datos en nuestro registro de investigación privados y confidenciales. Esta encuesta no recopilará información identificable a nivel personal o familiar. Solo los miembros del equipo de investigación pueden acceder a los datos. La Oficina de Cumplimiento de la Investigación (ORC) supervisa los estudios de investigación para proteger los derechos y el bienestar de los participantes en la investigación. Los datos se conservarán durante tres años (según las regulaciones federales) después de que se complete el estudio y luego se destruyan.

Si usted tiene alguna pregunta o inquietud, no dude en ponerse en contacto con **Ayodeji Iyanda** o Dr. **Yongmei Lu**, el asesor de la facultad de este estudio:

Ayodeji Iyanda (Alumno de posgrado)	**Dr. Yongmei Lu (Supervisora)**
Departamento de geografía	**Departamento de geografía**
9403046762	**512-245-8704**
aei11@texasstate.edu	**ymlu@texasstate.edu**

Este proyecto 7134 fue aprobado por el IRB del Estado de Texas en 8 de Mayo de 2020. Las preguntas o preocupaciones pertinentes sobre la investigación, los derechos de los participantes en la investigación y/ o las lesiones relacionadas con la investigación a los participantes deben dirigirse a la presidenta del IRB, La Dr. Denise Gobert 512-716-2652 –(dgobert@txstate.edu) o a Monica Gonzales, Gerente regulador deLA IRB 512-245-2334 (meg201@txstate.edu).

Si decide no participar, por favor no llene una encuesta.

Si acepta participar, complete la encuesta.

TEXAS STATE
Expedited Review
APPROVED: 5/8/2020
EXPIRES: 4/30/2021

TEXAS ★ STATE ®

Consent Form

Title: Neighborhood Change and Health

Ayodeji Iyanda, a doctoral student at Texas State University, is conducting research to understand the impacts of neighborhood change on health among residents in East and Southeast Austin. You are being asked to complete this survey because you live in East or Southeast Austin.

Participation is voluntary. The survey will take approximately 30 minutes or less to complete. You must be at least 18 years old to take this survey.

This study involves no foreseeable serious risks. We ask that you try to answer all questions; however, if there are any items that make you uncomfortable or that you would prefer to skip, please leave the answer blank. Your responses are anonymous and confidential. If you consider completing this survey, you may be randomly selected to partake in a one-on-one interview through Zoom application.

Although there may not be a direct and immediate personal benefit for participating in the study, your participation will help the researchers understand the potential relationship between urban renewal policies and residents' physical and mental health. This knowledge is essential for developing prevention and intervention strategies associated with urban renewal policies that may affect longtime residents.

Reasonable efforts will be made to keep the data in our research record private and confidential. This survey will collect no identifiable information at the personal or household level. Only the members of the research team may access the data. The Office of Research Compliance (ORC) monitors research studies to protect the rights and welfare of research participants. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed.

If you have any questions or concerns, feel free to contact **Ayodeji Iyanda** or **Dr. Yongmei Lu**, the faculty advisor of this study:

Ayodeji Iyanda, Graduate student	**Dr. Yongmei Lu, Advisor**
Department of Geography	**Department of Geography**
9403046762	**512-245-8704**
aei11@texasstate.edu	**ymlu@texasstate.edu**

This project 7134 was approved by the Texas State IRB on 5/8/2020. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu).

If you would choose not to participate, please do not fill out a survey.

If you consent to participate, please complete the survey.

223

Además, se harán esfuerzos razonables para mantener la información personal en su registro de investigación privada y confidencial. Cualquier información identificable obtenida en relación con este estudio será confidencial y se divulgará solo con su permiso o según lo exija la ley. Los miembros del equipo de investigación y la Oficina de Cumplimiento de Investigación (ORC) de la Universidad Estatal de Texas pueden acceder a los datos. El ORC supervisa los estudios de investigación para proteger los derechos y el bienestar de los participantes en la investigación.

Los datos se conservarán durante tres años (según las regulaciones federales) después de que se complete el estudio y luego se destruyan. Los datos se utilizarán para una disertación doctoral, presentaciones de conferencias y publicaciones. Si desea acceder a los resultados de este estudio, puede comunicarse con el Investigador principal (Ayodeji Iyanda) al (940) 304-6762 o aei11@txstate.edu.

Para hacer preguntas sobre esta investigación, comuníquese conmigo, Ayodeji Iyanda, al (940) 304-6762 o aei11@txstate.edu. O mi asesor, el Dr. Yongmei Lu.

Este proyecto 7134 fue aprobado por el IRB del estado de Texas el 8 de Mayo de 2020 Las preguntas o inquietudes pertinentes sobre la investigación, los derechos de los participantes de la investigación y / o las lesiones relacionadas con la investigación a los participantes deben dirigirse a la presidenta del IRB, Dra. Denise Gobert 512-716-2652- (dgobert@txstate.edu) o a Monica Gonzales, Gerente Regulador del IRB 512-245-2334 - (meg201@txstate.edu)

Appendix C:

Semi-structured Interview Script and Questionnaire

Thank you for agreeing to participate in this interview to understand the neighborhood effect, urban renewal policy, and residents' health. As you know, there is a currently great interest in how the neighborhoods in East and South East Austin are rapidly changing, and homeowners and property are also changing hands. Your response to the following will help us understand whether there is a health implication to this dimension of neighborhood change, which will allow community representatives and municipal government to take necessary actions to mitigate such effects.

The interview should take less than an hour and will be recorded so that I can more easily review the notes afterward. If, at any point, you feel not comfortable with any of the questions, do not hesitate to skip the question and ask me to move on to the next one.

1. How long have you lived in this neighborhood, and do you have any generational attachment to this neighborhood?

2. What are your biggest concerns in your current neighborhood, and could you mention some of them based on how serious they appear to you?

3. What is your understanding of gentrification?

4. Do you think gentrification has been beneficial to residents of East Austin in any way, or would you say otherwise?

5. Could you explain some of the ways you have benefited or affected negatively?

6. How would you rate your physical health and mental health?

7. Would you think gentrification is causing you any stress or posing any health risks to you?

8. Do you think gentrification is making people sick? If yes, in what ways?

9a. What have you done to remain in your neighborhood?

9b. What are the ways you have managed to retain your homes, pay bills, and the increasing taxes?

10a. Do you belong to any organization/community associations?

10b. Have you ever engaged in any activity in an effort to resist gentrification?

11. What would be your prediction of the demography in East and Southeast Austin in the next 10, 15, 30 years compared to the last 30 or 50 years?

12. What suggestions or solutions would you recommend to city council members and your representatives in general in the face of displacement of longtime residents?

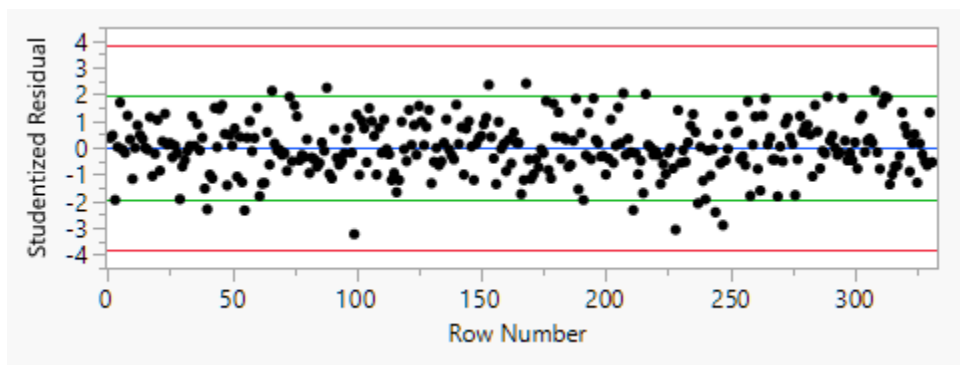Thank you so much for your time! Your time is much appreciated.
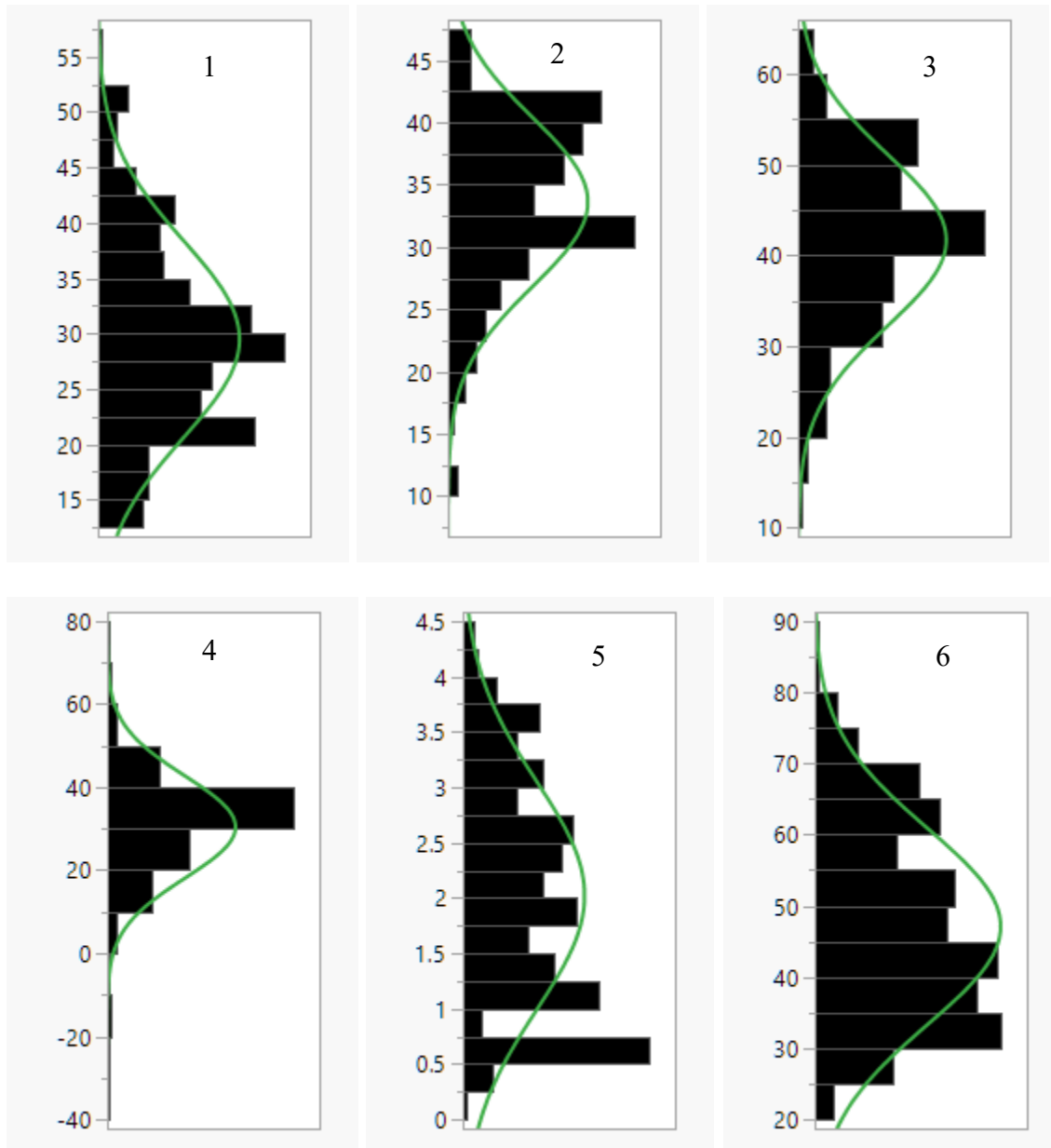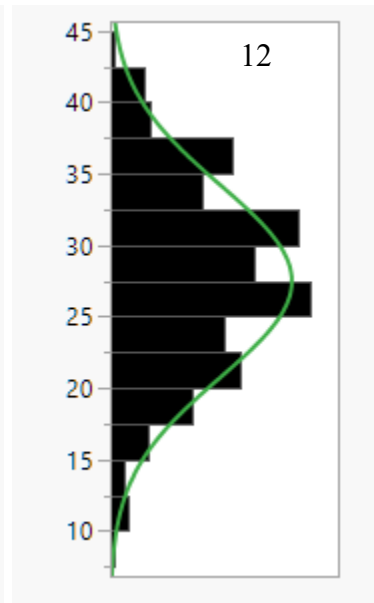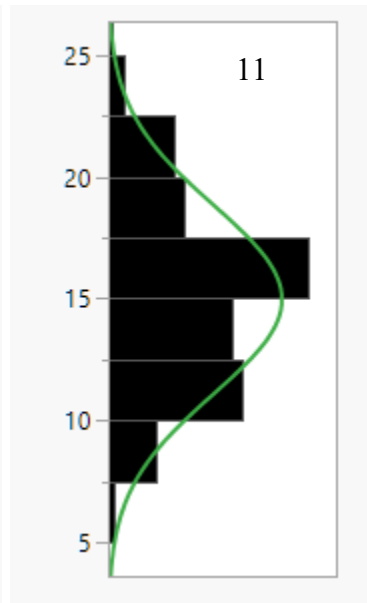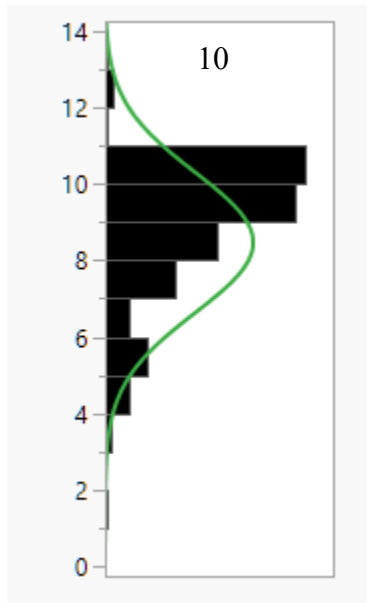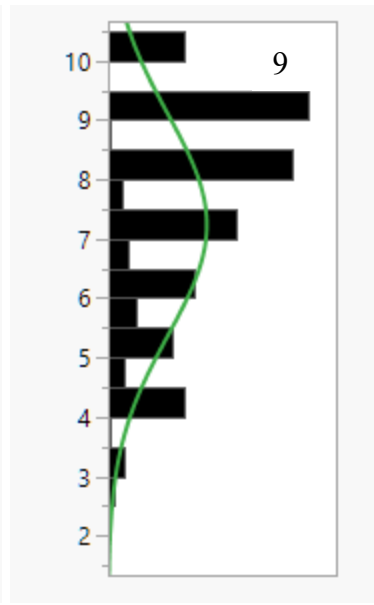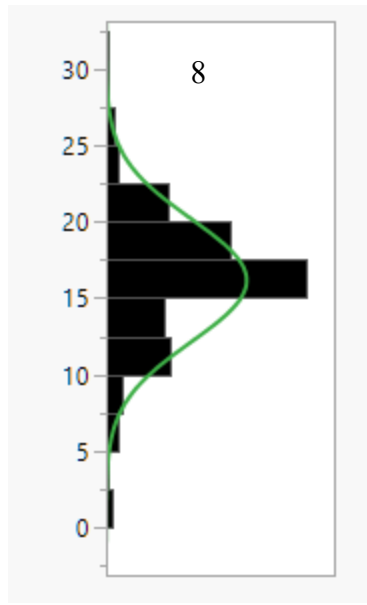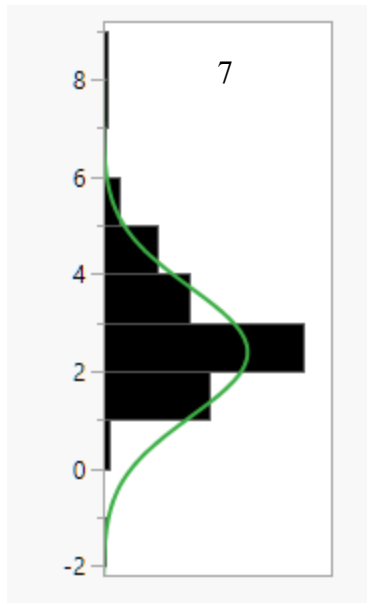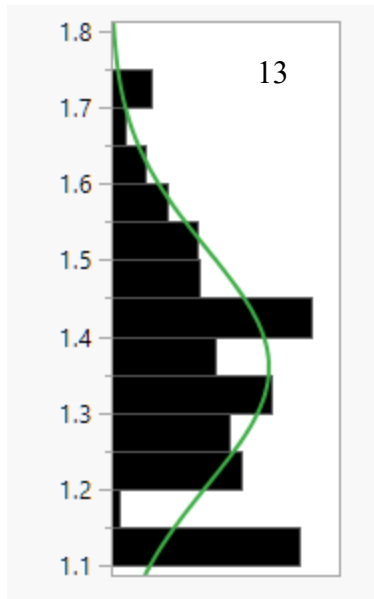
(1) Stress,(2) Interaction, (3) Cohesion, (4) Attraction, (5) Log[Duration+1], (6) Age,

(7) HMem,(8) YrSCHL, (9) SRMH, (10) CHDH,(11) PGS, (12) ASR, (13)

Log10[Depression]

Externally studentized residual with 95% simultaneous limits (Bonferroni) in red,

individual limits in green.

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