New Insights on Disadvantage in Wisconsin:

Perceived Housing Discrimination and Its Association with Residential Conditions and Poor Mental Health

By
Yaidi Cancel Martinez

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The dissertation is approved by the following members of the Final Oral Committee:

Alfonso Morales, Professor, Planning and Landscape Architecture
Molly Carnes, Professor, Medicine and Industrial and Systems Engineering
Kristen Malecki, Associate Professor, Population Health Sciences
Kurt Paulsen, Associate Professor, Planning and Landscape Architecture
Revel Sims, Assistant Professor, Planning and Landscape Architecture

ABSTRACT

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Yaidi Cancel Martinez

Chair of Doctoral Committee:
Alfonso Morales, Ph.D.

At the University of Wisconsin-Madison

This research investigates housing discrimination as a key influence on inequities in residential conditions and poor mental health. While the association between housing discrimination and outcomes of residential conditions and mental health have been investigated, little is known on the extent perceived housing discrimination associates with low residential quality, housing instability risk and the psychological disorders of stress, anxiety and depression in a midwestern state. This study fills this knowledge gap via a case study of Wisconsin housing markets and health indicators. I used data collected between 2009 and 2013 from formal complaints to examine reported incidences of housing discrimination, and the Survey of the Health of Wisconsin (SHOW) for fixed-effects logistic regressions and stratified analyses of 28 subpopulation categories and two geographies – the Milwaukee metro and the rest of the state. Wisconsin is chosen due to its similarities to other Midwestern states, and the histories of discrimination in housing market policies in Milwaukee, resulting in it becoming the most racially segregated metropolitan region in the country. Key findings indicate that roughly 1 in 15 Wisconsin residents experienced housing discrimination and the rate is the highest for African

Americans (1 in 3). Adjusting for socioeconomic, residential, and health-related factors, individuals perceiving housing discrimination are more than twice likely to live in lower residential quality and be at risk of housing instability, are roughly twice likely to have stress and anxiety, and close to 80% likely to have depression compared to non-discriminated counterparts. Stratified analyses indicate that for women, perceived housing discrimination significantly associates with all outcomes in this study. Perceived housing discrimination also significantly associates with at least one outcome for other subgroups including African Americans, Non-Hispanic Whites, and among household income, education and age groups. Lastly, the effects of perceived discrimination on each outcome are not significantly different between the Milwaukee metro and the rest of Wisconsin. These findings suggest housing discrimination impacts a broad population and influences inequities in residential conditions and mental health despite anti-discrimination laws enacted 50 years ago. Given extant evidence, collaborative interventions should address housing discrimination through education and proactive fair housing law implementation.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

"Epidemics emerge along the fissures of our society, reflecting not only on biology, but more importantly patterns of marginalization, exclusion, discrimination related to race, gender, sexuality, class and more."

-Mary Basset, 2015[1]

"Now is the time to open the doors of opportunity to all...".

- Dr. Martin Luther King, Jr., 1966.[2]

1.1. Literature review and context summary

Equal housing opportunity, fair housing, and adequate housing are all pieces of one basic human right. The right to a stable, decent, and safe place to live for *all*. While the Fair Housing Act has been in place for roughly 50 years, housing discrimination has limited equal access to quality housing opportunities across the nation, including Wisconsin. Limited access to housing opportunities contributes to disparities in health, impacting quality of life and well-being (Osypuk & Acevedo-Garcia, 2010; Grollman, 2014; Williams et al., 2019).

1.1.1. Definition of housing discrimination and debates in policy contexts

In this dissertation, I describe housing discrimination through the lenses of exposure to disparate treatment and disparate impacts consistent with interpretations of the Fair Housing Act and the Affirmatively Furthering Fair Housing (AFFH) rule. Both policies acknowledge the legacy of housing discrimination at the federal level yet remain overlooked by decision-makers. Through the lens of disparate treatment, housing discrimination is the unfair and unequal treatment of individuals or groups who seek housing due to their physical, social, or economic characteristics (Blank et al., 2004; Pager & Shepherd, 2008; Rothstein, 2017). Unequal renting,

[1] Speech from "Why Your Doctor Should Care About Social Justice" TEDMed.

[2] Speech at the Chicago Freedom Movement Rally in Soldier Field, Chicago, IL. As part of the Chicago Open Housing Movement. July 10, 1966

mortgage lending and steering away individuals seeking a home are among the most common forms of housing discrimination. Through the lens of disparate impact, housing discrimination is considered a main contributor to inequitable outcomes for the quality of life of one subpopulation group over another (O'Regan, 2019).

In public health policy, the impact of discrimination was recently recognized to meet the definition proposed by epidemiologist Dr. Sandro Galea, as "a problem affecting large numbers of people, threatening health over the long term, and requiring the adoption of large-scale solutions" (Galea, 2017; Wisconsin Public Health Association, 2018). In May 2018, the Wisconsin Public Health Association (WPHA) passed a resolution declaring racism as a public health crisis and called for state-wide action (Wisconsin Public Health Association, 2018). A year later, the Milwaukee County Executive signed a similar resolution, becoming the first county in the US to make such a declaration (Abele & Nicholson, 2019). These resolutions are among the first in recent times to explicitly recognize racism as a form of discrimination impacting quality of life and public health and to make a call for action. However, these resolutions are broad and do not explicitly address housing discrimination nor its impact on the quality of life and public health of residents. Support for equal treatment under the law is a broadly held value. Laws at the federal and state level have been adopted to address housing discrimination and promote equal housing opportunities.

The Fair Housing Act (Civil Rights Act of 1968, amended in 1988) prohibits the discrimination of individuals based on their race, color, religion, sex, national origin, disability or familial status during the sale, rental, financing or other housing-related services (42 U.S.C § 3604). Additionally, the Act requires the federal government to "provide, within constitutional limitations, for fair housing throughout the United States… [and] affirmatively further the

purposes of [fair housing]" (42 U.S.C §3608(d)). Thus, for roughly 50 years, the federal government within their regulatory context prohibited housing discrimination and mandated to affirmatively further fair housing by addressing disparate impacts resulting in housing discrimination (Jargowsky et al., 2019; O'Regan & Zimmerman, 2019). Implementation of the statute requires rulemaking, including standards for determining the violation of a law, and more importantly, guidance to mitigate the legacy of housing discrimination throughout the nation.

In 2015, the US Department of Housing and Urban Development (HUD) published the Affirmatively Furthering Fair Housing (AFFH) rule which outlines standards for the disparate impact liability under the Fair Housing Act. The rule also requires jurisdictions receiving federal funding, specifically Community Development Block Grants, to take "significant actions that are designed and can be reasonably expected to achieve a material positive change that affirmatively furthers fair housing by, for example, increasing fair housing choice or decreasing disparities in access to opportunity" (24 C.F.R. § 5.152). That same year, the US Supreme Court recognized that disparate impact, as a result of housing discrimination, might violate the Fourteen Amendment of the US Constitution if the measure "were undertaken with discriminatory intent and had disparate effects...." (Harvard Law Review, 2015). However, up to this date, housing discrimination as disparate treatments in housing market transactions and their consequential disparate impacts on residential conditions and quality of life factors continue to be debated in the housing policy field due to proposed changes aiming to weaken the Fair Housing Act's enforcement mechanisms (O'Regan & Zimmerman, 2019).[3]

[3] In January 2018, HUD announced it was delaying implementation of the AFFH rule. In August 2019, HUD announced it is proposing changes to the AFFH rule which may weaken the enforcement of the Fair Housing Act.

In Wisconsin, the state has the Open Housing Law which adds additional protections not included in the federal Fair Housing Act. According to the state law, discrimination is prohibited during the sale, rental, financing or other housing-related services to federally "protected classes" and individuals based on their marital status, ancestry, sexual orientation, lawful source of income, age (adults over 18 year old), and domestic abuse or sexual assault victims (Wis. Stat. § 106.50). However, the state lacks the capacity to properly enforce fair housing across their municipalities because it lacks substantial equivalency with the federal Fair Housing Act. The lack of equivalency limits the amount of federal funding and resources to address housing discrimination (Wisconsin, 2015). Limitations to address housing discrimination may, in turn, translate to disparate impacts on the quality of life of Wisconsin residents by impeding equal housing opportunities. Alarmingly, the extent of disparate impacts associated with housing discrimination in Wisconsin remain unclear because neither the state nor any of their municipalities have conducted a comprehensive "Assessment of Fair Housing" as expected under 2015 the AFFH rule. To date, the state only publishes an Analysis of Impediments (AI) to fair housing which is a broad assessment outlining the demographic, economic and social composition of the state, administrative rules relevant to housing, data on housing discrimination complaints, general impediments to fair housing and proposed actions to overcome such impediments. However, researchers have argued that AIs are inconsistent and ineffective because these are practically unenforceable (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019).

1.1.2. Previous studies and current gaps

Because housing discrimination is complex and multi-leveled, some scholars such as Krieger (2012) suggest considering the impact of discrimination across environmental and social

dimensions to understand their impact on health inequities. Studies have found strong associations between an exposure to housing discrimination, residential conditions and health outcomes (Dunn, 2000; Barata & Stewart, 2010; Beck et al., 2014; Priester et al., 2017). However, until recently, most studies examined the effect of perceived housing discrimination on one domain, either on residential factors or on health outcomes but seldom on both (Yang et al., 2016; Williams et al., 2019). Therefore, more research is needed to better understand these underlying mechanisms in a broader multileveled context. Also, few known studies have analyzed the potential impacts of exposure to housing discrimination among individual subpopulations by gender or racial categories (Yang & Chen, 2018; Stokes, 2019) and among contrasting subpopulations to estimate levels of disparate impact in residential conditions and health outcomes.

Uneven opportunities to access housing influence the quality of residential conditions individuals have (Kohlhuber et al., 2006; Jacobs et al., 2010; Suglia et al., 2011; Beck et al., 2014; Desmond & Shollenberger, 2015). For example, an individual or family denied access to good-quality housing may be limited to structurally deficient housing that is poorly insulated, with mold, or having other potentially hazardous conditions. Likewise, individuals or families that reside in good-quality housing but are exposed to discriminatory behavior from neighbors or their landlord may experience difficulties remaining housed and see no alternative but moving elsewhere (Greenberg et al., 2016; Priester et al., 2017; Sampson, 2019). Consequently, the combination of experienced discrimination and housing instability may associate with higher odds for mental distress and depression particularly among women (Barata & Stewart, 2010; Desmond & Kimbro, 2015). Additionally, scholars suggest that discrimination is a stressor and an agent of chronic diseases (Williams & Mohammed, 2009; Williams et al., 2019). These

studies build an argument that discrimination is likely a determinant of poor residential conditions and health. However, the extent that exposure to housing discrimination is associated with residential quality conditions, risk of housing instability, and ultimately mental health outcomes of stress, anxiety or depression is understudied in Wisconsin, especially following the Great Recession. In fact, no study assesses this combination of issues.

In this dissertation, I study the complex phenomenon of housing discrimination within the context of the built and social environment and acknowledge temporal contexts such as historical and more recent events (i.e., the 2008 Great Recession) because as Massey (2005) notes: "discrimination is a moving target." Thus, I focus my core analysis of perceived housing discrimination exposure on the five years after the Great Recession in Wisconsin (2009-2013). Studies suggest that housing discrimination in the form of unfair housing market transactions played a major role contributing to the 2008 Great Recession and disparities on wealth and quality of life indicators thereafter (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017; McClure et al., 2019). Research also shows that the disparate treatment in housing transactions exacerbated social, spatial and economic drawbacks, particularly among already disadvantaged households such as Non-Whites and female-headed (Rugh et al., 2015; Britton, 2016; Massey et al., 2016) and these drawbacks may extend to the next generation (Rothstein, 2017; Duque et al., 2018). However, the extent of perceived disparate treatment when obtaining housing or remaining in the neighborhood and associated disparate impacts on subpopulations in Wisconsin after the Great Recession is not well understood.

Wisconsin is an important setting to study housing discrimination because the state is among a few that lacks substantial equivalency with the Fair Housing Act. Also, studies point to severe racial and economic segregation in the state lingering past historic discriminatory housing

policies and practices (Glaeser & Vidgor, 2012; Levine, 2013; Frey, 2018; Landis, 2019). However, most studies on the effect of housing discrimination in Wisconsin, particularly on segregation, have focused on the Milwaukee metropolitan area and the Southeastern Wisconsin region due to persistent racial segregation patterns (Zhou et al., 2017; Mehdipanah et al., 2018; Landis, 2019). In fact, most known studies (Williams & Mohammed, 2009; Yang et al., 2016; Priester et al., 2017; Yang et al., 2018; McClure et al., 2019; Yang & Sun, 2019) on the impact of housing discrimination focus on urban areas. Therefore, housing discrimination and their effects post-Recession remain understudied at a state-wide level, particularly in Wisconsin.

After the Great Recession, between 2009 and 2013, the state received 1,888 formal complaints on housing discrimination, peaking in 2011 with 440 (Milwaukee Fair Housing Council, 2016; State of Wisconsin, 2016; US Department of Housing and Urban Development, 2017). While formal complaints suggest occurrences of housing discrimination in Wisconsin, the National Fair Housing Alliance notes that actual incidences of discrimination are higher and go unreported (National Fair Housing Alliance, 2014; Wisconsin, 2015). Therefore, in this dissertation, I examine reported housing discrimination between 2009 and 2013 from two sources including formal complaints and survey data on perceived housing discrimination from a representative sample in Wisconsin. This poses an opportunity to examine housing discrimination during this timeframe because thus far, to my knowledge, no study at the state-level has examined the potential effects of perceived housing discrimination on residential conditions and on outcomes of mental health in a representative sample population residing in Wisconsin right after the Great Recession utilizing two data sources.

1.2. Summary of research aims and approach

1.2.1. Principal aims

The principal aims of this study are to examine the extent self-reported exposure(s) to housing discrimination associates with:

1) residing in low residential quality;

2) encountering risk of housing instability; and

3) having stress, anxiety or depression in a sample of Wisconsin residents after the Great Recession, during the years 2009-2013.

Additional analyses explore the extent to which the association between exposure to housing discrimination and each outcome (1, 2, 3) varies by subpopulation (e.g., gender, race and ethnicity, household income) and by location, specifically between the Milwaukee metropolitan area compared to the rest of the state.

1.2.2. Proposed approach

In this dissertation, I examine the extent to which an exposure to housing discrimination associates with residential quality conditions, risk of housing instability, and ultimately mental health outcomes of stress, anxiety or depression. First, I assess reported measures of housing discrimination in Wisconsin from 2009 to 2013 to roughly estimate the occurrences and potential trends through this 5-year timeframe. These measures are obtained from formal complaints filed to fair housing agencies across the state and from a state-wide population health survey on perceived exposure to housing discrimination through the life course. Then, I assess how perceived exposure to housing discrimination through the life course associates with residential

conditions and whether such exposure to discrimination associates with the presence of stress, anxiety and depression. Lastly, I explore potential disparities in residential and mental health outcomes among individuals that perceived exposure to housing discrimination. To do this, I operationalize individual self-reported perceived exposure to housing discrimination as a population health indicator and employ stratified statistical analysis for specific social groups (e.g., gender, race and ethnicity, household income level) and for two locations within the state of Wisconsin, the Milwaukee metro and the rest of the state. This systematic approach will contribute to the understanding of housing discrimination as both a disparate treatment in obtaining housing or remaining in the neighborhood and a disparate impact on residential quality conditions, housing instability risk and mental health outcomes.

1.3. Dissertation structure

This dissertation is comprised of seven chapters. In this first chapter, I briefly describe the research context, aims and approach. In the next chapter (Chapter 2), divided into three sections, I provide detailed theoretical context and background information to advance our understanding of the complex phenomena of housing discrimination. For instance, I define discrimination and explain multiple perspectives of this complex phenomenon. Also, I describe common approaches used in previous research to assess housing discrimination and provide a descriptive analysis on reported perceived housing discrimination incidences in Wisconsin through this study's timeframe (2009-2013) based on observations from formal housing discrimination complaints filed through the state and self-reported measures from a state-wide population survey. To close the chapter, I describe the role of housing discrimination as a determinant of disparities in housing conditions and health with a focus on mental health.

In Chapter 3, I discuss in detail the statistical methodology applied to examine the extent exposure to housing discrimination associates with the outcomes of 1) residing in low residential quality; 2) encountering the risk of housing instability; and 3) having stress, anxiety, or depression in a sample population in Wisconsin post-recession (2009-2013). The next three chapters (Chapters 4-6) are the core studies, written primarily as a three-essay work with the intention that each can be published individually in peer-reviewed journals. In Chapter 4, I examine the extent of exposure to housing discrimination associates with residential quality conditions. In Chapter 5, I examine the extent exposure to housing discrimination associates with the risk of housing instability and the extent residential quality conditions influence the association, if any. In Chapter 6, I examine the extent exposure to housing discrimination associates with the likelihood of any of the following detrimental mental health outcomes: stress, anxiety and depression, and the extent residential factors such as residential quality and risk of housing instability influence the intersection between discrimination and health. In each core study (Chapters 4-6), I also examine whether findings vary by subpopulation groups and by location. Lastly, in Chapter 7, I provide a summary of this dissertation's core research findings, directions for future research and implications for housing policies and core disciplines including but not limited to urban planning and public health.

1.4. Expected research contribution

This dissertation will contribute to the research and policy literature in three ways. First, this study will advance our understanding of housing discrimination from the context of exposure to disparate treatment and its association with potential disparate outcomes, consistent upon claims under the 1968 Fair Housing Act, interpretations under the 2015 AFFH rule, and state declarations on public health policy. Second, this study will provide estimates on the extent

a perceived exposure to housing discrimination through the life course associates with the likelihood for low residential quality conditions, risk of housing instability and mental health outcomes of stress, anxiety and depression in a representative sample of the Wisconsin population surveyed during 2009 to 2013. Third, this study will unveil the potential relevancy an exposure to housing discrimination has on low residential quality conditions, risk of housing instability and mental health outcomes of stress, anxiety and depression for individuals by gender, age, racial and ethnic construct, education level, marital status, household income, employment status and location; comparing the sample population the Milwaukee metro to the rest of the state.

This dissertation will provide invaluable information to advance equitable housing and health policy in Wisconsin because, as we commemorate the 50th anniversary of the Fair Housing Act, proposed changes to weaken the Act's enforcement mechanisms present additional challenges that warrant for further consideration on the extent housing discrimination impacts residential conditions and mental health outcomes. Also, the recent declarations made by the WPHA and Milwaukee County on racism as a public health emergency presents a unique opportunity to further understand the effects of housing discrimination on Wisconsin residents. Therefore, this is a critical time to pursue empirical research on discrimination as an underlying barrier to adequate housing and health.

1.5. References

Abele, C., & Nicholson, M. (2019). *Resolution 19-397: Requesting approval to recognize April 1-7 as National Public Health Week and Supporting Milwaukee County's commitment to achieve racial equity and transform systems and institutions impacting the health of our community*. County Legislative Information Center Milwaukee County Board of Supervisors Retrieved from https://milwaukeecounty.legistar.com/LegislationDetail.aspx?ID=3915601&GUID=107F6551-8B82-45A8-A870-9B7516DD81AD.

Barata, P. C., & Stewart, D. E. (2010). Searching for housing as a battered woman: Does discrimination affect reported availability of a rental unit? *Psychology of Women Quarterly, 34*(1), 43-55.

Beck, A. F., Hunang, B., Chundur, R., & Kahn, R. S. (2014). Housing code violation density associated with emergency department and hospital use by children with asthma. *Health Affairs, 33*(11), 1993-2002.

Blank, R. M., Dabady, M., & Citro, C. F. (2004). Causal inference and the assessment of racial discrimination *Measuring racial discrimination*. Washington, DC: The National Academies Press.

Britton, M. L. (2016). Equity, growth, and community: What the nation can learn from America's metro areas. *City & Community, 15*(3), 338-340.

Desmond, M., & Kimbro, R. T. (2015). Eviction's fallout: Housing, hardship, and health. *Social Forces*.

Desmond, M., & Shollenberger, T. (2015). Forced displacement from rental housing: Prevalence and neighborhood consequences. *Demography, 52*, 1751-1772.

Dunn, J. R. (2000). Housing and health inequalities: Review and prospects for research. *Housing Studies, 15*(3), 341-366.

Duque, V., Pilkauskas, N. V., & Garfinkel, I. (2018). Assets among low-income families in the great recession. *PLoS One, 13*(2), e0192370-e0192370.

Fair Housing Act, Pub. L. No. 90-448 (1968).

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Frey, W. (2018). Black-white segregation edges downward since 2000, census shows. Retrieved from https://www.brookings.edu/blog/the-avenue/2018/12/17/black-white-segregation-edges-downward-since-2000-census-shows/.

Galea, S. (2017). Crying "crisis". Retrieved from https://www.bu.edu/sph/2017/04/23/crying-crisis/.

Glaeser, E., & Vidgor, J. (2012). *The end of the segregated century: Racial separation in America's neighborhoods, 1890- 2010*.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Grollman, E. A. (2014). Multiple disadvantaged statuses and health: The role of multiple forms of discrimination. *Journal of health and Social Behavior, 55*(1), 3.

Harvard Law Review. (2015). Texas department of housing & community affairs v. Inclusive community project, inc. *Race and Law, 129*(321), 321-330. Retrieved from https://harvardlawreview.org/2015/11/texas-department-of-housing-community-affairs-v-inclusive-communities-project/.

Jacobs, D. E., Brown, M. J., Baeder, A., Sucosky, M. S., Margolis, S., Hershovitz, J., Kolb, L., & Morley, R. L. (2010). A systematic review of housing interventions and health: Introduction, methods, and summary findings. *Journal of Public Health Management and Practice, 16*(5), S5-S10.

Jargowsky, P. A., Ding, L., & Fletcher, N. (2019). The Fair Housing act at 50: Successes, failures, and future directions. *Housing Policy Debate, 29*(5), 694-703.

Kohlhuber, M., Mielck, A., Weiland, S. K., & Bolte, G. (2006). Social inequality in perceived environmental exposures in relation to housing conditions in Germany. *Environmental Research, 101*(2), 246-255.

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health, 102*(5), 936-944.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American Community Survey. *Cityscape, 21*(1), 63-85.

Levine, M. (2013). *Perspectives on the current state of the Milwaukee economy*. Retrieved from Center for Economic Development, University of Wisconsin-Milwaukee: http://www4.uwm.edu/ced/publications/perspectives.pdf

Massey, D. S. (2005). Racial discrimination in housing: A moving target. *Social Problems, 52*, 148-149.

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Mehdipanah, R., Ramirez, J., Abedin, S., & F. Brown, S. (2018). Housing discrimination and health: Understanding potential linking pathways using a mixed-methods approach. *Social Sciences, 7*(10), 194.

Milwaukee Fair Housing Council. (2016). *Housing discrimination complaints filed: 2008-2016*.

National Fair Housing Alliance. (2014). *Expanding opportunity: Systemic approaches to fair housing*. Retrieved from http://www.nationalfairhousing.org/LinkClick.aspx?fileticket=MqO6AE6loGY%3D&tabid=3917&mid=5321

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The Fair Housing Act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Open Housing Law, Wisconsin Statute § 106.50 (1968).

Osypuk, T. L., & Acevedo-Garcia, D. (2010). Beyond individual neighborhoods: A geography of opportunity perspective for understanding racial/ethnic health disparities. *Health & Place, 16*(6), 1113-1123.

Pager, D., & Shepherd, H. (2008). The sociology of discrimination: Racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol, 34*, 181-209.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rothstein, R. (2017). *The color of law : A forgotten history of how our government segregated America*. First Edition. Liveright Publishing Corporation. New York.

Rugh, J. S., Albright, L., & Massey, D. S. (2015). Race, space, and cumulative disadvantage: A case study of the subprime lending collapse. *Social Problems, 62*(2), 186-218.

Sampson, R. J. (2019). Neighbourhood effects and beyond: Explaining the paradoxes of inequality in the changing american metropolis. *Urban Studies, 56*(1), 3-32.

State of Wisconsin. (2016). *Fair housing discrimination complaints filed*. Wisconsin Civil Rights Bureau.

Stokes, J. E. (2019). Trajectories of perceived neighborhood quality across the life course: Sociodemographic determinants and implications for well-being. *Social Science Research, 79*, 181-193.

Suglia, S. F., Duarte, C. S., & Sandel, M. T. (2011). Housing quality, housing instability, and maternal mental health. *Journal of Urban Health-Bulletin of the New York Academy of Medicine, 88*(6), 1105-1116.

U.S. Government Accountability Office. (2010). *Housing and community grants: HUD needs to enhance its requirements and oversight of jurisdictions' fair housing plans*. Retrieved from www.gao.gov/new.items/d10905.pdf.

US Department of Housing and Urban Development. (2015). *Assessment of fair housing*. Retrieved from https://www.law.cornell.edu/cfr/text/24/5.154.

US Department of Housing and Urban Development. (2017). *Fair housing violation complaints filed in Wisconsin: 2008-2016*.

Williams, D. R., Lawrence, J. A., & Davis, B. A. (2019). Racism and health: Evidence and needed research. In J. E. Fielding (Ed.), *Annual review of public health, vol 40* (Vol. 40, pp. 105-125).

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Wisconsin Public Health Association. (2018). *2018 resolution: Racism is a public health crisis*. Retrieved from Wisconsin Public Health Association: https://cdn.ymaws.com/www.wpha.org/resource/resmgr/2018_folder/WPHA_Racial_Equity_Resolutio.pdf

Yang, T. C., Chen, D., & Park, K. (2016). Perceived housing discrimination and self-reported health: How do neighborhood features matter? *Annals of behavioral medicine: A publication of the Society of Behavioral Medicine, 50*(6), 789-801.

Yang, T. C., & Chen, D. H. (2018). A multi-group path analysis of the relationship between perceived racial discrimination and self-rated stress: How does it vary across racial/ethnic groups? *Ethnicity & Health, 23*(3), 249-275.

Yang, T. C., Chen, I. C., Kim, S., & Choi, S. W. (2018). Differential investments and opportunities: How do neighborhood conditions moderate the relationship between perceived housing discrimination and social capital? *Social Science Research, 72*, 69-83.

Yang, T. C., & Sun, F. N. (2019). A longitudinal analysis of how perceived discrimination gets under the skin: Investigating gender and racial/ethnic differences. *Euramerica, 49*(2), 243-285.

Zhou, Y. H., Bemanian, A., & Beyer, K. M. M. (2017). Housing discrimination, residential racial segregation, and colorectal cancer survival in Southeastern Wisconsin. *Cancer Epidemiology Biomarkers & Prevention, 26*(4), 561-568.

CHAPTER 2: LITERATURE REVIEW AND RESEARCH CONTEXT

2.1. The multiple contexts of housing discrimination

Discrimination is multidimensional, relative and layered. The form and perception of discrimination vary in type, prevalence, distribution and ultimately on their impact on an individual's and the broader population's quality of life and well-being (Seaton et al., 2010; Krieger, 2012; Grollman, 2014). As Massey (2005) well describes in one single sentence: "discrimination is a moving target" (p.148). In this chapter, I describe the theoretical perspectives around discrimination and their role in institutional practices and policies relevant to housing and health.

2.1.1. From the inside out: Discriminatory behavior and bias

A key feature of any definition of discrimination is its focus on attitudes and behaviors (Pager & Shepherd, 2008). The psychological and attitudinal mechanisms range from implicit biases to explicit beliefs and ideologies. A combination of these can, therefore, perpetuate behavioral features leading to the act of discrimination from individual to institutional levels (Devine, 1989; Pager & Shepherd, 2008; Carlsson & Eriksson, 2017).

Implicit mechanisms of discrimination are described by Pager and Shepherd (2008) as intrapsychic factors which include implicit bias and unconscious stereotyping. In general, implicit bias and unconscious stereotyping involves inferring a link between two social or personal concepts that are not necessarily defining or true (Cox et al., 2012). While these factors may operate without complete conscious awareness, they influence cognition, behaviors and actions (Devine, 1989; Fazio & Olson, 2003; Pager & Shepherd, 2008). Classical research (Devine, 1989) and more recent studies (Devine et al., 2008; Cox et al., 2012) prove that

stereotyping are deeply embedded across psychological, cultural, and institutional contexts. Underlying assumptions on the social construction of target populations in the form of stereotyping can also exacerbate differences in how decisions are made toward one population versus another. Schneider and Ingram (1993) define social construction as a theory in which "the cultural characterization of persons or groups whose well-being and behaviors are affected by public policy" (p.334). Such prejudicial biases have been found to influence the decision-making process on issues such as who is granted (or not) the opportunity for accessing housing (Schneider & Ingram, 1993; Osypuk & Acevedo-Garcia, 2010; Narine & Shobe, 2014). As Pager and Shepherd (2008) argue, embedded stereotypes about social differences in conscious and unconscious evaluations set the stage for various forms of discriminatory treatment which in turn can promulgate disparate outcomes. However, not all forms of discrimination can be solely attributed to intrapsychic factors (implicit bias and unconscious stereotyping) because attitudes and behaviors at organizational and institutional levels also play important roles.

2.1.2. From within and beyond: Organizational and structural discrimination

Beyond attitudinal and intrapsychic factors that influence discriminatory treatment and disparate outcomes, a large body of research provides context on the influence of organizational actors and institutional actions. For instance, classic research by Baron and Bielby (1980) cited in Pager and Shepperd (2008; p. 138), framed the central role of organizations arguing the links between the "macro" and "micro" dimensions of inequality. The micro dimension relates to the intrapsychic factors discussed earlier and the macro dimension to complex institutional differentials catalyzed via organizational dynamics.

Research suggests that organizations are active actors in the economic and legal system by shaping and interpreting policies and practices (Pager & Shepherd, 2008; Rothstein, 2017).

For instance, several studies demonstrate ways in which the US federal government's lack of clear guidance regarding anti-discrimination law compliance allowed organizations to establish and legitimize their own measures in employment and housing market (Edelman, 1992; Kalev et al., 2006; Pager & Shepherd, 2008). Measures utilized by organizations include but were not limited to including racial exclusionary practices that perpetuated biases and contributed to disparate outcomes in residential conditions which were also combined with a greater body of structural and historic discrimination (Rothstein, 2017).

Structural discrimination is among the most prevailing system that enabled the disadvantage of members of certain groups due to their social and physical characteristics such as class, color, nationality, and gender among others (Pager & Shepherd, 2008; Rothstein, 2017). Like differential treatment in organizational settings, structural discrimination is a larger form of webbed attitudinal and organizational prejudice that have percolated through the creation and implementation of historical and modern policies (Blank et al., 2004; Rothstein, 2017). The term structural discrimination has been used in literature along with institutional discrimination. Additional concepts adding to this definition include institutional racism and sexism when referring to specific social constructs such as race and gender. Whether it is a broader or more specific concept, structural discrimination refers to the range of differential policies and practices (Pager & Shepherd, 2008). In turn, differential policies and practices influence public behavior (Perry, 2019); and these in turn influence perceptions, attitudes, organizations, and policies in on-going, iterative socio-political processes.

2.1.3. From time to time: Discrimination through history, urban planning and policies

The origins of contemporary disparities along racial, income and quality of life indicators are linked to historical practices of housing discrimination including redlining, housing

covenants, racially targeted federal housing policies (Massey & Denton, 1993; Pager & Shepherd, 2008; Rothstein, 2017). Research also shows that other forms of active discrimination in the housing market such as targeted subprime lending and rental steering contribute to disparities in quality of life (Massey et al., 2016; Faber, 2017; Rothstein, 2017). Yet, historical practices of housing discrimination are among the most severe with long-lasting effects (Rothstein 2017). The effects of historical discrimination are described in previous research as so deep and complex that if all contemporary forms of housing discrimination were eliminated today, disparities in residential conditions and quality of life would persist (Conley, 1999; Williams et al., 2019).

According to Omi and Winant (1994) and noted in more recent research by Rothstein (2017) and Williams et al. (2019), government institutions organized and enforced disparate politics of everyday life. This includes for example, enforcing presumably non-discriminatory housing policies that are administered and encoded into law (Rothstein 2017). Even without explicit intents, policies can play an active role in designating "winners and losers" in the allocation and receipt of resources, with implications for enduring inequalities (Rothstein 2017; Williams et al 2019). According to historical records discussed by Rothstein (2017), segregationist policies, and discriminatory planning and practice across the nation's cities and suburbs deprived equal housing opportunities, particularly to oppressed social groups such as non-whites, unmarried women, religious and ethnic minorities and immigrants. Historic segregationist and discriminatory practices led to a chain-reaction of enduring social disparities ranging from disparate housing choices to perpetrating poor housing conditions on oppressed social groups, and in turn to lower quality of life outcomes. As Rothstein (2017) concludes "the public policies from yesterday still shape the housing landscape today" (p. 187). Also, the

disconnect between social progress and physical plans for the built environment is a major criticism of the urban and regional planning practice (Fainstein & Fainstein, 2013).

While explicit discriminatory policy and planning practices, specifically racial zoning, were declared unconstitutional in 1917 per a Supreme court decision (Buchanan v. Warley), city and regional planners issued discriminatory zoning maps and guides that influenced their practice for decades.[4] Zoning, as Rothstein (2017) describes, had two faces. One face developed in part to evade a constitutional prohibition of racially explicit zoning by excluding the development and access of egalitarian housing choices under exclusionary clauses. The other allowed deteriorating housing conditions for marginalized populations by establishing industrial, environmentally unsafe businesses, and disreputable commercial establishments (e.g., taverns, night clubs) in neighborhoods with immigrants and non-white households and therefore "protecting" new and existing white neighborhoods by ensuring that these undesirable businesses could not locate in them. These practices, while argued by some scholars as "unintentional" (Semyonov et al., 2003; Narine & Shobe, 2014), prevented marginalized groups such as low-income immigrants and non-whites from buying or renting in white neighborhoods known for higher quality and more amenities. Additional barriers such as discriminatory policies and practices established by the Federal Housing Administration in 1934 (i.e., redlining) subsidized mortgage costs and supported, under the guidance of zoning maps, the development of middle-class residential developments reserved for privileged whites only (Rothstein, 2017).[5] These

[4] Buchanan vs. Warley Supreme Court decision is based on violation of the Fourteenth amendment of the US Constitution under the interpretation of "freedom of contract". This interpretation, as described by Rothstein (2017), notes that segregation or depriving access to purchase a residential property interfered with the right of negotiating work without government interference. Based on this, the Court ruled that the racial zoning interfered with the right of a property owner to sell to whomever he pleased.

[5] Privileged groups excluded primarily people of color, different national origin and religious minorities.

discriminatory policies and practices contributed in deteriorating the housing quality and exacerbating housing instability among the underprivileged (Rothstein, 2017). In 1968, as a result of intense civil unrest and protests in more than 150 cities across the U.S., the Kerner Commission deemed segregation a consequence of overt housing discrimination and "a key factor contributing to limiting access to decent housing, quality education and employment opportunities" (National Advisory on Civil Disorders, 1968; p.1) Therefore, the Commission recommended "a comprehensive and enforceable federal open housing law to cover the sale or rental of all housing, including single-family homes" (p.28).

Around that same time in the 1960s, urban planning scholars and practitioners such as Paul Davidoff, Bernard Frieden, and later Norman Krumholtz, called planners to focus their practice beyond the physical environment and address pressing social issues such as advancing equal housing opportunities. The concepts of advocacy, social and equity planning were developed as a response to the historical and ongoing (at the time) oppressive forces of urban development serving the privileged while leaving those who have few, if any, choices out in the margins (Davidoff, 1965; Frieden, 1967; Krumholz, 1982; Thomas, 1994; Fainstein & Fainstein, 2013). In one of his most cited articles, Davidoff (1965) presented advocacy planning as a foundation to promote justice and exhorted planners to become advocates for the people and communities they serve, especially disadvantaged groups (e.g., low income, immigrants and racial and ethnic groups historically oppressed). Around that time, Frieden (1967) introduced the concept of social planning requesting planners to emphasize on redistributing resources to the disadvantaged as a major policy goal. Similarly, Krumholz (1982) presented equity planning as a framework calling planners to adopt activist roles and advance egalitarian decision-making processes in cities and regions that promote equal opportunities. In overall, these planning

concepts were a wake-up call to advance equitable policies, most of these intersecting with one of the most important human rights: housing.

2.1.4. From progress to challenges: The mismatch between policies and implementation

In 1968, President Lyndon B. Johnson signed the Fair Housing Act (Civil Rights Act of 1968; 42 U.S.C § 3601) which prohibits discrimination based on race, color, religion, sex, or national origin during the sale, rental, financing or other housing-related services. Additionally, the Act requires the federal government to "provide, within constitutional limitations, for fair housing throughout the United States" (42 U.S.C § 3601) and "affirmatively further the purposes of [fair housing]" (42 U.S.C §3608(d)).[6] The Fair Housing Act considers both disparate treatment (intentional discrimination) and disparate impact (inequitable effects) within their regulatory context. Subsequent amendments such as the 1988 Fair Housing Amendments Act expanded protections to include people with disabilities and families with children. However, the main goal of eliminating discrimination and furthering fair housing and is yet to be achieved. As Jargowsky et al. (2019) notes, the Fair Housing Act "could well have been written with stronger enforcement mechanisms, but the larger reason it failed to deliver integrated living patterns is that it was undercut by the laws, regulations, institutions, and subsidies that govern and shape the production of housing" (p. 702). Few policies aimed delivering enforcement mechanisms to the Fair Housing Act, particularly the disparate impact liability mandate of affirmatively furthering

[6] The Fair Housing Act, 42 U.S.C §3608(d) states, "All executive departments and agencies shall administer their programs and activities relating to housing and urban development (including any Federal agency having regulatory or supervisory authority over financial institutions) in a manner affirmatively to further the purposes of this subchapter and shall cooperate with the Secretary to further such purposes." (*See also* Fair Housing Act, 42 U.S.C. § 3608(e)(5).) Litigation has made clear that the mandate applies to all Federal investments (*see* N.J. Super. Ct. App. Div. 2004). https://caselaw.findlaw.com/nj-superior-court-appellate-division/1084626.html.

fair housing. For instance, in 1995, the US Department of Housing and Urban Development (HUD) issued a policy that required agencies receiving federal funding to submit an analysis of impediments (AI) to fair housing and plan on addressing the disparate impacts of housing discrimination in states and eligible jurisdictions. However, the AI process was later criticized as being ineffective because HUD lacked appropriate agency enforcement and plans were rarely reviewed (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019). Enforcing the impact liability mandate of the Fair Housing Act remained practically dormant for another twenty years.

In 2015, the Supreme Court recognized that disparate impacts resulting from housing discrimination both explicitly and implicit, violate the Fourth teen Amendment of the US Constitution if the measure "were undertaken with discriminatory intent and had disparate effects...." (Harvard Law Review, 2015). The disparate impact argument was discussed in the court case Texas Department of Housing and Community Affairs v. Inclusive Communities Project (Harvard Law Review, 2015). That same year, HUD issued the "Affirmatively Furthering Fair Housing" (AFFH) rule which provides standards to comprehensively enforce the Fair Housing Act's disparate impact liability mandate.

The AFFH rule describes a new process to address disparate impacts resulting from discrimination and redefines the roles of the federal government, state and local actors. The rule replaced the AI process with a comprehensive and more collaborative "Assessment of Fair Housing" (AFH) for jurisdictions receiving federal funding, specifically Community Development Block Grants. Jurisdictions are required to examine patterns of historical and ongoing housing discrimination, such as segregation, and their related consequences to historically marginalized groups (e.g., Non-white racial and ethnic groups, female-headed

households, households with children, people with disabilities). Moreover, the AFFH rule requires "significant actions that are designed and can be reasonably expected to achieve a material positive change that affirmatively furthers fair housing by, for example, increasing fair housing choice or decreasing disparities in access to opportunity." (24 C.F.R. § 5.152). The rule articulates four main objectives:

1) to address disparities in housing needs and access to opportunity;

2) to replace segregated living patterns with truly integrated and balanced living patterns;

3) to transform racially or ethnically concentrated areas of poverty into areas of opportunities;

4) to foster and maintain compliance with civil rights and fair housing laws.

As O'Regan (2019) and Jargowsky et al. (2019) note, the AFFH rule is essentially a long-delayed policy to implement the Fair Housing Act's mandate to address housing discrimination in the contexts of disparate impact. The rule also clarifies that non-explicit housing disparities are relevant to AFFH objectives. For instance, the AFFH rule requests states to address levels of inequality in accessing neighborhood resources and amenities and resulting disparate outcomes in quality of life and well-being of people. The AFFH rule also recommends local jurisdictions to determine the best ways to address discrimination and disparities in housing needs. This provides some level of discretion and flexibility to state and local municipalities.

In Wisconsin, the pathways to address housing discrimination and their disparate impact on residents show some progress and outstanding challenges. In 1965, the state enacted a weak anti-discrimination housing law which was then amended in 1968 and revised throughout the

years to complement the federal Fair Housing Act.[7] The statute, namely the Wisconsin Open Housing Law, prohibits discrimination throughout the sale, rental, financing or other housing-related services to federally "protected classes" and individuals based on their marital status, ancestry, sexual orientation, lawful source of income, age (adults over 18 years old), and domestic abuse or sexual assault victims (Wis. Stat. § 106.50). While the state law includes a broader range of protected classes, the enforcement mechanism is weak due to implementation barriers. For instance, Wisconsin currently lacks substantial equivalency with the federal Fair Housing Act which limits the amount of federal funding and resources to address housing discrimination (Wisconsin, 2015).[8]

States with substantial equivalency with the Fair Housing Act meet both statutory and performance adequacy which means that their state legal obligations are consistent with the federal statute. Thus far, 36 states have statutes substantially equivalent to the Fair Housing Act (**Figure 2.1**). These states can receive federal funding and training from HUD on fair housing enforcement issues which allows them to appropriately investigate, educate and settle housing discrimination issues (Wisconsin, 2015; US Department of Housing and Urban Development, 2019b). The main difference between the Wisconsin Open Housing Law and the Fair Housing Act is that the state's statute "do not specifically provide [complainants] with legal representation [options] at the [state's] agency expense…" (Wisconsin, 2015; p.12). To secure substantial equivalency, the state would need to revise its Open Housing Law. The lack of substantial equivalency not only hinders enforcement capacity to address housing discrimination

[7] The 1965 Open Housing Law signed by Wisconsin governor Warren Knowles prohibited discrimination in the sale, rental or financing of multi-family housing with five or more units, excluding 75% of the state housing stock which comprised of owner-occupied units and apartment units with four or less units.

[8] A change resulting from the 1988 amendments to the Fair Housing Act, led HUD to de-certify Wisconsin as substantially equivalent in early 1993.

but may also impede residents' education on knowing their rights, report violations, and ultimately access equal housing opportunities (Wisconsin, 2015; p. 91).

Delays on implementing the AFFH rule pose another barrier to addressing housing discrimination and affirmatively further fair housing in Wisconsin. Up to this date, the state has not issued a comprehensive AFH report as expected under 2015 the AFFH rule. Moreover, in January 2018, HUD announced delays on the AFH reporting process and requested states to conduct instead AI reports (83 FR 683).[9] As noted, AI reports are ineffective and practically unenforceable (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019). Additional barriers include proposed changes in federal housing regulation. In August 2018, HUD issued a notice of proposed changes to the AFFH rule loosening the rule's enforcement mechanisms (83 FR 159 40713). Scholars argue that final changes in the AFFH rule may depend on whether a compelling body of evidence shows the extent of discrimination-related impacts across jurisdictions and whether the political environment allows appropriately enforcing the affirmatively further fair housing standards consistent with the mandate under the Fair Housing Act (O'Regan & Zimmerman, 2019). Therefore, in the wake of proposed changes, it appears almost critical as is was nearly 50 years ago to understand the extent of housing discrimination and its association with residential conditions and health outcomes during a relatively recent timeframe.

Some scholars argue that the mere existence of gaps in the implementation of fair housing laws are due to ongoing biases at the interpersonal, organizational and institutional levels of planning, policymaking and market practices (Lovering, 2010; Fainstein & Fainstein,

[9] Wisconsin's most recent AI report was published in 2015. The report outlines the demographic, economic and social composition of the state, administrative rules relevant to housing, data on housing discrimination complaints, general impediments to fair housing and a broad plan to overcome such impediments.

2013; Brand, 2015). For instance, recent discriminatory housing market practices that contributed to the Great Recession are among the most recently studied examples of rampant bias. One of the most troubling forms of such recent discrimination is the so-called "reverse redlining" and the "subprime boom" of the 2000s (Foster & Kleit, 2014; Massey et al., 2016; Faber, 2017). These practices included excessive marketing and lending of subprime loans with high interests to historically marginalized groups (e.g., non-whites), including those with higher incomes (Massey et al., 2016; Faber, 2017). The practice of "reverse redlining" contributed to the 2008 Great Recession because the sub-prime loans were set to default among targeted marginalized households (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017). In combination with prevalent patterns of residential segregation and on-going discrimination in housing markets, despite anti-discrimination laws in place, impacts are spread into inequities in residential conditions and quality of life (McClure et al., 2019). Therefore, while the federal and state fair housing laws discussed herein embrace *in writing* the concept of equal housing opportunity, deficient enforcement mechanisms and recent discriminatory practices such as those that contributed to the Great Recession reject, *in action,* equal opportunities for those who have few, if any, choices.

2.1.5. Summary

Throughout this section, I discussed the multidimensional aspects of housing discrimination. These views on the theory of discrimination include intrapsychic, organizational, structural and historical factors. Understanding the multiple components of housing discrimination provides a foundation to recognize potential pathways between discrimination and disparities in quality of life indicators and health outcomes.

I also discussed the roles of housing policies as mechanisms perpetuating and combating housing discrimination. As a perpetrator, early housing policies delivered segregationist planning practices with implications extending up to the present date. As a combater, housing policies – especially the Fair Housing Act enacted nearly 50 years ago – sought to prohibit housing discrimination and required to affirmatively further fair housing. Interpretations of the Fair Housing Act considered both disparate treatment and disparate impact within their regulatory context. However, challenges remain at a national and state level, particularly in Wisconsin, because the Fair Housing Act has been undercut by the lack of regulatory equivalency that hinders the enforcement of fair housing. Additional challenges in the implementation of fair housing policies include recent discriminatory events related to the Great Recession and proposed changes in federal housing regulations putting the goals of equal housing opportunity and the legacy of the Fair Housing Act on jeopardy. In the wake of challenges and recently proposed regulatory changes, assessing housing discrimination and understanding the extent discrimination associates with disparities in quality of life factors, particularly health, appears almost as critical as is was nearly 50 years ago.

2.2. Assessing housing discrimination in Wisconsin

State-wide assessments of housing discrimination and their effects remain understudied in Wisconsin even when various data and methods are available. Previous studies in the state have utilized matched-pair testing as an investigative tool to examine differential treatment to individuals of equal qualifications but different demographic characteristics seeking housing (US Department of Housing and Urban Development, 2014). Other studies, mostly done by government and planning commissions, used administrative data such as formal housing discrimination complaints to roughly estimate rates of reporting discrimination (Southeastern

Wisconsin Regional Planning Commission, 2013; Wisconsin, 2015). Some academic research used mortgage disclosure data and assessed racial residential segregation patterns to examine the disparate impact of discrimination on health from lending markets (Beyer et al., 2016; Zhou et al., 2017). Lastly, recent research used qualitative methods to assess personal experiences of discrimination (Rosenblatt & Cossyleon, 2018). However, up to this date, there is no study in Wisconsin that examined reported measures of housing discrimination from formal complaints and self-reports collected via surveys. Reported measures of housing discrimination such as formal filings of housing discrimination complaints and self-reported perceived housing discrimination are available tools that may offer a rough estimate of discrimination occurrences in housing and expand our understanding about potential patterns. Here I describe these measures and make some noteworthy observations.

2.2.1. Formal complaints of housing discrimination

According to complaint data, housing discrimination occurs state-wide. In Wisconsin, complaints are received by 3 different agencies: the US Department of Housing and Urban Development (HUD), the State Department of Workforce Development (DWD-ERD) Equal Rights Division and the Metropolitan Milwaukee Fair Housing Council (MMFHC). Each of these agencies process complaints from all 72 counties in the state. Despite their administrative volume, their capacity is limited. For example, complaints filed to HUD only apply to violations of the federal Fair Housing Act while complaints filed to the DWD-ERD may cover a wider range of violations under the state law.

Throughout this study's timeframe (2009-2013), the agencies received a combined total of 1,888 housing discrimination complaints. In 2011, a total of 440 complaints were filed, the highest in the 5-year interval (**Figure 2.2**). While formal discrimination complaints can be

tracked throughout the years, trends may show inconsistencies because not all discriminatory practices are illegal and many are unreported (Pager & Shepherd, 2008; National Fair Housing Alliance, 2014).

The National Fair Housing Alliance (NFHA) estimates that about 4 million housing discrimination incidents occur each year in the U.S. (National Fair Housing Alliance, 2014; Wisconsin, 2015). A study conducted in 2018 by Zillow and the NFHA surveyed 10,000 adults in the 20 largest metropolitan areas in the U.S. and found that roughly 1 in 4 adults perceived discrimination during their lifetime when searching for housing (Zillow, 2019). The study projected that the ratio, applied to the US population, is about 68 million. However, only about 28,000 incidences of housing discrimination are actually reported each year through formal complaint filings processed by private and government organizations overseeing fair housing issues (National Fair Housing Alliance, 2016). The low rate of reporting may come from fear of retaliation, lack of knowledge of policies and protection schemes, burdensome complaint process, or feeling apathetic due to previous discrimination experiences and believing that reporting will not make a difference (Raj & Silverman, 2002; Wisconsin, 2015; Greenberg et al., 2016).

Another potential inconsistency between reported housing discrimination through formal complaints and actual incidences is the potential for data duplication. In Wisconsin, there is a risk of data duplication because the agencies are not in sync with each other (Wisconsin, 2015).[10] Also, an increase in complaints could either indicate more discrimination or more reporting due to greater knowledge of fair housing laws. Regardless of the direction of the data, formal filings

[10] Wisconsin's lack of substantial equivalency with the Fair Housing Act also limits agencies because these do not have work sharing agreements. Therefore, someone could file a complaint with both the state's DWD-ERD and HUD without the enforcement agencies knowing (Wisconsin 2015).

housing discrimination complaints suggest that individuals experience housing discrimination whether they more knowable of their rights or not. Additional analysis with other measures of housing discrimination may illuminate potential trends and prevalence.

2.2.2. Self-reported perceived housing discrimination

The self-reported measure of perceived housing discrimination is obtained from a questionnaire administered to a representative sample of the Wisconsin population that participated in the Survey of the Health of Wisconsin (SHOW) from 2009 to 2013. The instrument is based on the Detroit Area Study Discrimination Questionnaire (DAS-DQ). The perceived housing discrimination measure is labeled under "major experiences of discrimination" which connotes "major experiences involving violations of civil rights" through the life course (Taylor et al., 2004). This is because perceptions are estimates of actual experiences of events and the impression of such events is "real in its consequences" (Gayman & Barragan, 2013; Carlsson & Eriksson, 2017). Scholars such as Williams and Mohammed (2009) and more recently Benner et al. (2018) suggest that self-reported measures of perceived discrimination throughout an individual's life course, also known as "lifetime discrimination", are proxies to cumulative disadvantage. The specific question from the SHOW on housing discrimination, explained in more detail in Chapter 3, reads: "Have you ever felt unfairly treated in getting housing or finding a place to live? (*For example, you were prevented from renting or buying a home in the neighborhood you wanted or were prevented from remaining in a neighborhood because neighbors made life so uncomfortable?*)."

Among the 2,704 surveyed adults in Wisconsin, 187 individuals reported perceived housing discrimination sometime during their life. The proportion of individuals that perceived housing discrimination is 7.4% or roughly 1 in 15 adults, after applying sampling weights. On a

year-to-year comparison from 2009 to 2013, the percentage of reported perceived housing discrimination did not substantially vary during the 5-year interval (**Figure 2.3**). This suggests that, while formal complaints show a potential trend of housing discrimination incidences peaking in 2011, the proportion of perceived housing discrimination is steady.

When comparing the self-reported perceived housing discrimination and data from formal complaints, it is important to note that both measures of housing discrimination are essentially different. This is because formal complaints are relevant to recent housing discrimination experiences likely within a year (Wisconsin, 2015; US Department of Housing and Urban Development, 2019a) and self-reported perceived exposure to housing discrimination may include a broader timeframe (Lewis et al., 2015). Some scholars argue that measures of self-reported perceived lifetime discrimination are more likely to capture recent experiences (Pager & Shepherd, 2008; Williams & Mohammed, 2009) while others argue that lifetime discrimination may include severe incidents that occurred more than a year ago (Lewis et al., 2015; Yang & Sun, 2019). Because the SHOW does not capture exactly when a perceived exposure to housing discrimination occurred, I apply a broad timeframe assumption (i.e., lifetime) while also considering that the data were collected after the housing market crash and the Great Recession, and recent events are more likely recalled. Some scholars suggest that research on lifetime exposure to discrimination captured should consider events likely affecting large populations (Williams & Mohammed, 2009). Significant events may include recessions (e.g., the 2008 Great Recession) and change the political environment which can correlate with hostility against certain social groups (Williams & Medlock, 2017; Williams et al., 2019). Therefore, throughout this research, I assess housing discrimination in Wisconsin as a perceived exposure that occurred

sometime during an individual's life course while also acknowledging the timeframe when the SHOW data were collected and when formal complaints were filed.

2.2.3. Summary

This section provided an overview of reported housing discrimination in Wisconsin from formal complaints and survey data collected from 2009 to 2013. Initial assessments suggest that people in Wisconsin experienced housing discrimination and reported incidences that appeared to peak in 2011 during the 5-year timeframe of this study. However, potential inconsistencies in the data and the time range limit making inferences on potential trends. Nevertheless, this assessment provides contexts suggesting occurrences of unfair discriminatory treatment in housing transactions in the state of Wisconsin. Understanding these contexts are important to examine the extent of experienced housing discrimination and its association with residential conditions and health outcomes.

2.3. Housing discrimination as a social determinant of health

2.3.1. Overview of social determinants of health

The World Health Organization (WHO) defines social determinants of health (SDH) as "the conditions in which people are born, grow, live, work and age" WHO (2017). These are nonmedical factors at the individual and community level that influence people's health (Braveman et al., 2011). Community-level factors include but are not limited to poverty rate, high-school or college graduation rate, neighborhood conditions, and crime. Individual-level factors include but are not limited to household income, education level attainment, housing conditions, and social networks. SDHs are often referred as "upstream" or underlying causes for health disparities that cannot be addressed in medical settings (Slade-Sawyer, 2014). Housing,

particularly barriers to equal housing opportunities, are among a wide array of social determinants of health with a large level of complexity (Shaw, 2004; Williams & Mohammed, 2009; Williams et al., 2019). Housing discrimination is amongst the most complex and pernicious barrier to equal housing opportunities associated with inequities in health outcomes (Dunn, 2000; Williams et al., 2019). However, debates remain on the extent and underlying mechanism in which experienced housing discrimination associates with health.

2.3.2. Discrimination: A determinant of residential inequality and health disparities?

Recent studies suggest that discrimination is both a determinant of residential inequalities and a social determinant of health (Williams & Mohammed, 2009; Krieger, 2012; Yang et al., 2016; Mehdipanah et al., 2018). Through an extensive review of the research literature, I identify three pathways in which discrimination associates with residential conditions and health outcomes, particularly with mental health.

First, research shows discrimination is directly associated with poor residential conditions. For instance, studies show that individuals and families that were subject to housing discrimination are more likely to live in undesirable or lower-quality neighborhoods or homes (Massey & Denton, 1993; Acevedo-Garcia & Lochner, 2003; Rosenblatt & Cossyleon, 2018; Stokes, 2019) and prone to housing instability (Priester et al., 2017). The underlying mechanism of housing discrimination shown in most known studies puts discrimination as a contributing factor to poor residential conditions. However, additional research unveils discriminatory practices and experiences in higher-quality residential conditions suggesting that the experience of discrimination might occur in these high-quality environments in which social oppression trigger individuals to feel stressed and ultimately move to lower-quality neighborhoods (Eligon & Gebeloff, 2016; Yang et al., 2016; Sampson, 2019).

Second, studies suggest that discrimination is directly associated with poor self-reported health status (Williams et al., 2003; Williams & Mohammed, 2009; Yang & Sun, 2019). Additional research shows discrimination relates with stress, anxiety and depression in children and adults (Sawyer et al., 2012; American Psychological Association, 2016; Taylor et al., 2019; Williams et al., 2019). The direct relationship between discrimination and health in these studies refers mostly to experienced or perceived discrimination.

Third, housing discrimination indirectly associates with poor mental health outcomes due to deteriorating housing conditions and instability (Barata & Stewart, 2010; Osypuk & Acevedo-Garcia, 2010; Desmond & Kimbro, 2015). Likewise, individuals that reside in poor housing conditions are more likely to have physical health issues such as asthma (Jacobs et al., 2010; Thomson et al., 2013; Beck et al., 2014). The mechanisms in which discrimination is operationalized is a latent contributing factor of disparities in health outcomes.

2.3.2.1. Discrimination and residential quality

Research literature suggests that discrimination in the form of unfair treatment when accessing housing leads to neighborhood disadvantages such as concentrated poverty, high crime rates, and lower educational opportunities (Desmond & Shollenberger, 2015; Greenberg et al., 2016). Individuals exposed to discrimination may be forced to live lower-quality homes and neighborhoods with higher rates of nuisances (Yang et al., 2016; Mehdipanah et al., 2018; Stokes, 2019). Lower-quality home conditions are in turn predictive of acute and chronic diseases (Jacobs et al., 2009; Northridge et al., 2010).

Housing discrimination also influences negative impacts on individuals from marginalized social constructs (e.g., Non-whites, females, low income) seeking to move or that

ultimately move to majority-white affluent neighborhoods that tend to have higher quality characteristics such as proximity to parks, access to healthy foods and other amenities (Osypuk & Acevedo-Garcia, 2010; Eligon & Gebeloff, 2016; Yang et al., 2016; Stokes, 2019). This restricts some individuals to reside in less affluent neighborhoods or exacerbating their sense of deprivation from building strong social ties in affluent neighborhoods. For example, a study in Philadelphia from Yang et al. (2016) found a significant negative association between perceived housing discrimination and self-reported health status among Non-Hispanic Blacks living in neighborhoods with higher home values. According to the study, when some of these individuals move to an affluent neighborhood, they are more likely to sense deprivation from social ties and resources. Another study in Southeastern Wisconsin from Zhou et al. (2017) found that black women that lived in a neighborhood with higher rates of racial bias in the mortgage lending process, as disclosed by Mortgage Data Disclosure Act data, have reduced likelihood for cancer survival. This is because the effect of housing discrimination has been linked to disruption on building social ties among new residents in affluent neighborhoods or places with higher bias but attenuated when existing social supports can counter the negative experience (Stafford et al., 2010; Yang et al., 2016; Priester et al., 2017; Yang et al., 2018). When individuals attribute the lack of resources to their exposure to discrimination in housing transactions, it may exacerbate anxiety or depression which can also have further negative impacts on health (Jencks & Mayer, 1990; Yang et al., 2016).

2.3.2.2. Discrimination and housing instability

Discrimination also plays a role in housing instability (Desmond et al., 2015; Greenberg et al., 2016; Priester et al., 2017). Housing instability includes a combination of short residence duration, frequent moves, financial constraints, and risk or current homelessness status (Kushel

et al., 2006; Bailey et al., 2016; Priester et al., 2017). Research suggests that housing instability is associated with poor health outcomes (Siefert et al., 2001; Desmond & Kimbro, 2015). A study conducted by Priester et al. (2017) in the Atlanta metropolitan area, with a sample of mostly African American women, found that individuals exposed to discrimination were more likely to be at risk of housing instability. Priester et al. (2017) and others (Charles, 2003; Roscigno et al., 2009; McClure et al., 2019) also argue that disproportional rates of foreclosures and evictions primarily impacting African American and female-headed households are a form of housing instability influenced by discriminatory practices in the housing market. This is because discrimination is linked to barriers in housing access, and thus it is conceivable that discrimination associates with the risk of housing instability (Priester et al., 2017; p.123). A study by Desmond and Kimbro (2015) on low-income urban mothers found that housing instability resulting from evictions are linked to psychological distress and depression. Therefore, these studies suggest that the effects of housing discrimination such as being steered away from better-quality housing, denied a mortgage, or unfairly evicted can exacerbate residential disadvantage in the way of depriving opportunities for better quality of life and influencing the likelihood for mental distress, depression or other poor health outcomes (Osypuk & Acevedo-Garcia, 2010; Desmond & Kimbro, 2015; Greenberg et al., 2016).

2.3.2.3. Discrimination and stress, anxiety and depression

Growing research evidence shows links between housing discrimination and stress. For instance, discrimination exacerbates stress and is associated with anxiety and depression in children and adults (Williams et al., 2003; Williams & Mohammed, 2009; Anderson, 2013; Sirin et al., 2015; American Psychological Association, 2016; Benner et al., 2018). A study by the American Psychological Association (2016) found that regardless of the domain in which

exposure to discrimination occurred (e.g., neighborhood, housing, employment), individuals that experienced discrimination are more likely to report stress and poorer health outcomes. Also, once an exposure to discrimination occurred and depending on the level and significance of such exposure, individuals may be at risk of anxiety and an increased state of vigilance thus triggering further stress responses that in turn may contribute to chronic conditions such as high blood pressure (Sawyer et al., 2012; American Psychological Association, 2016). These findings goes in hand with other studies suggesting that discrimination in overall is a stressor and an agent of disease (Link & Phelan, 1995; Williams & Mohammed, 2009; Yang et al., 2016; Link et al., 2017; Williams et al., 2019).[11] In the housing domain, Yang et al. (2016) found that discrimination in housing transactions is associated with a higher likelihood of psychological stress and can eventually lead to poor overall health. These mechanisms suggest that the exposure to housing discrimination is both, directly and indirectly, related to individual health, and ultimately to disparities in population health outcomes impacting one group over another. Based on the increasing evidence showing links between discrimination and poor health outcomes, scholars and public health advocates alike have recently declared discrimination as a social determinant of health and as a public health crisis (Wisconsin Public Health Association, 2018; Williams et al., 2019).

2.3.3. Discrimination as a public health crisis

While there is no epidemiologic definition of "crisis", the health impact of discrimination was recently recognized to meet the definition proposed by epidemiologist Dr. Sandro Galea, as

[11] Some scholars note that the relationship between socio-physical disadvantages (e.g., poor housing, neighborhood and social conditions) and health may be bi-directional. While the general assumption holds health as the ultimate outcome that is influenced by physical and social forces, studies have suggested that health (especially pre-existing health conditions) may determine social and economic standing and influence were and how an individual resides (*see Marmot and Wilkinson (1999), and Baker et al. (2014))*

"a problem affecting large numbers of people, threatening health over the long term, and requiring the adoption of large-scale solutions" (Galea, 2017; Wisconsin Public Health Association, 2018; Williams et al., 2019). Also, discrimination is considered a contributor to health inequities (Williams & Mohammed, 2009; Osypuk & Acevedo-Garcia, 2010; Mehdipanah et al., 2018; Williams et al., 2019). Health inequities are avoidable differences in the social, environmental and political conditions that shape health outcomes and disproportionately burden the disadvantaged such as low income, non-whites and migrants (Corburn, 2017). Therefore, health equity entails focused efforts to address avoidable social inequalities by emphasizing the conditions for everyone's health, especially those who have experienced socioeconomic disadvantage or historical injustices (Braveman & Gruskin, 2003; Corburn, 2017). Health equity is not the context of equality (sameness) but rather implies social efforts to ensure that historically marginalized groups have enhanced opportunities to access health-promoting resources and that existing barriers are removed (Corburn, 2017).

In May 2018, the Wisconsin Public Health Association (WPHA) passed a resolution declaring racism as a public health crisis and called for state-wide action to promote health equity. While discrimination goes beyond the social construct of race, the resolution is among the first one-of-its-kind to explicitly to recognize racism as a form of discrimination impacting overall public health and requesting remediation. An excerpt of the declaration reads as follow:

"*We agree that racism is a public health crisis and commit to take urgent action because:*

Race is a social construction with no biological basis;

Racism is a social system with multiple dimensions: individual racism is internalized or interpersonal; and systematic racism is institutional or structural, and is a system of structuring

opportunity assigning value based on the social interpretation on how one looks, that unfairly disadvantages some individuals and communities, unfairly advantages other individuals and communities, and saps the strength of the whole society through the waste of human resources; Racism causes persistent racial discrimination in housing, education, employment and criminal justice and an emerging body of research demonstrates that racism is a social determinant of health;

More than 100 studies have linked racism to worse health outcomes…" (Wisconsin Public Health Association, 2018).

The declaration demonstrates the wide-spread relevance of racism. However, most of the resolution's planned actions focus on internal practices. For example, 4 of the 6 resolution's items attempts to establish internal organizational practices while the last two extends some support for public policy advocacy and on building partnerships with other organizations to bring awareness on racism as a public health threat. An excerpt of the 2018 WPHA resolution reads as follow:

"*Therefore, be it resolved that the Wisconsin Public Health Association:*

[1.] Asserts that racism is a public health crisis affecting our entire society;

[2] Conduct an assessment of internal policies and procedures to ensure racial equity is a core element of WPHA…

[5] Advocates for relevant policies that improve health in communities of color, and supports local, state, and federal initiatives that advance social justice, while also encouraging individual member advocacy to dismantle systemic racism;

[6] Works to build alliances and partnerships with other organizations that are confronting racism and encourages other local, state and national entities to recognize racism as a public health crisis…" (Wisconsin Public Health Association, 2018).

Similar movements and resolutions have been enacted recently. For example, public health movements across the nation sponsored by the American Public Health Association (American Public Health Association, 2019) declared racism as a public health threat and proposed racial healing as a pathway to achieve health equity. Global initiatives such as the Campaign Against Racism of the Social Medicine Consortium with over 250 members and 22 chapters across countries educate health professionals about structural racism and social determinants of health while providing support to implement racial justice actions (Social Medicine Consortium, 2018). Lastly, on May 20th, 2019, Milwaukee County's Executive signed a resolution declaring racism as a public health emergency becoming the first municipality in the US to make such declaration (Abele & Nicholson, 2019). These recent actions demonstrate long-overdue steps to recognize discrimination as a social determinant of health and promote actions to overcome their effects on individuals and communities. However, among forms of discrimination, I argue that housing discrimination is the most pernicious because their effect may ripple across residential conditions, quality of life and ultimately health. Scholars such as Krieger (2012) proposed a framework to understand the connecting mechanisms between housing discrimination and health outcomes to help us understand further the complexity of this phenomenon on health.

2.3.4. The eco-social framework to examine housing discrimination's impact

This dissertation is built upon an eco-social framework because housing discrimination is not an isolated issue (Krieger, 2012). An eco-social model, developed by Krieger (2012), draws

upon a multilevel theory of health-related issues that integrates individual and collective social and environmental factors. The eco-social model acknowledges the psychosocial, historical, and spatiotemporal perspectives to further understand inequities in health. This approach requires considering pathways on the type of exposure and their domain (in this case, the event of housing discrimination). Krieger's eco-social theory indicates that there is no one path in which discrimination harms health but many pathways that may interconnect. Therefore, studying the complex phenomenon of housing discrimination within the context of the built and social environment and acknowledging historical and recent events (i.e., the Great Recession) can provide an integrated approach to better understand the impact of perceived housing discrimination. Also, comparing the potential impacts of exposure to housing discrimination among individual and contrasting social characteristics will help illustrate a clearer picture of the levels of impact across populations.

2.3.5. Summary

In this section, I describe a variety of research, most of which suggest that discrimination is a determinant of residential inequality and health disparities. First, discrimination may force individuals and families to live in undesirable or lower-quality neighborhoods or homes. This, in turn, relates housing quality to exposure to potential hazards in homes such as pests, mold, chipping lead paint and thus trigger higher risks for chronic and acute diseases. Second, housing discrimination contributes to housing instability which in turn hinders opportunities to access good-quality housing and neighborhoods and may, in turn, contribute to poor health. Third, housing discrimination contributes to stress, anxiety and depression which is also linked to overall poor health outcomes. Based on the complexity and potential interrelationship between perceived housing discrimination and residential factors on health, this dissertation builds upon

an eco-social framework originally developed by Krieger (2012). This framework draws upon a multilevel theory of health-related issues within the housing domain that integrates the physical and social domains of housing.

2.4. References

Abele, C., & Nicholson, M. (2019). *Resolution 19-397: Requesting approval to recognize April 1-7 as National Public Health Week and supporting Milwaukee County's commitment to achieve racial equity and transform systems and institutions impacting the health of our community*. County Legislative Information Center Milwaukee County Board of Supervisors Retrieved from https://milwaukeecounty.legistar.com/LegislationDetail.aspx?ID=3915601&GUID=107F6551-8B82-45A8-A870-9B7516DD81AD.

Acevedo-Garcia, D., & Lochner, K. (2003). Residential segregation and health. In I. Kawachi & L. F. Berkman (Eds.), *Neighborhoods and health* (pp. 265–281.). New York: Oxford University Press.

American Psychological Association. (2016). *Stress in America: The impact of discrimination*. Retrieved from https://www.apa.org/news/press/releases/stress/2015/impact-of-discrimination.pdf

American Public Health Association. (2019). Racism and health. Retrieved from https://www.apha.org/topics-and-issues/health-equity/racism-and-health.

Anderson, K. F. (2013). Diagnosing discrimination: Stress from perceived racism and the mental and physical health effects. *Sociological Inquiry, 83*(1), 55-81.

Bailey, K. T., Cook, J. T., de Cuba, S. E., Casey, P. H., Chilton, M., Coleman, S. M., Cutts, D. B., Heeren, T. C., Rose-Jacobs, R., Black, M. M., & Frank, D. A. (2016). Development of an index of subsidized housing availability and its relationship to housing insecurity. *Housing Policy Debate, 26*(1), 172-187.

Baker, E., Mason, K., Bentley, R., & Mallett, S. (2014). Exploring the bi-directional relationship between health and housing in australia. *Urban Policy and Research, 32*(1), 71-84.

Barata, P. C., & Stewart, D. E. (2010). Searching for housing as a battered woman: Does discrimination affect reported availability of a rental unit? *Psychology of Women Quarterly, 34*(1), 43-55.

Baron, J. N., & Bielby, W. T. (1980). Bringing the firms back in - stratification, segmentation, and the organization of work *American Sociological Review, 45*(5), 737-765.

Beck, A. F., Hunang, B., Chundur, R., & Kahn, R. S. (2014). Housing code violation density associated with emergency department and hospital use by children with asthma. *Health Affairs, 33*(11), 1993-2002.

Benner, A. D., Wang, Y. J., Shen, Y. S., Boyle, A. E., Polk, R., & Cheng, Y. P. (2018). Racial/ethnic discrimination and well-being during adolescence: A meta-analytic review. *American Psychologist, 73*(7), 855-883.

Beyer, K. M. M., Zhou, Y., Matthews, K., Bemanian, A., Laud, P. W., & Nattinger, A. B. (2016). New spatially continuous indices of redlining and racial bias in mortgage lending: Links to survival after breast cancer diagnosis and implications for health disparities research. *Health & Place, 40*, 34-43.

Blank, R. M., Dabady, M., & Citro, C. F. (2004). Causal inference and the assessment of racial discrimination *Measuring racial discrimination*. Washington, DC: The National Academies Press.

Brand, A. L. (2015). The politics of defining and building equity in the twenty-first century. *Journal of Planning Education and Research, 35*(3), 249-264.

Braveman, P., Egerer, S., & Williams, D. R. (2011). The social determinants of health: Coming of age. *Annual Review of Public Health, 32*, 381-398.

Braveman, P., & Gruskin, S. (2003). Defining equity in health. *J Epidemiol Community Health, 57*(4), 254-258.

Buchanan v. Warley, No. 245 U.S. 60 (U.S. Supreme Court 1917).

Carlsson, M., & Eriksson, S. (2017). Do attitudes expressed in surveys predict ethnic discrimination? *Ethnic and Racial Studies, 40*(10), 1739-1757.

Charles, C. Z. (2003). The dynamics of racial residential segregation. *Annu Rev Sociol, 29*, 167-207.

Conley, D. (1999). *Being black, living in the red: Race, wealth, and social policy in america*. Berkeley: Univ. Calif. Press.

Corburn, J. (2017). Urban place and health equity: Critical issues and practices. *Int J Environ Res Public Health, 14*(2).

Cox, W. T. L., Abramson, L. Y., Devine, P. G., & Hollon, S. D. (2012). Stereotypes, prejudice, and depression: The integrated perspective. *Perspectives on Psychological Science, 7*(5), 427-449.

Davidoff, P. (1965). Advocacy and plurarism in planning. *Journal of the American Institute of Planners, 31*(4), 331-337.

Desmond, M., Gershenson, C., & Kiviat, B. (2015). Forced relocation and residential instability among urban renters. *Social Service Review, 89*(2), 227-262.

Desmond, M., & Kimbro, R. T. (2015). Eviction's fallout: Housing, hardship, and health. *Social Forces*.

Desmond, M., & Shollenberger, T. (2015). Forced displacement from rental housing: Prevalence and neighborhood consequences. *Demography, 52*, 1751-1772.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology, 56*(1), 5-18.

Devine, P. G., Rhodewalt, F., & Siemionko, M. (2008). Personality and prejudice in interracial interactions. *Personality and Social Behavior*, 223-249.

Dunn, J. R. (2000). Housing and health inequalities: Review and prospects for research. *Housing Studies, 15*(3), 341-366.

Edelman, L. B. (1992). Legal ambiguity and symbolic structures - organizational mediation of civil rights law. *American Journal of Sociology, 97*(6), 1531-1576.

Eligon, J., & Gebeloff, R. (2016). Affluent and black, and still trapped by segregation: Why well-off black families end up living in poorer areas than white families with similar or even lower incomes. *New York Times*. 8/20/2016

Faber, J. W. (2017). Segregation and the geography of creditworthiness: Racial inequality in a recovered mortgage market. *Housing Policy Debate*, 1-33.

Fainstein, S., & Fainstein, N. (2013). Restoring just outcomes to planning concerns *Policy, planning and people: Promoting justice in urban development* (pp. 32-53). Philadelphia: University of Pennsylvania.

Fair Housing Act, Pub. L. No. 90-448 (1968).

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297-327.

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Frieden, B. (1967). The changing prospects for social planning. *Journal of the American Institute of Planners*(33), 311-323.

Galea, S. (2017). Crying "crisis". Retrieved from https://www.bu.edu/sph/2017/04/23/crying-crisis/

Gayman, M. D., & Barragan, J. (2013). Multiple perceived reasons for major discrimination and depression. *Society and Mental Health, 3*(3), 203-220.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Grollman, E. A. (2014). Multiple disadvantaged statuses and health: The role of multiple forms of discrimination. *Journal of health and Social Behavior, 55*(1), 3.

Harvard Law Review. (2015). Texas department of housing & community affairs v. Inclusive community project, inc. *Race and Law, 129*(321), 321-330. Retrieved from https://harvardlawreview.org/2015/11/texas-department-of-housing-community-affairs-v-inclusive-communities-project/.

Jacobs, D. E., Brown, M. J., Baeder, A., Sucosky, M. S., Margolis, S., Hershovitz, J., Kolb, L., & Morley, R. L. (2010). A systematic review of housing interventions and health: Introduction, methods, and summary findings. *Journal of Public Health Management and Practice, 16*(5), S5-S10.

Jacobs, D. E., Wilson, J., Dixon, S. L., Smith, J., & Evens, A. (2009). The relationship of housing and population health: A 30-year retrospective analysis. *Environmental Health Perspectives, 117*(4), 597-604.

Jargowsky, P. A., Ding, L., & Fletcher, N. (2019). The Fair Housing Act at 50: Successes, failures, and future directions. *Housing Policy Debate, 29*(5), 694-703.

Jencks, C., & Mayer, S. (1990). The social consequences of growing up in a poor neighbourhood. In L. Lynn & M. McGeary (Eds.), *Inner-city poverty in the united states* (pp. 111-186.). Washington, DC: National Academy Press.

Kalev, A., Dobbin, F., & Kelly, E. (2006). Best practices or best guesses? Assessing the efficacy of corporate affirmative action and diversity policies. *American Sociological Review, 71*(4), 589-617.

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health, 102*(5), 936-944.

Krumholz, N. (1982). A retrospective view of equity in planning: Clelevand 1969-1979. *Journal of the American Planning Association, 48*(2), 163-183.

Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low-income americans. *Journal of General Internal Medicine, 21*(1), 71-77.

Lewis, T. T., Cogburn, C. D., & Williams, D. R. (2015). Self-reported experiences of discrimination and health: Scientific advances, ongoing controversies, and emerging issues. In T. D. Cannon & T. Widiger (Eds.), *Annual review of clinical psychology, vol 11*, 407-440.

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of health and Social Behavior, 35*, 80-94.

Link, B. G., Susser, E. S., Factor-Litvak, P., March, D., Kezios, K. L., Lovasi, G. S., Rundle, A. G., Suglia, S. F., Fader, K. M., Andrews, H. F., Johnson, E., Cirillo, P. M., & Cohn, B. A. (2017). Disparities in self-rated health across generations and through the life course. *Social Science & Medicine, 174*, 17-25.

Lovering, J. (2010). Will the recession prove to be a turning point in planning and urban development thinking? *International Planning Studies, 15*(3), 227-243.

Marmot, M., & Wilkinson, R. (1999). *Social determinants of health* Oxford: Oxford University Press.

Massey, D. S. (2005). Racial discrimination in housing: A moving target. *Social Problems, 52*, 148-149.

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass*. Cambridge, MA: Harvard Univ. Press.

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Mehdipanah, R., Ramirez, J., Abedin, S., & F. Brown, S. (2018). Housing discrimination and health: Understanding potential linking pathways using a mixed-methods approach. *Social Sciences, 7*(10), 194.

Narine, L., & Shobe, M. A. (2014). Making sense of housing disparities research: A review of health and economic inequities. *Soc Work Public Health, 29*(1), 35-41.

National Fair Housing Alliance. (2014). *Expanding opportunity: Systemic approaches to fair housing*. Retrieved from http://www.nationalfairhousing.org/LinkClick.aspx?fileticket=MqO6AE6loGY%3D&tabid=3917&mid=5321

National Fair Housing Alliance. (2016). *A landmark year: 2016 fair housing trends report*. Retrieved from http://www.nationalfairhousing.org/LinkClick.aspx?fileticket=8dc8tGsxAhc%3D&tabid=3917&mid=5321

Northridge, J., Ramirez, O. F., Stingone, J. A., & Claudio, L. (2010). The role of housing type and housing quality in urban children with asthma. *Journal of Urban Health-Bulletin of the New York Academy of Medicine, 87*(2), 211-224.

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The Fair Housing Act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Omi, M., & Winant, H. (1994). *Racial formation in the united states: From the 1960s to the 1980s* (2nd ed.). New York: Routledge.

Open Housing Law, Wisconsin Statute Section 106.50 (1968, 2015).

Osypuk, T. L., & Acevedo-Garcia, D. (2010). Beyond individual neighborhoods: A geography of opportunity perspective for understanding racial/ethnic health disparities. *Health & Place, 16*(6), 1113-1123.

Pager, D., & Shepherd, H. (2008). The sociology of discrimination: Racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol, 34*, 181-209.

Perry, A. (2019). Racism is not a distraction; it's policy. Retrieved from https://www.brookings.edu/blog/the-avenue/2019/07/19/racism-is-not-a-distraction-its-policy/?utm_campaign=Brookings%20Brief&utm_source=hs_email&utm_medium=email&utm_content=74837430,

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Raj, A., & Silverman, J. (2002). Violence against immigrant women, the roles of culture, context, and legal immigrant status on intimate partner violence. *Violence Against Women, 8*, 367-385.

Roscigno, V. J., Karafin, D. L., & Tester, G. (2009). The complexities and processes of racial housing discrimination. *Social Problems, 56*(1), 49-69.

Rosenblatt, P., & Cossyleon, J. E. (2018). Pushing the boundaries: Searching for housing in the most segregated metropolis in America. *City & Community, 17*(1), 87-108.

Rothstein, R. (2017). *The color of law : A forgotten history of how our government segregated America*. First Edition. Liveright Publishing Corporation. New York.

Sampson, R. J. (2019). Neighbourhood effects and beyond: Explaining the paradoxes of inequality in the changing american metropolis. *Urban Studies, 56*(1), 3-32.

Sawyer, P. J., Major, B., Casad, B. J., Townsend, S. S. M., & Mendes, W. B. (2012). Discrimination and the stress response: Psychological and physiological consequences of anticipating prejudice in interethnic interactions. *American Journal of Public Health, 102*(5), 1020-1026.

Schneider, A., & Ingram, H. (1993). Social construction of target populations: Implications for politics and policy. *American Political Science Review, 87*(2), 334-347.

Seaton, E. K., Caldwell, C. H., Sellers, R. M., & Jackson, J. S. (2010). Developmental characteristics of african american and caribbean black adolescents' attributions regarding discrimination. *Journal of Research on Adolescence, 20*(3), 774-788.

Semyonov, M., Lewin-Epstein, N., & Davidov, E. (2003). Period and duration effects on the value of housing among immigrants. *Social Science Research, 32*(1), 2-24.

Shaw, M. (2004). Housing and public health. *Annual Review of Public Health, 25*, 397-418.

Siefert, K., Heflin, C. M., Cocoran, M. E., & Williams, D. R. (2001). Food insufficiency and the physical and mental health of low-income women. *Women Health, 32*(1-2), 159-177.

Sirin, S. R., Rogers-Sirin, L., Cressen, J., Gupta, T., Ahmed, S. F., & Novoa, A. D. (2015). Discrimination-related stress effects on the development of internalizing symptoms among latino adolescents. *Child Development, 86*(3), 709-725.

Slade-Sawyer, P. (2014). Is health determined by genetic code or zip code? Measuring the health of groups and improving population health. *N C Med J, 75*(6), 394-397.

Social Medicine Consortium. (2018). SMC 2018 Campaign against racism. Retrieved from http://www.socialmedicineconsortium.org/campaign-against-racism.

Southeastern Wisconsin Regional Planning Commission. (2013). *A regional housing plan for Southeastern Wisconsin: 2035*. Retrieved from https://www.sewrpc.org/SEWRPCFiles/Publications/pr/pr-054-regional-housing-plan-2035.pdf

Stafford, M., Becares, L., & Nazroo, J. (2010). *Racial discrimination and health: Exploring the possible protective effects of ethnic density* (Vol. 3).

Stokes, J. E. (2019). Trajectories of perceived neighborhood quality across the life course: Sociodemographic determinants and implications for well-being. *Social Science Research, 79*, 181-193.

Taylor, R., Forsythe-Brown, I., Mouzon, D. M., Keith, V. M., Chae, D. H., & Chatters, L. M. (2019). Prevalence and correlates of everyday discrimination among black caribbeans in the United States: The impact of nativity and country of origin. *Ethnicity & Health, 24*(5), 463-483.

Taylor, T. R., Kamarck, T. W., & Shiffman, S. (2004). Validation of the Detroit area study discrimination scale in a community sample of older african american adults: The Pittsburgh Healthy Heart Project. *International Journal of Behavioral Medicine, 11*(2), 88-94.

Thomas, J. M. (1994). Planning history and the black urban experience: Linkages and contemporary implications. *Journal of Planning Education and Research, 14*(1), 1-11.

Thomson, H., Thomas, S., Sellstrom, E., & Petticrew, M. (2013). Housing improvements for health and associated socio-economic outcomes. *Cochrane Database Syst Rev, 2*, Cd008657.

U.S. Government Accountability Office. (2010). *Housing and community grants: HUD needs to enhance its requirements and oversight of jurisdictions' fair housing plans*. Retrieved from www.gao.gov/new.items/d10905.pdf.

U.S. Kerner Commission. (1968). *Report of the National Advisory Commission on Civil Disorders*. New York: Bantam Books.

US Department of Housing and Urban Development. (2014). Fair housing enforcement organizations use testing to expose discrimination. *Evidence Matters* (Spring/Summer 2014).

US Department of Housing and Urban Development. (2018a). Affirmatively furthering fair housing: Extension of deadline for submission of assessment of fair housing for consolidated plan participants *83 FR 683* (pp. 683-685). Federal Register: Office of the Federal Register.

US Department of Housing and Urban Development. (2018b). Affirmatively furthering fair housing: Streamlining and enhancements *83 FR 40713* (pp. 40713-40715). Federal Register: Office of the Federal Register.

US Department of Housing and Urban Development. (2019a). Overview of FHEO's complaint and investigation process. Retrieved from https://www.hud.gov/program_offices/fair_housing_equal_opp/complaint-process.

US Department of Housing and Urban Development. (2019b). Substantial equivalence certification. Retrieved from https://www.hud.gov/program_offices/fair_housing_equal_opp/partners/FHAP#FHAP2.

Weinshneck, A. (2019). How polarized are wisconsin's lawmakers? Calculating the growing political divide between democratic and republican legislators. Retrieved from https://www.wiscontext.org/how-polarized-are-wisconsins-lawmakers.

WHO. (2017). Social determinants of health: What are social determinants of health? Retrieved from http://www.who.int/social_determinants/sdh_definition/en/.

Williams, D. R., Lawrence, J. A., & Davis, B. A. (2019). Racism and health: Evidence and needed research. In J. E. Fielding (Ed.), *Annual review of public health, vol 40* (Vol. 40, pp. 105-125).

Williams, D. R., & Medlock, M. M. (2017). Health effects of dramatic societal events - ramifications of the recent presidential election. *New England Journal of Medicine, 376*(23), 2295-2299.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/ethnic discrimination and health: Findings from community studies. *American Journal of Public Health, 93*(2), 200-208.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Wisconsin Public Health Association. (2018). *2018 Resolution: Racism is a public health crisis*. Retrieved from Wisconsin Public Health Association: https://cdn.ymaws.com/www.wpha.org/resource/resmgr/2018_folder/WPHA_Racial_Equity_Resolutio.pdf

Yang, T. C., Chen, D., & Park, K. (2016). Perceived housing discrimination and self-reported health: How do neighborhood features matter? *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine, 50*(6), 789-801.

Yang, T. C., Chen, I. C., Kim, S., & Choi, S. W. (2018). Differential investments and opportunities: How do neighborhood conditions moderate the relationship between perceived housing discrimination and social capital? *Social Science Research, 72*, 69-83.

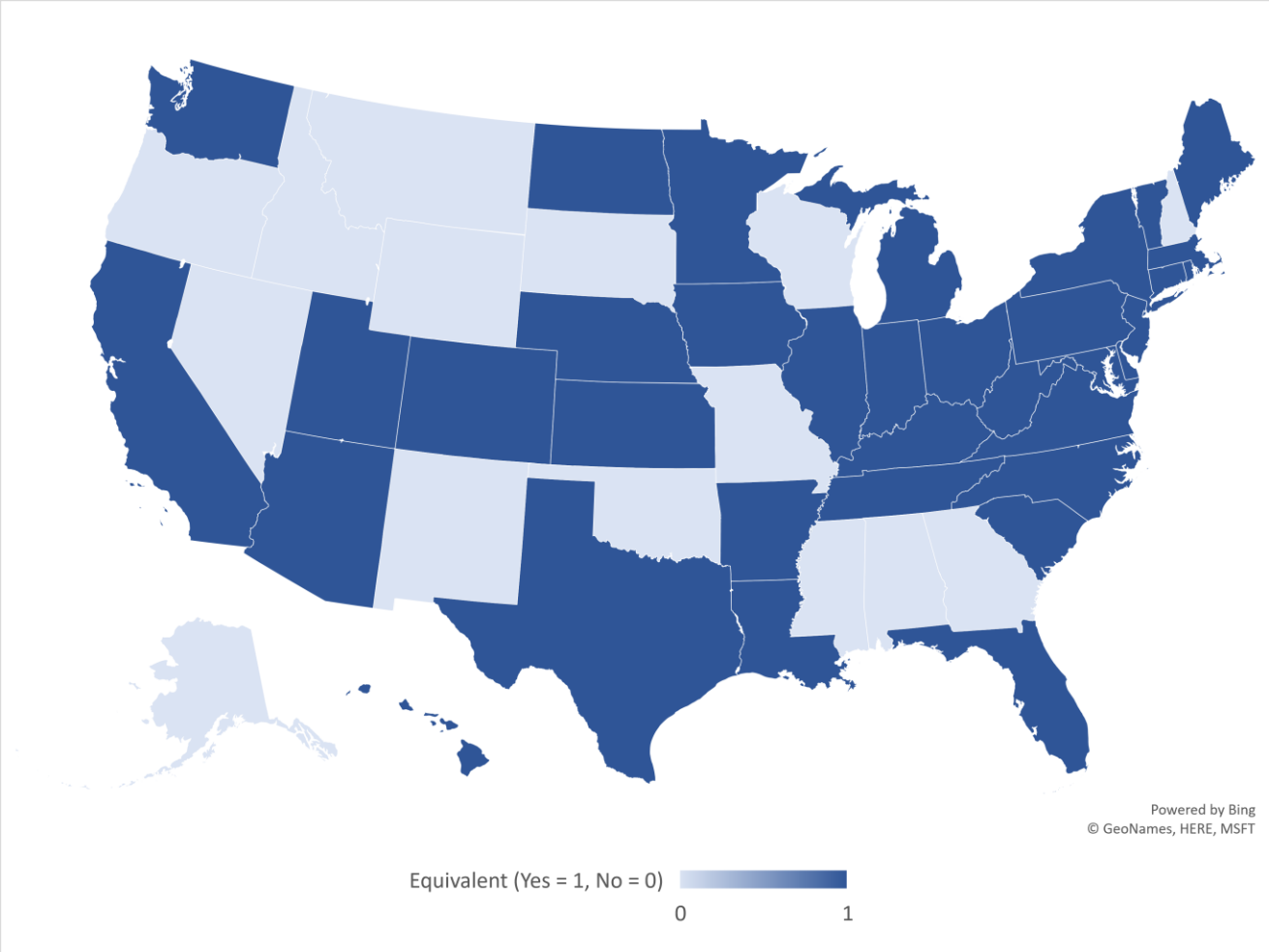
Yang, T. C., & Sun, F. N. (2019). A longitudinal analysis of how perceived discrimination gets under the skin: Investigating gender and racial/ethnic differences. *Euramerica, 49*(2), 243-285.

Zhou, Y. H., Bemanian, A., & Beyer, K. M. M. (2017). Housing discrimination, residential racial segregation, and colorectal cancer survival in southeastern wisconsin. *Cancer Epidemiology Biomarkers & Prevention, 26*(4), 561-568.

Zillow. (2019). What modern-day housing discrimination looks like. Retrieved from https://www.zillow.com/research/modern-housing-discrimination-22898/

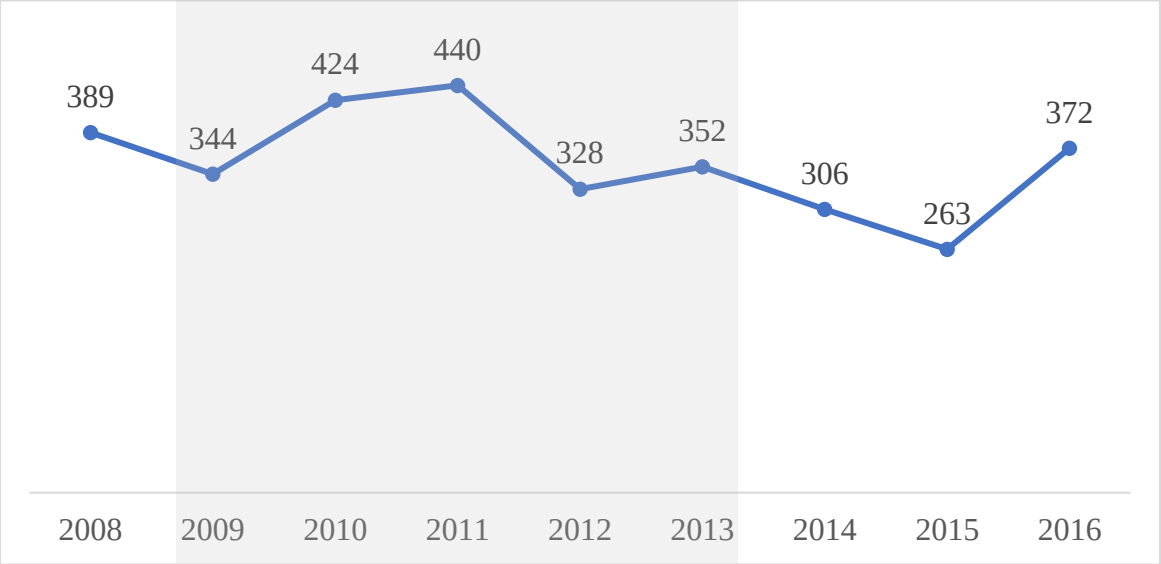
2.5. Figures

Figure 2.1. States with statutes substantially equivalent to the Fair Housing Act



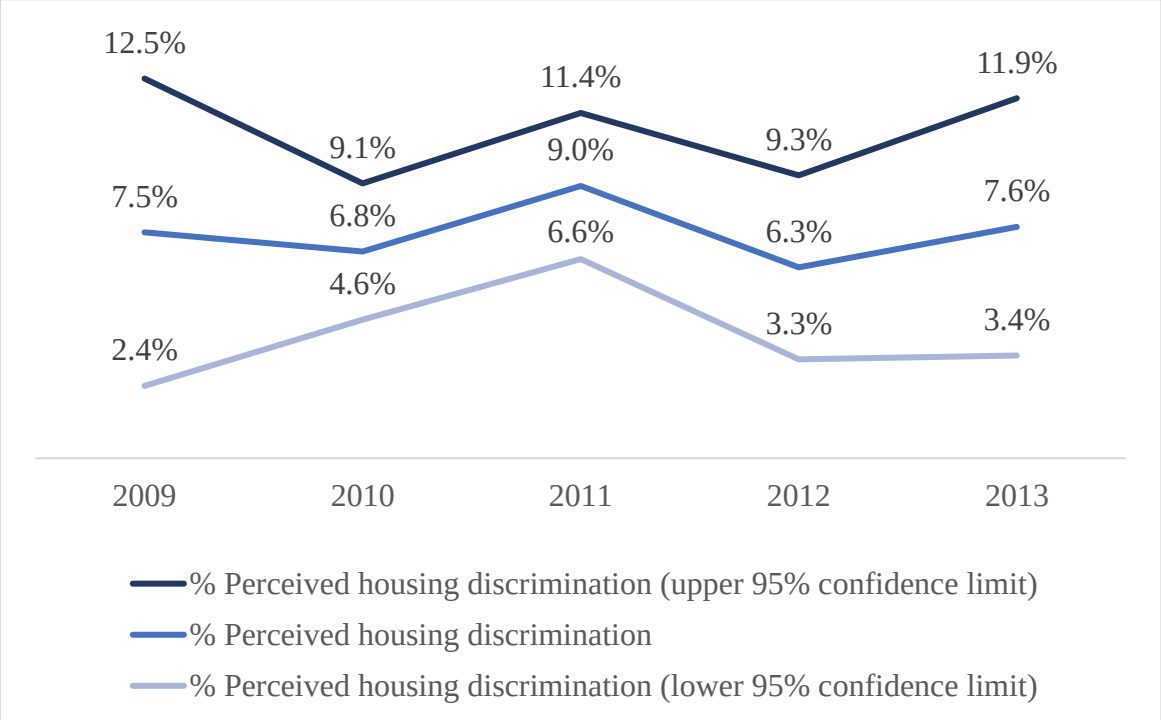
Source: US Department of Housing and Urban Development (2019)

Figure 2.2. Total housing discrimination complaints filed in Wisconsin, 2008-2016*



* Combined total of complaints received by the US Department of Housing and Urban Development, Wisconsin Department of Workforce Development Equal Rights Division and the Milwaukee Fair Housing Council. Shaded area represents the study timeframe.

Figure 2.3. Percent Wisconsin residents that perceived housing discrimination, 2009-2013*



* Based on self-reported perceived housing discrimination from the Survey of the Health of Wisconsin, sampling weights applied to reflect the Wisconsin population.

CHAPTER 3: METHODOLOGY

In this chapter, I describe the statistical approach to advance our understanding of the extent perceived housing discrimination exposure associates with the outcomes of 1) residing in low residential quality; 2) encountering risk of housing instability; and 3) showing presence of stress, anxiety or depression above normal in a sample population in Wisconsin. Additional analyses are employed to understand whether the outcomes associated with housing discrimination exposure (if any) vary by subpopulation groups and by location, specifically the Milwaukee metropolitan (Milwaukee metro) area compared to the rest of the state.

Table 3.1. Research questions and specific aims

	Research Questions	Aims
1	To what extent housing discrimination exposure throughout the life course, compared to non-exposure, associates with low residential quality?	Analyze the potential effects of perceived housing discrimination exposure on residential quality, controlling for demographic and residential factors.
2	To what extent housing discrimination exposure throughout the life course associates with housing instability risk?	Analyze the potential effects of perceived housing discrimination exposure on housing instability risk, controlling for demographic and residential factors.
3	To what extent housing discrimination exposure throughout the life course associates with stress, anxiety, and depression?	Analyze the potential effects of perceived housing discrimination exposure on stress, anxiety and depression, controlling for demographic, residential and health-related factors.
4	Does the association (if any) between housing discrimination exposure and outcomes (1-3) vary by social factors?	Analyze whether the relationship (if any) between perceived housing discrimination exposure and outcomes (1-3) vary by social characteristics such as income and race.
5	Does the association (if any) between housing discrimination exposure and outcomes (1-3) differ by residing in the Milwaukee metro as opposed to the rest of the state?	Analyze whether the relationship (if any) between perceived housing discrimination exposure and outcomes (1-3) vary by two residence locations, the Milwaukee Metro and the rest of the state.

3.1. Data and sample population

Most of the data I use for this dissertation is from the Survey of the Health of Wisconsin (SHOW) obtained during the years 2009-2013. The SHOW is a population-based survey with a rich collection of social determinants of health constructs including objective and subjective factors of the built environment, socio-economic characteristics, and self-reported social experiences among other issues. The data included in this study includes a representative sample of non-institutionalized adults (ages 21 to 74 years old) who are residents of Wisconsin. The sample of survey participants is selected from random households using a two-stage probability-based cluster sampling approach in which census block groups are randomly selected and then stratified based on two factors, congressional district and the percentage of the population living below the poverty line. The SHOW excludes residents in nursing homes, Indian reservations (except the Menominee Tribal territory), hospitals or other institutional settings, full-time members of the armed forces, and residents who voluntarily disclose mental incapacity with no available representative or assistant.

The data from the SHOW is collected in three waves. The first wave includes an in-home interview (T1). The second wave is a self-administered questionnaire at the end of the interview returned to the survey center (T2), and the third wave is a follow-up visit to the survey center and in-clinic exams (T3). Sampling weights to the Wisconsin population are applied for each wave of the data collected. Additional survey methodology, data collection, sample weighting process and validity of the SHOW is described in detail by Nieto et al. (2010) and Hale et al. (2013).

In this study, I use data collected during the in-home interview (T1) and the self-administered questionnaires (T2). While the individuals that participated in T1 were 3,113 at the state level, the sample size this study is based on the number of participants who returned the

self-administered questionnaires, thus T2. This is because most measures of interests (e.g., perceived housing discrimination and outcome variables) were collected at T2. Therefore, I apply sample weights to T2. This drops the sample size at the state level to 2,760 from which 2,704 responded to the housing discrimination section. Among these 2,704 individuals, 57% self-identifies are female, 21% obtained a high school or general education diploma (GED) as the highest education level attained, 64% are married, 6% are Non-Hispanic Black, 23% have an annual household income under $25,000, and 18% are non-retired unemployed.

While the research design and analysis mostly focus on the state of Wisconsin as a whole, additional analysis is done at the Milwaukee metro level. The 2009-2013 sample size at the Milwaukee metro is 571. Of this, 559 responded to the housing discrimination survey section. The characteristics of these 559 individuals in the Milwaukee metro are comparable to the state except for the racial construct composition, the percentage of unemployed not retired individuals and the proportion of married people. **Table 3.2** reports the characteristics of individuals that responded to the housing discrimination survey section at the state level and at the Milwaukee metro level.

3.2. Variables

3.2.1. Housing discrimination exposure

Housing discrimination exposure, noted as an "anytime" exposure throughout the life course of lifetime, serves as the **main explanatory variable (Aims 1-5)**. SHOW recorded data Wisconsin residents that self-reported whether they perceived unfair discriminatory treatment when accessing housing or remaining in the neighborhood throughout their lifetime related to their physical appearance, race, age, gender, sexual orientation, culture or any other

characteristic. The questionnaire is modified from the Detroit Area Study of Discrimination and based upon Williams et al. (1997). The specific question about housing discrimination is:

> "Have you ever felt unfairly treated in getting housing or finding a place to live? (*For example, you were prevented from renting or buying a home in the neighborhood you wanted, or were prevented from remaining in a neighborhood because neighbors made life so uncomfortable?*)"

Respondents had the choice to answer "yes", "no" or "don't know". Based on the nature of this data, "housing discrimination" is used as a dichotomous variable denoting: "exposed to housing discrimination" coded as "1" and "not exposed housing discrimination" coded as "0".

3.2.2. Residential quality

Residential quality in this study is measured by the immediate built environment quality index (herein, IBE quality index) and serves as **the outcome variable for Aim 1** and corresponding analyses for Aims 4 and 5. The index is calculated using binary-coded housing and neighborhood quality measures obtained from the SHOW in which values of "1" represent a positive quality and "0" a negative quality.[12] The housing characteristics questionnaire from the SHOW is based on the National Health and Nutrition Examination Survey (NHANES). Housing quality measures were obtained during T1. The selected housing quality measures included in this study are the year built of the home and whether conditions are overcrowded.

The SHOW measures on neighborhood quality are based on the Neighborhood Walkability Scale (NEWS) by Cerin et al. (2006). These were obtained during T2. The selected neighborhood quality measures in this study include walkable distance to basic neighborhood

[12] The selected housing and neighborhood measures used in the IBE quality index had relatively low correlation coefficients (Pearson $r < 0.30$; Cronbach's $\alpha = 0.23$). However, each measure is significantly positively correlated ($p<0.5$) to at least one measure in the Index.

amenities (grocery stores/supermarket, parks, recreation/fitness centers), perceived safety due to traffic, perceived crime, and perceived pleasantness based on how well-maintained the neighborhood is.

All selected housing and neighborhood quality measures were equally weighted to T2 to create a combined IBE quality sum score. The lowest value of the IBE sum score is 0 and the highest 6.0. A dichotomized IBE quality index variable is developed based on the median of the sum score. The median value of 4.0 represents the cut point between low IBE quality (score below the median) and moderate-high IBE quality (score at or above the median). This approach is similar to the methodology presented by Habib et al. (2009) and Hale et al. (2013). For logistic regression models, the IBE quality index is used as dichotomous, binary-coded into "1" indicating "moderate-high IBE quality" conditions and "0" indicating "low IBE quality" conditions.

3.2.2.1. Housing quality measures

Year built – this measure is based on the question: "When was this [mobile home, house, building] originally built". This measure is used as an indicator of the structural age of the dwelling, whether it is an older or newer structure. It also serves as an indicator of housing quality under the assumption that the older a home is, the more likely it has health-related structural problems or contains lead paint (Shaw, 2004; Suglia et al., 2011)

In 2009, the SHOW collected the year built of homes by asking respondents to provide the numerical value of the year. If respondents were unsure of the year, the interviewer asked whether the home was constructed at or prior to 1978 or after 1978. From 2010 and thereafter, the SHOW collected this data based on five categories. Respondents had the option of selecting the age from the following categories: "before 1900", "1901 to 1950", "1951 to 1978", "1979 to

1990" and "1991 and after". Based on how the data was collected, the variable *year built* was recoded into binary format in which "0" indicates units built at or before 1978 and "1" indicates units built after 1978.

Overcrowd – this measure is calculated upon the reported number of rooms (minus bathrooms) in the home divided by the number of individuals in the household. A ratio higher than one person per room denotes overcrowding, consistent with the definition used by the US Census Bureau and the US Department of Housing and Urban Development (Bratt, 2002; Blake et al., 2007; Cutts et al., 2011; Bailey et al., 2016). The variable "Overcrowd' is reversed-coded into a binary format in which "0" indicates "crowded" and "1" indicates "not-crowded".

4.2.2.2. Neighborhood quality measures

Proximity to basic amenities – This measure is based on the perceived time in minutes it takes for a person to arrive at each of following five *basic* neighborhood amenities: grocery stores and supermarkets, recreation and fitness centers, and parks. The measure was developed from a SHOW question: "about how many minutes would it take to walk from your home to the nearest of these facilities…" The values in minutes were ranked in 10-minute intervals: "10 minutes or less", "11 to 20 minutes", "21 to 30 minutes", and "more than 30 minutes". The measures for the time taken to walk to each amenity were recoded to binary format: "0" if the survey respondent indicated that it takes her/him "more than 10 minutes" and "1" if it takes her/him "10 minutes or less".

Previous studies suggest that residing within a walking distance to desirable neighborhood amenities such as parks, recreation centers, and grocery stores are positive indicators of neighborhood quality (Sallis et al., 2011; Adlakha et al., 2015; Kim & Woo, 2016). For SHOW respondents, the median number of basic amenities at walking distance (10 minutes

or less) is three. This median value is used as a cut-point for the construct of *proximity to basic amenities,* coded into binary format in which "1" indicates that the individual resides "close to three or more basic amenities" and "0" indicates residing "not close to three or more amenities".

Perceived safety due to traffic – This measure is based on traffic-related perceived safety in the neighborhood. The SHOW presents the question: "how safe from traffic is your community for walking or riding a bike?" The original variable is ordinal with four categories and values range from: "not all safe" to "very safe". The variable was recoded into binary format by combining responses indicating either "not at all safe" or "somewhat not safe" into "not safe", and combining responses indicating either "somewhat safe" or "very safe" into "safe". The resulting *safety due to traffic* variable is therefore presented as "safe" coded as "1" and "not safe" coded as "0".

Perceived crime - This measure is based on perceived crime in the neighborhood. It is based on the SHOW question: "how safe from crime is your community for walking or riding a bike?" Similar to the previous variable *perceived safety due to traffic*, the original variable is ordinal with four categories ranging from: "not all safe" to "very safe". The variable was recoded into binary format by combining responses indicating either "not at all safe" or "somewhat not safe" into "not safe", and combining responses indicating either "somewhat safe" or "very safe" into "safe". The resulting *perceived crime* variable is presented as "safe" coded as "1" and "not safe" coded as "0".

While the variables on *perceived safety due to traffic* and *perceived crime* were significantly correlated (Pearson correlation: 0.28, $p<0.001$), these are essentially different in meaning. Similar measures of perceived safety due to traffic and crime has also been used

individually in studies that developed neighborhood quality indices (Sallis et al., 2011; Hale et al., 2013). In this study, each variable is used individually in the IBE quality index.

Pleasantness – This variable was developed from a SHOW instrument asking participants to "rate [their] degree of agreement" to the following two statements on neighborhood maintenance and cleanliness:

1) "my community is well maintained";

2) "My community is generally free from garbage, litter, or broken glass".

Responses to each statement were in 4 categories, ranging from "strongly agree" to strongly disagree". The variable was recoded into binary format by combining responses indicating either "strongly agree" or "agree" in both statements into "agree" (coded as "1" for overall "pleasant"), and combining responses indicating either "somewhat disagree" or "disagree" in either one or both statements into "disagree" (coded as "0" for "unpleasant"). Previous studies suggest perception of "pleasantness" as a proxy for neighborhood quality (Ross & Mirowsky, 1999; Hale et al., 2013; Beyer et al., 2016).

3.2.3. Housing instability risk

Housing instability risk serves as **the outcome variable for Aim 2** and in corresponding analyses for Aims 4 and 5. I compute this variable based on SHOW responses to measures of residential mobility and financial stress. Respondents are considered "at risk of housing instability" if they meet at least one of the residential mobility measures and indicate any level of financial stress. The combination of short residence duration, recent move and financial constraints have been used as indicators of housing instability in studies by Priester et al. (2017), Bailey et al. (2016) and Kushel et al. (2006). A binary-coded version of this variable is

developed to denote "any risk" of housing instability coded as "1" and "no risk" of housing instability coded as "0" for logistic regression models.

3.2.3.1 Residential mobility measures

Residential mobility measures from the SHOW include data indicating that individuals either resided at their current address for a year or less, reported a change in residence over the last year, or both.[13] These measures were re-coded to binary and weighted to T2.

Residence duration – is the number of years respondents resided at their current home at the time of the interview (T1). The SHOW question is: "how long have you live at [this, current] address [in years]?" The original data collected is on a numerical scale in months and years. The data is re-coded into a binary format: "residence duration of a year or less" coded as "1" to indicate short residence duration, and "residence duration of more than one year" coded as "0" to indicate longer residence duration.

Recent move – is a change in residence over the last year. SHOW collected this data at T2 based on an in-home questionnaire about Life Events based on the Holmes and Rahe Stress Scale to understand individual's major life events linked to stress based on the assertion that both good and bad events can increase stress and increase susceptibility to illness (Holmes & Rahe, 1967). The instrument's question is provided as follow:

[13] I interpret the measures of short residence duration and recent move as indicators of residential mobility, meaning that participants have been residing for a short time (a year of less) due to a recent move. Note that the measures of residence duration and recent move were recorded at different times, from two different instruments from the SHOW. For instance, of the 341 responses to short residence duration (T1) and recent move (T2), 253 (74.2%) were consistent for both measures affirming that the respondent's duration at their residence was of a year or less and that they *also* reported a change in residence during the past year. Due of potential data loss, I combined these measures.

"…Please mark the circle next to each event that has happened to you during the past 12 months: (O) Change in residence."

Due to the dichotomous nature of this measure, responses are binary coded into "1" for responses indicating a change in residence and "0" for those not indicating a change in residence.

3.2.3.2. Financial stress

The measure of financial stress was obtained from the SHOW based on a questionnaire asking individuals to rate their level of stress related to life situations that occurred over the past 12 months (at or prior participating in the survey). The specific question reads:

"Over the past 12 months, how much stress did you experience… related to meeting basic needs? (This would include housing, buying food, paying bills, etc.)."

Respondents had the option to indicate "not at all, mildly, moderate, or very". The measure is binary-coded to "1" to indicate "any level of financial stress" and "0" to indicate "no financial stress".

3.2.4. Stress, Anxiety and Depression (SAD)

Stress, anxiety and depression (SAD) serve **as individual outcome variables for Aim 3** and in additional analyses (Aims 4-5). Each component of SAD was assessed using one survey instrument based on Lovibond & Lovibond (1995) and Crawford (2005). For 2009-2013, the SHOW used the long version of the depression, anxiety and stress scale (DASS) which consists of a 42-item questionnaire. Each measure from the questionnaire is identified as follows:

<u>*Stress*</u> - Participants responded to at least 7 out of the 14 questions on the extent certain conditions related to *stress* applied to the respondent over the past week.

Anxiety - Participants responded to at least 7 out of the 14 questions on the extent certain conditions related to *anxiety* applied to the respondent over the past week.

Depression – Participants responded to at least 7 out of the 14 questions on the extent certain conditions related to *depression* applied to the respondent over the past week.

The SHOW issued a severity rating for each measure of SAD based on Z-scores. The rating ranged from "1" to "5" with the lowest value indicating no concerning presence of the condition (thus, normal) and the highest value indicating an extreme presence of the condition above normal. In more detail, the rating values are determined as follow:

- z-score of < 0.5 indicates a "normal" rating coded as "1";
- z-score of ≤ 1 indicates a "mild" presence coded as "2";
- z-score of ≤ 2 indicates "moderate" presence coded as "3";
- z-score of ≤ 3 indicates a "severe" presence coded as "4"; and
- z-score of > 3 indicates "extremely severe" presence coded as "5".

For logistic regression models, each component of SAD is used as a dichotomous (any/none) variable. For each variable, responses indicating a presence of the condition above normal are coded as "1" and non-presence or normal status as "0".

Additionally, I compute a combined variable indicating the presence of any level of stress, anxiety or depression above normal. The combined variable, called "Any SAD", is used in binary format to denote "any" or "none" presence of SAD above normal in exploratory bivariate analyses and logistic regression models. The differences between stress, anxiety and depression experienced by normal and clinical populations are differences in the degree of psychological disorders due to some overlapping symptoms (Clark & Watson, 1991; Tran et al., 2013). Some

scholars argue that individual indicators of SAD are likely a dimension of psychological outcomes rather than an exclusive condition (Clark & Watson, 1991). When assessing for potential correlations among the binary-coded individual variables of SAD, I found that these are significantly correlated and likely unidimensional according to principal component analysis. Also, the standardized Cronbach alpha is 0.78, indicating the internal reliability of the combined measure. Similar observations suggesting that indicators of stress, anxiety and depression collected by the DASS instrument are unidimensional and highly correlated were recorded in previous research (Tran et al., 2013).

3.2.5. Socioeconomic indicators

Demographic individual socio-economic (SES) variables are expected to potentially confound the relationships denoted the Aims in this study. These variables form the SHOW, collected at T1, include age (less than 35, 35-44, 45-54, 55-64, 65-74), race (Non-Hispanic White, Non-Hispanic Black, Hispanic and Other), gender (female, male), relationship status (married, separated/divorced, widowed, never married, living with partner), income level (less than $25,000, $25,000-$44,999, $45,000-$74,999, $75,000-$99,999, $100,000 or more), educational attainment (less than high school, high school degree or equivalent – GED, some college or associate degree, bachelor's degree, graduate degree or higher), employment status (unemployed, employed), and citizenship status (US citizen and not US citizen). These variables are also used to stratify the sample population and explore the extent perceived housing discrimination exposure and the outcomes (1-3) vary by social characteristics (Aim 4). All socioeconomic variables are weighted to T2 for consistency with the explanatory and outcome variables in statistical analyses.

3.2.6. The Milwaukee metro

I incorporate a dummy variable, "Milwaukee metro" to compare responses from participants that reside in the Milwaukee metropolitan area versus the rest of the state. Making a distinction between the Milwaukee metro and the rest of the state is important due to the large population (largest in the state of Wisconsin) and severe racial and income segregation (Levine, 2013; Frey, 2018; Landis, 2019) in this metro. This variable represents the geographical location of the sample population residing in any of the four counties – Milwaukee, Waukesha, Ozaukee, Washington – corresponding to the Milwaukee metro in Wisconsin during 2009 to 2013. Sampling weights to T2 are applied to this variable.

3.2.7. Additional controls

Additional variables from the SHOW are used in some models to control for potential neighborhood selection bias, existing poor health status and recent life shocks. These variables include duration at the current residence in years, general fair/poor health status, and life shocks that occurred over the past 12 months such as "recent death of a close friend or family member" and "change in financial status". The use of any of these control variables is discussed more in detail in each specific inferential statistic model. All control variables are weighted to T2 for consistency with the explanatory and outcome variables in statistical analyses.

3.3. Statistical analysis (Aims 1-3)

The overall goal of this research is to examine the extent perceived housing discrimination exposure associates with the likelihood of 1) living in lower residential quality; 2) being at risk of housing instability; 3) and having a presence of stress, anxiety or depression. I examine potential associations in a leveled approach as illustrated in **Figure 3.1** in this chapter.

My main hypothesis in this dissertation is that housing discrimination exposure interconnects with residential conditions (residential quality and housing instability risk), and these, in combination, disparately impact outcomes of stress, anxiety and depression in Wisconsin residents. To test the hypothesis, I conduct a series of analyses described in detail next.

First, I conduct bivariate analyses to examine frequencies of responses and potential two-way associations between housing discrimination exposure and each individual outcome and control variables of interest. I use PROC SURVEYFREQ in SAS version 9.4 to conduct Rao-Scott Chi-Square tests, a design-adjusted version of the Pearson Chi-Square test statistic (Rao & Scott, 1981, 1987). The Rao-Scott Chi-Square statistic is used to test for an association between row and column categorical variables. This analysis allows adjusting for the complex survey design and for examining the proportion of responses among the two groups.

Second, I develop logistic regressions models to examine the extent housing discrimination exposure associates with the likelihood of 1) living in lower residential quality versus higher quality; 2) being at risk of housing instability versus not being at risk of housing instability; 3) and having mental health outcomes of stress, anxiety and depression above normal versus non-presence or normal status these mental health outcomes. Regression models are controlled for demographic and SES characteristics, residence duration in years, and general health and life shocks (when applicable). Additional models explore whether the risk of housing instability and residential quality influences the relationship (if any) between perceived housing discrimination exposure and each SAD outcome.

The logistic regression models are developed with SAS version 9.4 using PROC SURVEYLOGISTIC to consider the complex survey design and appropriate sampling weights. The use of logistic regression modeling allows for a robust, yet easy interpretation of potential

associations analyzed in this study while also conforming to binary outcome variables. The basic multivariate logistic regression modeling for this study is presented as:

$$logit(P_i) = \log\left(\frac{P_i}{1-P_i}\right) = \log\left(\frac{Odds_1}{Odds_0}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} \qquad (1)$$

Where: Pi is the probability of the outcome;

β_0 is the intercept which is the log odds ratio of the outcome at the baseline or reference (when X_{1i} , X_{2i} , …X_{ki} = 0 or held constant);

β_1 is the log odds ratio of the outcome when housing discrimination exposure is present vs. absent (X_{1i} =1 vs. X_{1i} =0) and covariates X_{2i} , …X_{ki} = 0 are at reference, or held constant;

β_2 are the log odds ratio of the outcome when the value of the covariate differs in one unit (or is present vs. absent for binary or categorical data) and the rest of the variables (X_{1i}, …X_{ki}) are held constant or at reference (for categorical data); and

β_k , by symmetry, is a unit increase (or present vs. absent for binary or categorical data) in a covariate X_{ki} fixing all else constant.

Transforming the regression coefficient β_1 to an exponential form represents an odds ratio. This translates into a multiplicative effect of housing discrimination exposure (X'_{1i}) on the odds ratio of an outcome, presented in the following equation:

$$OR_{(1|0)} = \frac{Odds_1}{Odds_0} = \exp\left(X'_{1i}\beta_1\right) \qquad (2)$$

An estimated OR > 1 would suggest that housing discrimination exposure is positively associated with the outcome. Thus, perceived housing discrimination exposure, compared to the

lack thereof, would translate to *n* times more likely or at *n percent* higher odds for an outcome of:

1) living in low residential quality versus higher quality;

2) being at risk of housing instability versus not being at risk of housing instability; or

3) having mental health outcomes of stress, anxiety or depression above normal versus not having either of these mental health outcomes.

For outcomes 1 to 3, an estimated OR < 1 would suggest that housing discrimination exposure is negatively associated with the outcome or at *n* percent fewer odds of the outcome. Lastly, an estimated OR = 1 would suggest that housing discrimination exposure does not increase or decrease the odds of the outcome and therefore we find no evidence for an association. Computing confidence intervals and p-values allow examining the extent associations are significant between housing discrimination exposure and each outcome, at a specific level of confidence.

3.4. Additional exploratory analysis

3.4.1. Population subgroups (Aim 4)

Research literature suggests that minority groups such as Non-Whites, individuals earning low-incomes, and females are among the most discriminated in the housing market (Massey & Denton, 1993; Greenberg et al., 2016; Rothstein, 2017; McClure et al., 2019). Based on previous research, I analyze whether the association between perceived housing discrimination exposure and any of the outcomes (1-3) in this study vary among demographic SES categories. To do this, I conduct logistic regression models with individual interactions between perceived exposure to housing discrimination and SES categories and compute least-

square means (LS-means) of fixed effects for all possible pairwise comparisons of interactions terms on the logit scale. LS-means are linear combinations of the parameter estimates that are constructed in such ways that they correspond to the average predicted values in a population where the levels of classification variables are balanced – meaning, "all else equal" (Cai, 2014). An example of a logistic regression modeling an interaction between perceived housing discrimination exposure and Black vs. White ($R_{B|W}$) for the outcome of low IBE quality vs moderate/high IBE quality is presented as follow:

$$\ln\left(\frac{Odds_{IBEq\_low}}{Odds_{IBEq\_moderate,high}}\right) = \beta_0 + \beta_1 HD_{1|0} + \beta_2 R_{B|W} + \beta_3 Cntrls_{ki} + \beta_{12}(HD_{1|0} * R_{B|W}) \quad (3)$$

Where, β_0 is the log odds ratio of the outcome IBE quality low vs. moderate/high at the baseline or reference. The coefficient β_1 is the log odds ratio of the outcome when perceived housing discrimination exposure is present vs. absent ($HD_{1|0}$) and covariates are held constant (or at reference). The coefficient β_2 is the log odds ratio of the outcome for Black vs. White ($R_{B|W}$) when housing discrimination exposure absent and other covariates are held constant (or at reference). The regression coefficients for the control variables ($Cntrls_{ki}$) including individual demographic SES variables and residence duration are grouped here as β_k for explanatory purposes. β_k represents the log odds ratio of the outcome when the value of a $Cntrls_{ki}$ a covariate is present vs. absent, meets the condition compared to the reference category, or changes one unit and all other variables are held constant or at the reference category. Finally, the regression coefficient for the pairwise comparisons of the interaction Black vs. White for on the housing discrimination-exposed group $HD_{1|1} * R_{B|W}$ (i.e, β_{12}) is read as the log odds ratio of the outcome IBE quality low vs. moderate/high for Black vs. White ($R_{B|W}$) and reported

experience of housing discrimination present ($HD_{1|1}$) while all other variables (e.g., $Cntrls_{ki}$) are held constant or at the reference group.

3.4.2. The Milwaukee Metro vs. the rest of the state (Aim 5)

The Milwaukee metro, which includes the counties of Milwaukee, Waukesha, Ozaukee and Washington, has been ranked consecutively over the past 10 years as the most racially segregated metropolis in the nation due to an aggressive housing discrimination history (Glaeser & Vidgor, 2012; Landis, 2019). However, the likelihood of residing in lower quality, being at risk of housing instability, or having stress, anxiety or depression is understudied in the Milwaukee metro. Furthermore, no known study has examined for differences between the Milwaukee metro and the rest of the state with regards to perceived exposure to housing discrimination. This poses an opportunity to explore for potential differences in outcomes by comparing the Milwaukee metro against the rest of the state (Aim 5).

I first apply Rao Rao-Scott Chi-Square statistics to examine the extent exposed and non-exposed samples to housing discrimination have different probabilities of belonging to the same geographical category. This analysis serves as a step to indicate whether the share of individuals exposed to housing discrimination residing in Milwaukee metro contrast the rest of the state. Then I add a dummy variable (*MKE|elseWI*) for 'Milwaukee metro vs. else in Wisconsin' to the adjusted logistic regression models developed for Aims 1-3 with an interaction term. Lastly, I compute least-square means of fixed effects for all possible pairwise comparisons of interaction terms on the logit scale. An example logistic regression modeling an interaction between perceived housing discrimination exposure and Milwaukee metro ($HD * R_{MKE|(elseWI)}$) an outcome of depression above normal vs absence of depression is presented as follow:

$$\ln\left(\frac{Odds_{D\_p}}{Odds_{D\_a}}\right) = \beta_0 + \beta_1 HD_{1|0} + \beta_2 R_{B|W} + \beta_3 Cntrls_{ki} + \beta_{12}(HD * R_{MKE|elseWI}) \quad (4)$$

Where, β_0 is the log odds ratio of the outcome at the baseline or reference. The coefficient β_1 is the log odds ratio of the outcome when a reported experience of housing discrimination is present vs. absent ($HD_{1|0}$) and covariates are held constant or at the reference category. The coefficient β_2 is the log odds ratio of the outcome when residing in Milwaukee metro compared to the rest of the state ($R_{MKE|elseWI}$) when the experience of housing discrimination is absent and other covariates are held constant or at reference. The regression coefficients for the control variables ($Cntrls_{ki}$), grouped here as β_k, represent the log odds ratio of the outcome when an individual $Cntrls_k$ variable is present vs. absent, meets the condition compared to the reference category, or changes one unit and all other variables are held constant or at the reference category. Lastly, the regression coefficient for the interaction $HD * R_{MKE|elseWI}$ (β_{12}) is read as the log odds ratio of the outcome for exposed individuals that reside in Milwaukee metro vs. individuals that reside elsewhere in Wisconsin, holding other variables constant or at the reference group.

3.5. Goodness of fit, hypothesis tests, and robustness

Adjusted models are selected based on their goodness of fit and relative quality. I use the Akaike information criterion (AIC) to guide the selection process of adjusted models while minimizing potential information loss and overfitting. Usually, models with a lower AIC value indicate better fit and quality of the model. I also assess for multicollinearity in each model using the following three criteria: 1) variance inflation factor (VIF) larger than ten; 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero) and a large corresponding condition index (Schreiber-Gregory, 2017).

I compute global null hypothesis tests for each selected model using the Rao-Scott likelihood ratio Chi-squared approach. This approach uses a proper adjustment for complex survey data (Rao & Scott, 1981, 1987; Lohr, 2009). For each parameter in the selected models, I conduct maximum likelihood estimates which are the most likely value for the parameters given the observed data. Likelihood ratio and Wald tests are conducted to test the hypothesis of no association between predictors and the outcome. For models with interaction terms, I conduct likelihood ratio and Wald tests compare the reduced additive model with the model including the interaction terms. Confidence intervals at the 95% are computed for each parameter of interest.

To test the predictive accuracy of each model developed for Aims 1-5, I compute the index of rank correlation. The index (herein expressed as "*C")*, provides an estimate of the area under the receiver operating curve (ROC) when the response variable is binary (Hanley & McNeil, 1982). The "C" estimate is similar to the ROC to assess the predictive ability of a model (SAS Institute, 2019).

Lastly, to examine the internal robustness of findings, two sensitivity analyses are performed for each research question (Aims 1-5) by varying the scale of measure for the outcome variables and splitting the sample timing and size.

1) Outcome variable transformation - I transform each outcome variable into a continuous format to analyze the extent exposure to housing discrimination associates with a unit change in the outcome, instead of their presence or absence. Linear regression models using PROC SURVEYREG in SAS 9.4 version are computed to allow for complex survey design. For both outcomes of IBE quality index and risk of housing instability, weighted-factor scores will be obtained using Principal components analysis (PCA). For each outcome of stress, anxiety, a depression, then I use the DASS z-score from the SHOW data.

2. Split analyses – The five-year (2009-2013) cross-sectional sample from SHOW is split into two datasets sharing one year in common. I split the SHOW sample data into two cohort groups, each containing three-year interval data sharing the 2011 sampling year in common. Cohort 1 includes a sample population from 2009 to 2011 and Cohort 2 includes a sample population from 2011 to 2013. For each cohort, I conduct adjusted logistic regression models controlling for potential confounders including demographic SES, residence duration and location. This analysis allows examining the extent associations (if any) vary due to the timing of the sample collection and sample size.

3.6. Summary

In this chapter, I describe in detail the methods I use through this dissertation research which aims to advance our understanding of the extent perceived housing discrimination exposure associates with the outcomes of 1) living in low residential quality; 2) encountering risk of housing instability; and 3) showing presence of stress, anxiety or depression above normal in a sample population in Wisconsin. I also describe robust statistical methods to analyze whether the outcomes associated housing discrimination exposure vary by subpopulation groups and by location, specifically the Milwaukee metro compared to the rest of the state. Lastly, I describe the methods to test hypotheses and the robustness of findings.

3.7. References

Adlakha, D., Hipp, A. J., Marx, C., Yang, L., Tabak, R., Dodson, E. A., & Brownson, R. C. (2015). Home and workplace built environment supports for physical activity. *American Journal of Preventive Medicine, 48*(1), 104-107.

Bailey, K. T., Cook, J. T., de Cuba, S. E., Casey, P. H., Chilton, M., Coleman, S. M., Cutts, D. B., Heeren, T. C., Rose-Jacobs, R., Black, M. M., & Frank, D. A. (2016). Development of an index of subsidized housing availability and its relationship to housing insecurity. *Housing Policy Debate, 26*(1), 172-187.

Beyer, K. M. M., Malecki, K. M., Hoormann, K. A., Szabo, A., & Nattinger, A. B. (2016). Perceived neighborhood quality and cancer screening behavior: Evidence from the survey of the health of Wisconsin. *Journal of Community Health, 41*(1), 134-137.

Blake, K., Kellerson, R., & Simic, A. (2007). *Measuring overcrowding in housing*. (017-002). Office of Policy Development and Research Retrieved from https://www.census.gov/programs-surveys/ahs/research/publications/Measuring_Overcrowding_in_Hsg.html.

Bratt, R. G. (2002). Housing and family well-being. *Housing Studies, 17*(1), 13-26.

Cai, W. (2014). *Making comparisons fair: How ls-means unify the analysis of linear models.* Paper presented at the SAS Support.

Cerin, E., Saelens, B. E., Sallis, J. F., & Frank, L. D. (2006). Neighborhood environment walkability scale: Validity and development of a short form. *Med Sci Sports Exerc, 38*.

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *J Abnorm Psychol, 100*(3), 316-336.

Cutts, D. B., Meyers, A. F., Black, M. M., Casey, P. H., Chilton, M., Cook, J. T., Geppert, J., Ettinger de Cuba, S., Heeren, T., Coleman, S., Rose-Jacobs, R., & Frank, D. A. (2011). Us housing insecurity and the health of very young children. *Am J Public Health, 101*(8), 1508-1514.

Frey, W. (2018). Black-white segregation edges downward since 2000, census shows. Retrieved from https://www.brookings.edu/blog/the-avenue/2018/12/17/black-white-segregation-edges-downward-since-2000-census-shows/.

Glaeser, E., & Vidgor, J. (2012). *The end of the segregated century: Racial separation in America's neighborhoods, 1890- 2010*.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Habib, R., Mahfoud, Z., Fawaz, M., Basma, S. H., & Yeretzian, J. S. (2009). Housing quality and ill health in a disadvantaged urban community. *Public Health, 123*(2), 174-181.

Hale, L., Hill, T. D., Friedman, E., Nieto, F. J., Galvao, L. W., Engelman, C. D., Malecki, K. M. C., & Peppard, P. E. (2013). Perceived neighborhood quality, sleep quality, and health status: Evidence from the Survey of the Health of Wisconsin. *Social Science & Medicine, 79*, 16-22.

Hanley, J. A., & McNeil, B. J. (1982). The meaning and the use of the area under a receiver operating characteristic (roc). *Radiology, 143*(1), 29-36.

Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research, 11*, 213-218

Kim, Y. J., & Woo, A. (2016). What's the score? Walkable environments and subsidized households. *Sustainability, 8*(4).

Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low-income Americans. *Journal of General Internal Medicine, 21*(1), 71-77.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American Community Survey. *Cityscape, 21*(1), 63-85.

Levine, M. (2013). *Perspectives on the current state of the Milwaukee economy*. Retrieved from Center for Economic Development, University of Wisconsin-Milwaukee: http://www4.uwm.edu/ced/publications/perspectives.pdf

Lohr, S. (2009). *Sampling: Design and Analysis* (2nd ed.). Pacific Grove, CA: Duxbury Press.

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass*. Cambridge, MA: Harvard Univ. Press.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Nieto, F. J., Peppard, P. E., Engelman, C. D., McElroy, J. A., Galvao, L. W., Friedman, E. M., Bersch, A. J., & Malecki, K. C. (2010). The Survey of the Health of Wisconsin (show), a novel infrastructure for population health research: Rationale and methods. *BMC Public Health, 10*(1), 785.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rao, J., & Scott, A. J. (1981). The analysis of categorical data from complex surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association, 76*, 221–230.

Rao, J., & Scott, A. J. (1987). On simple adjustments to chi-square tests with survey data. *The Annals of Statistics, 15*, 385–397.

Ross, C. E., & Mirowsky, J. (1999). Disorder and decay - the concept and measurement of perceived neighborhood disorder. *Urban Affairs Review, 34*(3), 412-432.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America*. First Edition. Liveright Publishing Corporation. New York.

Sallis, J. F., Slymen, D. J., Conway, T. L., Frank, L. D., Saelens, B. E., Cain, K., & Chapman, J. E. (2011). Income disparities in perceived neighborhood built and social environment attributes. *Health & Place, 17*(6), 1274-1283.

SAS Institute. (2019). The logistic procedure: Rank correlation of observed responses and predicted probabilities. Retrieved from https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_logistic_sect042.htm.

Schreiber-Gregory, D. (2017). *Multicollinearity: What is it, why should we care, and how can it be controlled?* Paper presented at the SAS Support.

Shaw, M. (2004). Housing and public health. *Annual Review of Public Health, 25*, 397-418.

Suglia, S. F., Duarte, C. S., & Sandel, M. T. (2011). Housing quality, housing instability, and maternal mental health. *Journal of Urban Health-Bulletin of the New York Academy of Medicine, 88*(6), 1105-1116.

Tran, T. D., Tran, T., & Fisher, J. (2013). Validation of the depression anxiety stress scales (dass) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *Bmc Psychiatry, 13*, 24-24.

Williams, D. R., Yan, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socioeconomic status, stress and discrimination. *J Health Psychol, 2*(3), 335-351.

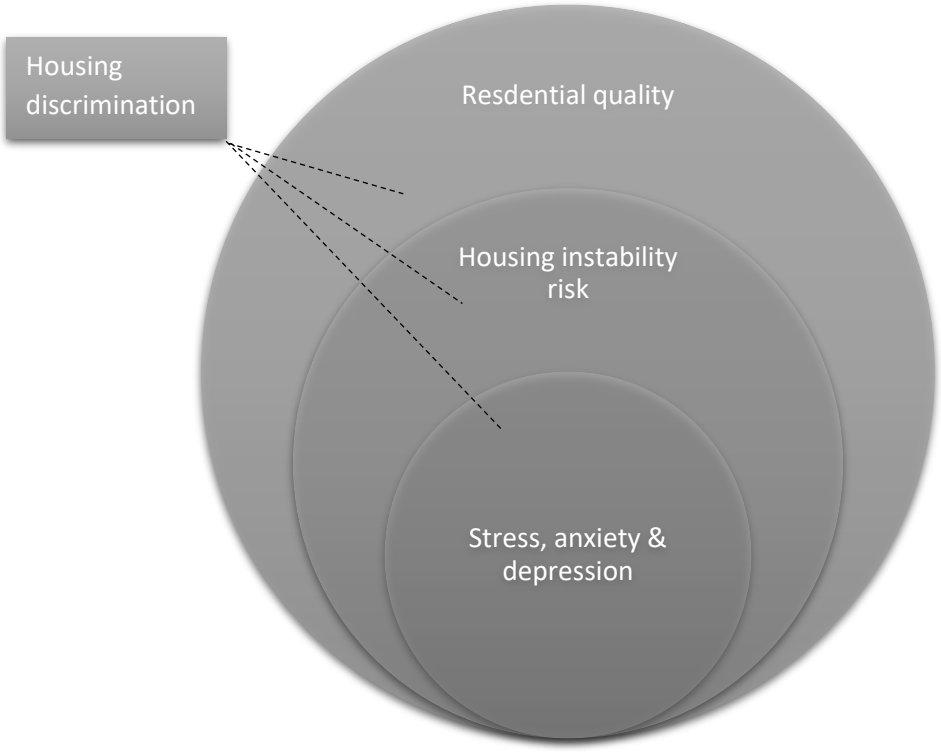
3.8. Tables and figures

Table 3.2. Demographic characteristics of questionnaire respondents by geographic level

		Wisconsin[1]		Milwaukee Metro[1]	
Characteristic	**Category**	**N**	**%**	**N**	**%**
Gender	Male	1165	43%	225	40%
	Female	1539	57%	334	60%
Age	< 35	615	23%	122	22%
	35-44	462	17%	105	19%
	45-54	635	23%	138	25%
	55-64	604	22%	127	23%
	65-74	388	14%	67	12%
Education attainment	< High school	178	7%	46	8%
	High school or GED	571	21%	99	18%
	Some college or associate degree	1057	39%	199	36%
	Bachelor's degree	595	22%	134	24%
	Graduate degree	299	11%	80	14%
Relationship status	**Married**	**1724**	**64%**	**319**	**57%**
	Widowed	96	4%	20	4%
	Divorced/separated	351	13%	72	13%
	Never married	437	16%	118	21%
	Living w/ partner	92	3%	30	5%
Race/ethnicity	Non-Hispanic White	2366	88%	394	70%
	Non-Hispanic Black	**154**	**6%**	**124**	**22%**
	Hispanic	68	3%	25	4%
	Other	112	4%	16	3%
US citizenship	Non-citizen	27	1%	10	2%
	Citizen	2676	99%	549	98%
Household income	<$25,000	587	23%	135	25%
	$25,000-$44,999	501	19%	89	17%
	$45,000-$74,999	662	25%	114	21%
	$75,000-$99,999	361	14%	68	13%
	>$100,000	494	19%	131	24%
Unemployed[2.]	No	2201	82%	413	74%
	Yes	**495**	**18%**	**146**	**26%**
Housing status[3.]	Own	189	72%	53	82%
	Rent	73	28%	12	18%

[1.] Unweighted sample of individuals that responded to the housing discrimination inquiry from the Survey of the Health of Wisconsin, 2009-2013.
[2.] Unemployed and not retired
[3.] Available only for the year 2009.
Boldface emphasizes substantial differences between Wisconsin and the Milwaukee Metro.

Figure 3.1. Hypothesized pathways of perceived housing discrimination exposure



Note: I hypothesize that perceived housing discrimination exposure impacts the residential quality, associates with housing instability risk and influences psychological outcomes of stress, anxiety and depression in a layered yet interconnected way.

CHAPTER 4:

The Extent Housing Discrimination Exposure Associates with Residential Quality: Analysis of a Representative Sample of the Wisconsin Population, 2009-2013

4.1. Introduction

While the Fair Housing Act has been in place for roughly fifty years, housing discrimination has limited equal access to quality housing opportunities across the nation, including Wisconsin. This study is the first in a series of three that examines reported exposure to housing discrimination from a state-wide sample population in Wisconsin Post-Recession, from 2009 to 2013. Through the series, I attempt to advance our understanding of housing discrimination from the context of an exposure to disparate treatment and its potential association with disparate outcomes. I base analyses on interpretations of the 1968 Fair Housing Act and the Affirmatively Furthering Fair Housing (AFFH) rule of 2015, both of which acknowledge the pernicious legacy of housing discrimination. Within the context of exposure to disparate treatment, housing discrimination is the unfair and unequal treatment of individuals or groups when accessing housing due to their physical, social or economic characteristics (Blank et al., 2004; Pager & Shepherd, 2008; Rothstein, 2017). Within the context of disparate impact, housing discrimination is considered as the main contributor to disparate outcomes in the quality of life conditions of one subpopulation group over another (Williams & Seicshnaydre, 2017; O'Regan, 2019).

The Fair Housing Act of 1968 (42 U.S.C § 3601) prohibits discrimination against individuals based on their race, color, religion, sex, national origin, disability or familial status during the sale, rental, financing or use of other housing-related services. The Act also requires the federal government to "provide, within constitutional limitations, for fair housing throughout the United States… affirmatively further the purposes of [fair housing]" (42 U.S.C §3608(d)). In

2015, the US Department of Housing and Urban Development (HUD) issued the AFFH rule to underscore a disparate impact liability under the Fair Housing Act and require state and local governments receiving federal funding from Community Development Block Grants to take "significant actions that are designed and can be reasonably expected to achieve a material positive change that affirmatively furthers fair housing by, for example, increasing fair housing choice or decreasing disparities in access to opportunity." (24 C.F.R. § 5.152). The AFFH rule also requested state and local governments to examine the extent of disparate impacts related to current and historical patterns of housing discrimination, including how historically marginalized communities based on their social characteristics (e.g., race and ethnicity, gender, income status) have been impacted.

To date, no known jurisdiction within the state of Wisconsin has issued a comprehensive assessment of fair housing as required under the 2015 AFFH rule because the enforcement of AFFH mandate has been delayed and a new proposal from HUD issued in August 2019 (80 FR 159) aims to revise the existing rule.[14] Also, the state of Wisconsin's Open Housing Law (Wis. Stat. § 106.50), which attempts to mirror the Federal Fair Housing Act, lacks substantial equivalency with the federal statute. This absence of equivalence limits the state's capacity to enforce properly the Fair Housing Act (Wisconsin, 2015). The lack of proper enforcement may, in turn, exacerbate disparate impacts by impeding equal housing opportunities.

[14] The state has currently available an Analysis of Impediments (AI) to Fair Housing published in 2015 which is a broad assessment outlining the demographic, economic and social composition of the state, administrative rules relevant to housing, data on housing discrimination complaints, impediments to fair housing and general actions to overcome impediments. However, researchers argued that AIs are inconsistent and ineffective (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019).

In January 2018, HUD announced it was delaying implementation of the AFFH rule and that jurisdictions were to return to conducting AIs during the delay. In August 2019, HUD announced is proposing changes to the AFFH rule, especially in the fair housing assessment and reporting process.

In this first study, I examine housing discrimination as a perceived exposure to unfair treatment through the life course when seeking housing or remaining in the neighborhood and examine: 1) the extent a perceived exposure to housing discrimination associates with low residential quality conditions; 2) whether the association (if any) between perceived exposure to housing discrimination and residential quality conditions differ by social and residential characteristics of one subpopulation over another in Wisconsin. Furthermore, this study seeks to unveil the potential relevance housing discrimination exposure has on the residential quality conditions of residents by individual sub-categories of gender, age, racial and ethnic constructs, education level, marital status, household income, employment status, residence duration and location; comparing the sample population the Milwaukee metro to the rest of the state. While this study does not include data on cumulative housing discrimination exposure, I assume that perceived housing discrimination accumulates throughout the life course and includes both recent and older exposures. As noted by Pager and Shepherd (2008), recently perceived discrimination is more likely to be reported. Yet, experiences of discrimination that happened 10 years ago may still impact outcomes (Yang & Sun, 2019). Building upon these assumptions and previous research, I hypothesize that residents in Wisconsin that perceived housing discrimination are more likely to have lower residential quality than residents that perceived no housing discrimination throughout their life course. Throughout this study, I use perceived housing discrimination and experienced housing discrimination interchangeably, which refers to self-reported housing discrimination exposure during the life course.

Previous research suggests that discrimination in housing has enduring consequences in housing choices and disparities in residential quality conditions (Osypuk & Acevedo-Garcia, 2010; Greenberg et al., 2016; Rothstein, 2017; Rosenblatt & Cossyleon, 2018). For example,

individuals exposed to discrimination may be forced to live in lower-quality homes and neighborhoods with higher rates of crime and nuisances (Osypuk & Acevedo-Garcia, 2010; Greenberg et al., 2016; Rosenblatt & Cossyleon, 2018). However, the extent perceived housing discriminations exposure associates with residential quality conditions right after the Great Recession in Wisconsin remains understudied.

Wisconsin is an important setting to understand the effects of housing discrimination from 2009 to 2013, primarily for three (3) reasons. First, the state lacks appropriate measures to estimate housing discrimination and enforce the Fair Housing Act due to a lack of equivalency with the federal statute (Wisconsin, 2015). Second, research evidence suggests housing discrimination contributed to the 2008 Great Recession with enduring consequences thereafter (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017; McClure et al., 2019). Third and most important, Wisconsin has the most racially segregated metropolitan area (Landis, 2019). Yet, 6 of the 8 most segregated metros are in the Midwest (Gordon, 2019). Persistent racial segregation is an indicator of pernicious housing discrimination that continues occurring even with anti-discrimination laws in place.

From 2009 to 2013 Wisconsin fair housing agencies received a combination of 1,888 housing discrimination complaints. On average, the agencies received 358 complaints per year. In 2011 the three agencies received a total of 440 complaints, the highest in the 5-year interval. Based on these complaints and data from a representative state population survey, this study draws our attention to the extent perceived housing discrimination associates with residential quality and influence disparities among social groups and by geography within the state. Understanding the extent of perceived housing discrimination in a midwestern state with a similar population and economic characteristics as others in the region (Council of State

Governments, 2011) and with similarly persistent racial disparities (Gordon, 2019) pose important implications to the regional planning and housing policy fields. This study provides important contexts on housing discrimination through the lenses of disparate exposure and impacts during a critical time in which objectives of the Fair Housing Act are in jeopardy.

4.2. Methods

4.2.1. Setting and data

This study focuses on the state of Wisconsin with additional analysis at the Milwaukee metro level. I use data from the Survey of the Health of Wisconsin (SHOW) obtained during the years 2009-2013. The SHOW is a population-based survey with a rich collection of social determinants of health constructs including objective and subjective factors of the built environment, socio-economic characteristics, and self-reported exposure to social prejudice among other issues. The data included in this study includes a representative sample of non-institutionalized adults (ages 21 to 74 years old) who are residents of Wisconsin. The sample of survey participants is selected from random households using a two-stage probability-based cluster sampling approach in which census block groups are randomly selected and then stratified based on two factors, congressional district and the percentage of the population living below the poverty line. The data collected from the SHOW include an in-home interview which is the first portion of data (T1), self-administered questionnaires at the end of the interview returned to survey center which is the second portion (T2), and a third portion collected during a visit to the survey center and in-clinic exams (T3). Survey methodology, data collection, and validity of the SHOW is described in detail by Nieto et al. (2010) and Hale et al. (2013).

In this study, I use data collected during T1 and T2 and apply sample weights to T2 because most measures of interest were collected at T2. This drops the sample size at the state level from 3113 to 2760 in which 2704 responded to the housing discrimination section of the survey. The sample size on T2 at the Milwaukee metro is 571 of which 559 individuals responded to the housing discrimination survey section.

4.2.2. Measures of interest

4.2.2.1. Housing discrimination exposure

Housing discrimination exposure serves as the **main explanatory variable.** An exposure to housing discrimination is noted as an "anytime" event where the respondent perceives being unfairly treated when finding a place to live, accessing housing, or remaining in the neighborhood. This may include one-time or multiple events perceived throughout an individual's life. SHOW recorded this self-reported data using a questionnaire based on the Detroit Area Study of Discrimination and Williams et al. (1997) at T2. The variable is coded as a binary variable to denote "yes/no" to a perceived housing discrimination exposure throughout the life course.

4.2.2.2. Residential quality

Residential quality in this study is measured by the immediate built environment quality index (herein, IBE quality index) and serves as **the outcome variable** in this study. The IBE quality index is computed based on selected objective and subjective housing and neighborhood quality measures from the SHOW. Housing quality measures include the year the home was built and whether the housing is overcrowded based on the number of household occupants per rooms in the home. Neighborhood quality measures include perceived walkable distance of 10 minutes

or less to a basic neighborhood amenity (grocery store, supermarket, parks, recreation, and fitness centers), perceived safety due to traffic, perceived crime, and perceived pleasantness based on general maintenance (how well is the neighborhood maintained free from litter and nuisances). All selected housing and neighborhood quality measures were equally weighted to T2 and binary-coded to create a combined IBE quality sum score. The lowest value of the IBE sum score is 0 and the highest 6.0. A dichotomized IBE quality index variable is developed based on the median of the sum score. The median value of 4.0 represents the cut point between low IBE quality (score below the median) and moderate-high IBE quality (score at or above the median). This approach is similar to the methodology presented by Habib et al. (2009) and Hale et al. (2013). For logistic regression models, the IBE quality index is used as dichotomous, coded into "1" indicating "moderate-high IBE quality" conditions and "0" indicating "low IBE quality" conditions.

4.2.2.3. The Milwaukee metro

Due to the large population (largest in the state of Wisconsin) and severe racial and income segregation (Levine, 2013; Landis, 2019), I incorporate a dummy variable, "Milwaukee metro," into adjusted regression models. This variable represents the geographical location of the sample population residing in any of the four counties – Milwaukee, Waukesha, Ozaukee, Washington – corresponding to the Milwaukee metro in Wisconsin during 2009 to 2013. This variable is used to compare responses from participants that reside in the Milwaukee metro versus the rest of the state.

4.2.2.4. Individual control variables

Individual control variables include demographic and SES measures obtained from the SHOW. These variables are: age (less than 35, 35-44, 45-54, 55-64, 65-74), race and ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic and Other), gender (female, male), relationship status (married, separated/divorced, widowed, never married, living with partner), income level (less than $25,000, $25,000-$44,999, $45,000-$74,999, $75,000-$99,999, $100,000 or more), educational attainment (less than high school, high school degree or equivalent – GED, some college or associate degree, bachelor's degree, graduate degree or higher), employment status (unemployed, employed) excluding retirement, and citizenship status (US citizen and not US citizen). To control for potential neighborhood selection bias on the perceived quality of the immediate living space (Greenberg & Crossney, 2007; Elo et al., 2009; Oakes, 2014), I also examine duration at the current residence in years. Control variables are weighted for T2 for consistency with the main variables in statistical analyses.

4.2.3. Statistical analysis

I use SAS version 9.4 to analyze whether housing discrimination exposure associates with the likelihood of residing in low-quality IBE. If findings suggest the association is significant, I also examine whether the association vary among demographic SES categories and by contrasts in residence duration and location, and specifically residing in the Milwaukee metro as opposed to the rest of the state. Lastly, I test for the robustness of findings and assess whether the outcome substantially varies by the timeframe of the data collected.

4.2.3.1. Bivariate analysis

I first conduct a bivariate analysis to examine two-way associations between housing discrimination exposure and residential quality measures for a weighted sample population at the state and at the Milwaukee metro levels. I use the Rao-Scott Chi-Square test statistic which is a design-adjusted version of the Pearson Chi-Square test (Rao & Scott, 1981, 1987) complex survey design.

4.2.3.2. Regression analysis

Next, I develop logistic regressions models to examine whether housing discrimination exposure associates with the likelihood of residing in lower-quality IBE. Additional regression models explore for potential individual interactions between exposure to housing discrimination and 1) SES categories, 2) residence duration, and 3) residence location. For these, I compute least-square means of fixed effects for all possible pairwise comparisons of interaction terms on the logit scale.

Each regression model controls for demographic SES characteristics, residence duration, and location unless noted otherwise. For each model, I conduct hypothesis tests of no association between the explanatory and the outcome variables utilizing the likelihood ratio method. Then, I compute confidence intervals at the 95% confidence level for each parameter. I also assess for multicollinearity among parameters using the following criteria: 1) variance inflation factor (VIF) larger than ten; 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero), and a large corresponding condition index (Schreiber-Gregory, 2017). To measure the predictive accuracy of each model, I compute the index of rank correlation, which gives an estimate of the area under the receiver operating characteristic (ROC) curve when the response variable is

binary (Hanley & McNeil, 1982; SAS Institute, 2019). To test the robustness of findings, I conduct a sensitivity analysis for the adjusted model. I do this by computing two adjusted multivariate linear regression (MLR) models with alternate IBE quality outcome variables. The IBE quality variable for each of these models is set into a continuous format using the sum score of the six binary-coded residential quality measures utilized in the original dichotomous IBE index. In the first MLR, I use an equally weighted sum score for the IBE (noted, IBE sum score). In the second MLR, I use a factor-weighted sum score for the IBE (noted, IBE factor-weighted score) using Principal components analysis (PCA). The IBE factor-weighted score is developed by extracting the first factor from the PCA because it explains the most variance and has the most influence on a principle (Gennarelli & Goodman, 2014). Each model is controlled for potential confounders including demographic SES, residence duration and location.

Lastly, due to a three-consecutive year increase in housing discrimination complaints filed state-wide after the Great Recession (peaking in 2011), I assess whether findings from this study vary by the timeframe of the data collected. To do this, I split the SHOW sample data into two cohort groups, each containing three-year interval data sharing the 2011 sampling year in common. Cohort 1 includes a sample population from 2009 to 2011 and Cohort 2 includes a sample population from 2011 to 2013. For each cohort, I conduct adjusted logistic regression models controlling for potential confounders including demographic SES, residence duration, and location.

4.3. Findings

4.3.1. Sample population characteristics

Among the 3,113 individuals interviewed in the SHOW across the state, 2,704 responded to the questionnaire including the perceived housing discrimination exposure inquiry. Of these respondents, 57% self-identified as female, 21% obtained a high school or GED as the highest education level attained, 64% are married, 6% are Non-Hispanic Black, 23% have an annual household income under $25,000, and 18% are unemployed yet not retired. Among the 571 SHOW participants in the Milwaukee metro, 559 responded to the housing discrimination question. Characteristics of these respondents are somewhat comparable to the overall state sample population with 60% self-identified females, 18% with a high school or GED as the highest education level attained, and 25% with an annual household income under $25,000. However, the racial construct composition, marital status, and percentage of unemployed yet not retired individuals differed substantially from the overall state sample with higher percentages of Non-Hispanic Blacks (22%) and unemployed yet not retired individuals (26%) and lower percentage of married individuals (57%).

4.3.1.1. Housing discrimination exposure

Among the 2,704 respondents, 187 reported having perceived an exposure to housing discrimination sometime during their lifetime. When applying sampling weights to reflect the Wisconsin population, the proportion of people exposed to housing discrimination is roughly 1 in 15 Wisconsin residents (7.4%; 95% CI [5.8%, 9.0%]). Of the 559 respondents in the Milwaukee metro, 67 reported having perceived an exposure to housing discrimination which translates to approximately 1 out of 10 Milwaukee metro residents (9.9%; 95% CI [6.4%, 13.3%]). While the

Milwaukee Metro and the rest of the state appear to differ on the percentage of perceived exposure to housing discrimination, the proportions between locations are statistically indistinguishable at the 0.05 alpha, yet marginally, according to the Rao-Scott Chi-square test (X^2 = 3.19, *p=0.07)*. Despite this marginality, additional analysis compares the Milwaukee metro to the rest of the state and examines perceived housing discrimination exposure against low IBE quality factors.

Also, among subgroups in the sample population, approximately 1 in 3 Non-Hispanic Blacks reported housing discrimination - the highest ratio among the social categories in my study. In comparison, approximately 1 in 22 Non-Hispanic Whites reported housing discrimination. Due to these observations suggesting differences in perceived housing discrimination reporting among racial groups, the additional analysis compares racial categories and other SES categories on the extent perceived housing discrimination associates with low residential quality.

4.3.1.2. Reported residential quality

Table 4.1 shows the selected residential quality factors and the IBE quality index as the combined measure for residential quality and their corresponding descriptive statistics for the weighted sampled population at the state and at the Milwaukee metro levels. Among the residential quality measures reported by the 2,074 SHOW respondents at the state level, roughly 62% live in homes built prior 1978, approximately 2% reside in overcrowded conditions, 2.5% perceive their neighborhood is unsafe because of crime and 10.5% perceive their neighborhood is unsafe to walk because of traffic, 27.5% can walk to 3 or more neighborhood amenities, and approximately 19% perceive their neighborhood unpleasant. Lastly, roughly 18% of the sample population reside in low IBE quality. The residential quality characteristics reported by the

sample population at the Milwaukee Metro level are comparable in most measures including the combined IBE quality index.

4.3.2. Bivariate analysis findings

Table 4.2 reports the results of the bivariate analysis exploring potential two-way associations and the extent of undesirable residential factors and the IBE quality index to differ by perceived presence or absence of perceived housing discrimination exposure for a weighted sample population at the state and at the Milwaukee metro levels. At both levels, perceived crime, traffic, and neighborhood unpleasantness is twice as high among individuals exposed to housing discrimination compared to unexposed. This difference is statistically significant according to Rao-Scott Chi-Square tests at both geographic levels. Similarly, the combined low residential quality, based on the dichotomous IBE quality index is twice as high among individuals exposed to housing discrimination compared to unexposed. The differences in proportions for the low IBE quality index between exposed and non-exposed groups are significant at both the state (X^2 = 32.6, p<0.0001) and at the Milwaukee metro levels (X^2 =12.1, p=0.001). Among low-quality housing characteristics, overcrowding is marginally higher for individuals that were exposed to housing discrimination compared to those not exposed. This difference is somewhat significant only at the state-level. The year built of the home (at or prior 1978) and proximity to amenities in the neighborhood is not statistically different between individuals exposed to housing discrimination and those not exposed at both state and Milwaukee metro levels. Lastly, when comparing the Milwaukee metro against the rest of the state, no statistically distinguishable differences were observed between individuals exposed to housing discrimination and those not exposed residing in low IBE quality conditions (X^2 = 1.2, p = 0.29).

4.3.3. Logistic regression findings

Table 4.3 reports the summarized results of logistic regression models examining the extent housing discrimination exposure, contrasted by non-exposure, associates with the likelihood of residing in low-quality IBE as opposed to residing in moderate-high quality IBE. Results from Model 1 (unadjusted for potential confounders) show that perceived housing discrimination exposure positively associates with low IBE quality and suggests that a perceived exposure alone increases the likelihood of residing in low IBE quality by approximately three folds (OR = 3.37; 95% CI [2.21, 5.14]). Adjusting for SES characteristics, Model 2 shows that exposure to housing discrimination is positively and significantly associates ($p < 0.001$) with low IBE quality, albeit at a reduced partial effect. Results from Model 2 suggests that individuals exposed to housing discrimination, as opposed to those non-exposed, are about twice more likely to reside in low IBE quality (OR = 2.34; 95% CI [1.50, 3.65]), controlling for individual SES characteristics including gender, age, education attainment, relationship status, racial and ethnic constructs, citizenship status, household income, and unemployment.

Model 3 and 4 adjusts for residence duration (more than 1 year vs. a year or less) and residence location (Milwaukee metro versus the rest of the state), respectively. As shown in Model 3, the inclusion of residence duration in the adjusted model slightly increases the partial effect of housing discrimination exposure on the outcome of residing in low IBE quality (OR = 2.45; 95% CI [1.56-3.85]. However, the odds ratio slightly rose for all other covariates which suggest that residence duration has an additive partial effect in the model. Interestingly, residing for more than a year, as opposed to a year or less, is not significantly associated with the odds of an outcome of residing in low IBE quality (OR = 1.15; 95% CI [0.80, 1.65]; $p = 0.46$). However, utilizing residence duration as a continuous variable in the adjusted model, instead of the

categorical version, shows that an increase in one year in residence duration narrowly increases the odds of residing in low IBE quality (OR = 1.02; 95% CI [1.00,1.03]). Nonetheless, careful interpretation is warranted for the actual population as suggested by the confidence intervals.[15]

Model 4 shows that the inclusion of residence location (Milwaukee metro versus the rest of the state) attenuates the partial effect of perceived housing discrimination exposure on the outcome of residing in low IBE quality (OR = 2.42; 95% CI [1.55, 3.79]). Yet, the partial effect of perceived housing discrimination exposure remains significant (p <0.001) in the adjusted model. Other variables in Model 4 that have positive and significant associations with the odds of residing in low IBE quality when the perceived exposure to housing discrimination is absent and other covariates are held constant or at reference, include education (all categories versus graduate degree), Hispanic (versus Non-Hispanic White), household income (all categories versus income over $100,000), and not-retired unemployed (versus employed). Conversely, the odds ratio for the contrast between the Milwaukee metro and the rest of the state is not significant at the 95% confidence level (OR = 1.44; 95% CI [0.96, 2.16]; p = 0.079). Results for all covariates in each model (2-4) are available in the appendix (**Table A.4.2)**. Among all models, Model 4 shows the best overall fit according to the Akaike Information Criterion (*AIC* = 13,717,155) and the highest predictive ability according to the index of rank correlation (c = 0.683).

4.3.3.1. Population subgroup analysis: Interactions and least-square means results

Based on previous findings in this study suggesting that housing discrimination exposure associates with the likelihood of residing in low IBE quality as opposed to residing in higher IBE

[15] Note that the odds ratio is 1 when there is no relationship.

quality, I analyzed whether the association vary among demographic categories and by contrasting residence duration and location. According to individual adjusted models with interaction terms (**Tables 4.4 to 4.7**), no statistically distinguishable associations were observed for contrasting levels of demographic categories, residence duration and location against their reference category for individuals that perceived housing discrimination exposure. However, the least-square means of fixed effects for all possible pairwise comparisons of interaction terms revealed noteworthy findings for individual demographic and residential categories. Among such findings, individuals exposed to housing discrimination that is female, without a college or associate degree, that are in the "other" racial and ethnic construct category (thus, are neither Non-Hispanic White, Non-Hispanic Black or Hispanic), or that earned an annual household income between $45,000 and $74,999, are more than three times likely to reside in low IBE quality compared to unexposed individuals in the same categories, albeit with large margins for the actual population at the 95% confidence level. Significant odds ratios were also observed among other individual SES categories including young adults and middle age groups, single (never married) and unemployed people; Also, among individuals residing more than a year. Due to the lack of a sufficient sample size of non-US citizens reporting housing discrimination exposure and residing in low IBE, results are not reported for this group.[16] I describe the results for each SES and residential category in detail next.

4.3.3.1.1. Results by gender

Among females alone, the association between housing discrimination exposure and the odds of residing in low IBE quality is significant (OR = 3.20; 95% CI [1.96, 5.23]). However,

[16] The sample size of non-US citizen is 27. Seven reside in low IBE quality. Of these, none reported perceived housing discrimination. Of the 20 that reside in moderate-high IBE quality, one reported perceived housing discrimination. For samples this small, confidence intervals resulting from the analysis are extremely large.

among males alone, the association between housing discrimination exposure and the odds of residing in low IBE quality is not significant (95% CI [0.84, 3.95]; $p = 0.13$). Among individuals exposed to housing discrimination, the odds of residing in low IBE quality are statistically indistinguishable between gender categories (females versus males). **Table 4.4** reports these results.

4.3.3.1.2. Results by race/ethnicity

Among individuals that are Non-Hispanic White and in the "other" racial and ethnic category (neither Hispanic, Non-Hispanic White or Non-Hispanic Black), housing discrimination exposure is significantly associated with increased odds of residing in low IBE quality (OR = 2.54; 95% CI [1.38, 4.66]; OR = 6.62; 95% CI [1.62, 27.01]), respectively. Among Non-Hispanic Blacks and Hispanics, housing discrimination exposure is not statistically associated with either an increase or decrease in the odds of residing in low IBE quality. Lastly, among individuals exposed to housing discrimination, the odds of residing in low IBE quality were not statistically distinguishable between each racial construct and the reference category (Non-Hispanic White). **Table 4.4** reports these results.

4.3.3.1.3. Results by household income level

Individuals that either earned an annual household income under $25,000, between $45,000 and $74,999, or higher than $100,000 and were exposed to housing discrimination have relatively high odds (OR = 2.18; 95% [1.13, 4.21]; OR = 3.22; 95% CI [1.35, 7.66]; OR = 7.25; 95% CI [1.29, 40.77]) of residing in low IBE quality, compared to unexposed individuals in the same income categories. Among individuals earning modest annual household incomes (between $25,000 and $44,999) and among those earning moderately high annual household incomes (between $75,000 and $100,000), housing discrimination exposure is not associated with either

increased or decreased odds of residing in low IBE quality. Lastly, among those exposed to housing discrimination, the odds of residing in low IBE quality were not statistically distinguishable between the reference group (household income above $100,000) and each income level. **Table 4.5** reports these results.

4.3.3.1.4. Results by employment status

Among unemployed individuals, housing discrimination exposure is significantly associated with increased odds of residing in low IBE quality (OR = 2.25; 95% CI [1.11, 4.56]). The association is somewhat comparable to employed individuals (OR = 2.53; 95% CI [1.45, 4.42]) and therefore statistically indistinguishable between both employment status categories. **Table 4.5** reports these results.

4.3.3.1.5. Results by education level

Individuals without a post-secondary education (i.e., did not complete high school or obtained a high school diploma or GED) that were exposed to housing discrimination have higher the odds of residing in low IBE quality compared those non-exposed in the same education categories (OR = 3.15; 95% CI [1.01, 9.81]; OR = 5.33; 95% CI [2.09, 13.59]) respectively. Individuals with a bachelor's degree that were exposed to housing discrimination also have relatively high odds of residing in low IBE quality compared to unexposed individuals in the same educational attainment group (OR = 4.10; 95% CI [1.61, 10.49]). However, the exposure to housing discrimination is not associated with the probability of residing in low IBE for individuals that earned either some college, an associate degree or completed graduate school. Lastly, among individuals exposed to housing discrimination, the odds of residing in low IBE quality as opposed to residing in higher IBE quality are statistically indistinguishable

between the reference category (graduate degree) and each individual education level. These results are reported in **Table 4.5**.

4.3.3.1.6. Results by age group

Among younger and middle-aged individuals (i.e., with less than 35 years of age and between 45 and 54 years of age at consent, respectively) housing discrimination exposure is significantly associated with an increased odds of residing in low IBE quality (OR = 2.49; 95% CI [1.27, 4.89]; OR = 3.44; 95% CI [1.40, 8.45]). However, the exposure to housing discrimination for individuals between 35 to 44 years of age and older than 55, is not statistically significantly associated with the probability of residing in low IBE quality. Lastly, among individuals exposed to housing discrimination, the odds of residing in low IBE quality as opposed to residing in higher IBE quality are statistically indistinguishable between individuals in reference category (older than 64) and each other age group. **Table 4.6.** reports these results.

4.3.3.1.7. Results by marital status

Among singles (never married), an exposure to housing discrimination is significantly associated with increased odds of residing in low IBE quality (OR = 2.31; 95% CI [1.17, 4.59]). The association is also significant among married individuals (OR =2.73; 95% CI [1.35, 5.56]). No statistical associations were observed among individuals that are either divorced, separated, widowed or living with a partner. Finally, among individuals exposed to housing discrimination, the odds of residing in low IBE quality as opposed to residing in higher IBE quality are statistically indistinguishable between the reference category (married) and each individual category of relationship status, **Table 4.6** also shows these results.

4.3.3.1.8. Results by residence duration

For individuals residing more than a year, perceived housing discrimination significantly associates with low residential quality (OR = 2.54; 95% CI [1.46, 4.43]); and similarly, for individuals residing shorter (OR = 2.21; 95% CI [1.06, 4.59]). Among individuals that perceived housing discrimination, no statistically distinguishable differences between long and short residence duration were found on the odds of residing in low IBE quality. This suggests that exposure to housing discrimination does not depend on the value of residence duration on associating with the odds for the outcome. **Table 4.7** reports the results.

4.3.3.1.9. Results by two locations: the Milwaukee Metro and the rest of the state

For individuals residing in the Milwaukee metro, housing discrimination associates with residing in low IBE, albeit moderately (OR = 2.11; 90% CI [1.12, 3.99]). The association between perceived housing discrimination and low IBE quality appears more significant for individuals residing outside the Milwaukee metro (OR = 2.60; 95% CI [1.50, 4.51]). Yet, the association between housing discrimination and residential quality is not significantly different among the two geographic locations (95% CI [0.52, 2.78]; p = 0.67). **Table 4.7** also reports these results.

4.3.4. Robustness check and additional analysis

4.3.4.1. Robustness check 1: Assessing for potential multicollinearity

For each model, I assessed multicollinearity among parameters. I used the: 1) variance inflation factor (VIF) larger than ten; 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero), and a large corresponding condition index (Schreiber-Gregory, 2017). Following each criterium, I found no concerns about multicollinearity.

4.3.4.2. Robustness check 2: Alternate regression models

I developed two adjusted MLR models to test for the robustness of findings from this study suggesting that exposure to housing discrimination associates with low IBE quality. The first model uses the IBE sum score which is an equally weighted score and the second model uses the IBE factor-weighted score obtained with PCA. I controlled all models for SES, residence duration and location. To allow for comparability, I standardized the regression coefficients.

As reported in **Table 4.8,** results from both MLR models suggest a significant negative association between a perceived exposure to housing discrimination and IBE quality. The first model shows that for exposure to housing discrimination, the IBE sum score lowers by roughly 0.09 standard deviation units. The second model shows somewhat stronger effects, a decrease in IBE factor-weighted score by 0.13 standard deviation units. This difference is likely due to the weighting scheme of the first factor utilized from PCA that, while chosen due to their highest eigenvalues explaining the most variance, coincidentally had larger weights on residential quality measures that were highly correlated with the housing discrimination variable. Nonetheless, the direction and significance of the association observed in both MLR adjusted models is consistent with previous observations in this study suggesting that a perceived exposure to housing discrimination associates with lower IBE quality.

4.3.4.3. Robustness check 3: Split-cohort analysis

Due to an increase in housing discrimination complaints filed state-wide after the Great Recession peaking in 2011, I examined whether findings from this study by the timeframe of the data collected. Adjusted logistic regressions on samples from two cohort groups (i.e., cohort 1:

2009-2011, cohort 2: 2011-2013) reveal noteworthy observations reported in **Table 4.9.** For cohort 1, exposure to housing discrimination increases the odds of residing in low IBE quality by 81 percent (OR = 1.81; 95% CI [1.03-3.19]. The association is significant (p = 0.039). For cohort 2, exposure to housing discrimination increases the odds of residing in low IBE quality by more than three folds (OR = 3.30; 95% CI [1.91-5.71]). The association is highly significant (p <0.0001). While differences in odds ratios among cohorts in the sampled population seem apparent, the overlapping confidence intervals suggest that the likelihood for the outcome is not substantially different from one another. Also results from a Rao-Scott Chi-square analysis (X^2 = 3.45; p=0.49) confirm that cohorts reporting perceived housing discrimination and low residential quality are not statistically different.

4.4. Discussion

This study is the first in a series of three that examined reported exposure to housing discrimination from a state-wide sample population in Wisconsin Post-Recession, from 2009 to 2013. My principal aim through this research is to advance our understanding on discrimination from the perspective of perceived disparate treatment through the life course when getting housing or remaining in the neighborhood and its potential association with disparate outcomes. Building upon the assumption that perceived discrimination through the life course is cumulative and that recent events are more likely to be reported, I hypothesized that: 1) perceived housing discrimination exposure associates with the likelihood of residing in lower residential quality; and 2) the association between perceived exposure and residential quality conditions vary among subpopulations in Wisconsin by social characteristics, residence duration, and location.

Results suggest that a perceived exposure to housing discrimination significantly associates with residing in lower residential quality as defined by the IBE quality index.

Individuals residing in Wisconsin from 2009 to 2013 that perceived an exposure to housing discrimination through the life course are more than twice likely to live in lower residential quality compared to their counterparts that perceived no discrimination. The relationship remained significant when controlling for socioeconomic characteristics, location, and residence duration. An additional analysis confirmed the direction and significance of the findings, showing a significant negative association between perceived exposure to housing discrimination and residential quality, based on a similar residential quality measure developed with PCA. In addition to these findings, I observed noteworthy differences between people in Wisconsin that perceived housing dissemination and those that did not on single residential quality factors. Compared to their non-discriminated counterparts, individuals exposed to housing discrimination reported residing in lower subjective and objective quality conditions at both the state and the Milwaukee Metro levels. Among subjective measures, they reported twice as high perceived crime, traffic, and neighborhood unpleasantness. Among objective residential factors, they reported moderately higher overcrowding conditions, albeit at the state-level only. Therefore, these findings support my first hypothesis and show substantial evidence of the detrimental effect of perceived housing discrimination on a combination of objective and subjective measures of residential quality in a sample population throughout the state of Wisconsin.

Additionally, due to research suggesting that housing discrimination played an important role contributing to the Great Recession (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017), this study also adds context with regards to the five years after the Great Recession. According to fair housing agencies in Wisconsin, during this timeframe, the state received an increased amount of housing discrimination complaints peaking in 2011 and declining thereafter. Noting this, I assessed whether the association between perceived discrimination and low

residential quality varied between the sample population surveyed from 2009 to 2011 and the sample population surveyed from 2011 and 2013. Results show no statistically significant differences in the association among the surveyed groups which suggests that the detrimental effect of perceived discrimination on residential quality does not substantially vary across time - neither by being closer or farther from the Great Recession.

When examining this study's second hypothesis, least-square means of fixed effects reveal noteworthy findings. First, this study suggests that among individuals that reported no perceived housing discrimination, people with lower education, lower household income, that are Hispanics or are unemployed have significant odds for living in low residential quality conditions compared to their respective higher education, higher income, Non-Hispanic Whites and employed counterparts. These findings are consistent with previous studies that have found worse residential quality conditions among individuals with low income, lower education attainment, and Non-Whites compared to their White or affluent counterparts (Narine & Shobe, 2014; Stokes, 2019). However, these studies did not account for discrimination as a mechanism intersecting with social characteristics. Once exposure to housing discrimination is operationalized in the mechanism for residential quality conditions among individual social groups, the effect of discrimination appears also significant for individuals in affluent or privileged groups.

Second, this study suggests that the effect of exposure to housing discrimination can be particularly relevant for specific social groups in the sample population, including some in historically marginalized categories and some with privileged status. For instance, Wisconsin residents that perceived housing discrimination and are female, obtained a bachelor's degree, are in the "other" racial and ethnic construct category (thus, are neither Non-Hispanic White, Non-

Hispanic Black or Hispanic), or earned an annual household income between $45,000 and $74,999, are more than three times likely to live in low residential quality compared to unexposed individuals in the same categories. Significant odds for low residential quality were also observed for a broad variety of groups that were exposed to housing discrimination, compared to their unexposed counterparts in the same social categories. For example, perceived housing discrimination exposure significantly associated with low residential quality for young and middle-aged adults, people that did not attend college, singles (never married), married, Non-Hispanic Whites, people in the lowest and highest household income categories, employed, unemployed, living in the Milwaukee metro and outside the Milwaukee metro within the state. There were several groups in which perceived housing discrimination exposure made no difference in the odds of living in low residential quality. These groups include males, individual older than 55 years of age, individuals with either an associate degree or a graduate degree, single people that are divorced, separated, widowed or living with a partner, Hispanics, Non-Hispanic Blacks, and individuals with either modest (between $25,000 and $44,999) or moderately high (between $75,000 and $100,000) annual household incomes. In effect, the housing outcomes for these groups were not statistically different from their unexposed counterparts in the same group.

Third, this study shows comparably high percentages of Non-Hispanic Blacks that perceived housing discrimination in both residential quality conditions. Therefore, we are not surprised to find that perceived housing discrimination made no difference in the odds of low residential quality. Rao-Scott Chi-squared tests confirmed the indistinguishability between residing in low versus higher residential quality conditions among exposed Non-Hispanic Blacks in Wisconsin ($X^2 = 1.64$; $p = 0.2$). For instance, 32.8% (95% CI [16.6%, 49.0%]) of Non-

Hispanic Blacks exposed to housing discrimination reside in low residential quality and 20.5% (95% CI [9.5%, 31.5%]) reside in moderate-high residential quality. The overlap in the confidence intervals underscores the indistinguishability. In contrast, 11.3% (95% CI [6.3%, 16.4%]) of exposed Non-Hispanic Whites reside in low residential quality compared to 4.1% (95% CI [2.6%, 5.6%]) in moderate-high residential quality. This suggests the Black-White difference is apparent in higher-quality residential conditions. The relatively high percentage of perceived discrimination reported by Non-Hispanic Blacks in both residential quality conditions is worrisome because it implies this group is a target of discrimination in both low and high-quality residential environments. Recent research (Yang et al., 2016; Yang et al., 2018) suggests that African Americans are more likely to perceive housing discrimination in predominately White affluent neighborhoods where they have fewer social ties. Other studies, most of which are qualitative, suggest there is a temporal conditionality for African Americans in which the experience of housing discrimination occurred in an affluent neighborhood and the experience contribute for the relocation into a 'lower-quality' neighborhood (Eligon & Gebeloff, 2016; Greenberg et al., 2016; Rosenblatt & Cossyleon, 2018). Because such temporal conditionality is out of the scope in this study, future studies should examine whether the experience of housing discrimination in 'higher-quality' residential environments contributes to the relocation into lower-quality environments for African Americans.

Lastly, for the sample of the Wisconsin population that perceived housing discrimination exposure, no statistically significant differences were observed in the likelihood of residing in low residential quality conditions for one subpopulation group over their reference category. For example, in the previously discussed comparison between Non-Hispanic Blacks and Whites that perceived exposure to housing discrimination, the percentage of individuals in low residential

quality conditions were to some extent comparable, particularly when considering the almost overlapping 95% confidence intervals. This suggests that once an exposure to housing discrimination is experienced, differences across social characteristics – specifically between historically marginalized and privileged categories (e.g., lowest income vs. highest income, lowest education vs. highest education) – are negligible on the odds for residing in low residential quality in Wisconsin. Similarly, no statistically significant differences were found in the odds for low residential quality among contrasts in residence duration and among contrasts in location (i.e., residing in the Milwaukee metro versus the rest of the state) for Wisconsin residents that perceived an exposure to housing discrimination. These observations are carefully interpreted because the sample size among individual subgroups that reported housing discrimination exposure is small. Therefore, while this study finds that a perceived exposure to housing discrimination does not associate with worse outcomes in the residential quality conditions for one subpopulation group over another when all else is equal and adjusting for demographic and residential factors, a perceived exposure can still be relevant for a broad variety of groups in Wisconsin as previously discussed.

Recent studies, one with data from a representative sample population in Philadelphia (Yang & Chen, 2018) and another with a national longitudinal data (Yang & Sun, 2019), show that the effect of perceived discrimination does not significantly vary across social dimensions, specifically among gender and race/ethnic groups on self-rated health. Furthermore, the authors suggest that the negative effect of perceived discrimination appears to be universal regardless of an individual's social background. From a different perspective, this study suggests that perceived exposure to housing discrimination can be particularly relevant regardless of an individual's social group, residence duration, and residence location.

4.4.1. Limitations

This study has several limitations. First, this is a cross-sectional study relying on self-reported measures from interviews and questionnaires. Second, the theoretical mechanisms are not exhaustive and may not have thoroughly captured or measured housing discrimination and residential quality. While this study assumes that the experience of housing discrimination is cumulative over lifetime and that perceptions serve as a proxy for factual experiences, the measure of perceived housing discrimination over the life course obtained from the SHOW is subjective and does not explicitly capture the number of discriminatory events and the time these occurred. The IBE quality index as the main combined measure for residential quality conditions relies on self-reported objective and subjective measures from SHOW participants that were dichotomized. Therefore, the estimated residential quality conditions are not exhaustive and there is potentially some data loss. Third, the data utilized in this study focuses on the state of Wisconsin and the Milwaukee metro. While the state and metro population are typical of others in the mid-west and rustbelt (Council of State Governments, 2011; Gordon, 2019), findings should not be generalized to other populations. Fourth, the variation in perceived housing discrimination is small in the data and this variable may not account for much of the variation in the odds for the combined measure of residential quality conditions. It is important to note that only 7.4% of survey respondents or roughly 1 in 15 Wisconsin residents perceived housing discrimination through their life course. Lastly, while this study suggests that the relationship between perceived housing discrimination and residential quality conditions are in overall significant based on robust analysis with a representative sample population in Wisconsin, due to the aforementioned limitations, one should not infer causality.

4.5. Conclusion

4.5.1. Study contributions and future research

This study contributes to the research literature in three ways. First, this study documents perceived experiences of housing discrimination in Wisconsin reported during the five years post-recession. Second, findings show that perceived housing discrimination exposure significantly associates with low residential quality in a representative sample of the Wisconsin population. Second, this study suggests that perceived housing discrimination can be particularly relevant on residential quality for various social groups, including some in historically marginalized categories (e.g., females, Non-white, lower education, lower income) and some with privileged status (e.g., married, with bachelor's degree as the highest education attainment, Non-Hispanic Whites, with an annual household income above $100,000).

To date, no known studies have examined the extent of perceived housing discrimination exposure associates with residential quality conditions for a representative sample population in the state of Wisconsin. As previously discussed, most studies examining the potential effect of housing discrimination focused in urban areas. This study expands geographic understanding and compares associations between perceived housing discrimination and residential quality between two geographies, the Milwaukee metro and the rest of the state. This is important because Wisconsin ranks among the top in the nation with the most segregated metropolis as a result of historical and prevalent patterns of housing discrimination (Landis, 2019). Yet, this study finds that the effect of perceived housing discrimination on residential quality conditions is not significantly different between the Milwaukee metro and the rest of the state. This warrants additional research to explore whether there are any differences among smaller geographical units (e.g., county, census tract) when we have a larger sample size available. Also, future

research should incorporate residential quality and socioeconomic data obtained from other sources such as the US Census and housing quality surveys at a local and regional level.

Additional research should examine the potential compounding of social identities (e.g., income, race, gender, marital status) to understand the levels of residential advantage and disadvantage and the role of housing discrimination in sorting people into different housing outcomes. For example, are Non-White single low-income women more likely to live in lower-quality homes and neighborhoods in Wisconsin; and if so, does an experience of housing discrimination influence their housing outcome? As noted by Stokes (2019), differences in perceived residential quality should not be examined in isolation but in an intersectional way to further understand mechanisms of advantage and disadvantage. Larger sample size may facilitate such analysis for the Wisconsin population using data from the SHOW.

Future research should examine potential interrelationships between perceived housing discrimination, housing instability, and residential quality conditions. Recent research (Priester et al., 2017) unveiled a strong association between perceived housing discrimination and the risk of housing instability. However, what residential conditions influence the association between discrimination and housing instability remains unclear. Scholars have argued that because discrimination acts as a barrier to housing access, discrimination may also contribute to instability, particularly in low-quality residential conditions (Desmond & An, 2015; Desmond & Shollenberger, 2015; Priester et al., 2017). However, the mechanisms on how these issues relate and their impact in Wisconsin are unknown. My next study, in these series of three, will explore these mechanisms more in detail utilizing data on reported exposure to housing discrimination from a state-wide sample population in Wisconsin Post-Recession, from 2009 to 2013.

4.5.2. Policy implications

As we commemorate the 50th anniversary of the Fair Housing Act, proposed changes to the AFFH rule present additional challenges on the implementation of the statute that, as noted by O'Regan and Zimmerman (2019), warrant further consideration on the extent of disparate impacts across jurisdictions. This study advanced our understanding of housing discrimination from the context of perceived exposure to disparate treatment and its association with potential disparate outcomes on residential quality conditions. This approach is consistent upon interpretations of the 1968 Fair Housing Act and the 2015 AFFH rule acknowledging the legacy of housing discrimination from both contexts of disparate treatment and disparate impacts.

Ameliorative urban and regional planning practices and housing policies continue to face challenges despite some advances such as deeming illegal the explicit practice of housing discrimination. Among prominent challenges in Wisconsin, the lack of substantial equivalency with the Federal Fair Housing Act limits the capacity of properly enforcing fair housing across the state. This, in turn, may exacerbate disparate impacts among Wisconsin residents, particularly among historically marginalized groups (e.g., Non-whites, females, low income, lower education) on their residential quality conditions. However, this study suggests that perceived housing discrimination is also relevant to the residential quality conditions for groups with presumably privileged status (e.g., Non-Hispanic Whites, higher income, higher education). Therefore, findings in this study presents housing discrimination as a potentially universal issue that can impact a broader population. This is important for the urban and regional planning practice, and for housing policies because existing policies are meant to expand equal housing opportunities for all, yet housing discrimination prevails as an equity problem. This means that

oppressive practices in housing markets and developments continue and contribute to detriments on housing choice.

Policymakers and urban and regional planners should incorporate more active roles and focus efforts to address avoidable social inequalities related to housing discrimination by emphasizing conditions for the fair treatment of individuals and families seeking housing or remaining in their neighborhood. For instance, planners should re-incorporate the concepts of social, advocacy, and equity planning championed in the Civil Rights Era by renowned scholars and practitioners such as Paul Davidoff, Bernand Frieden, and Norman Krumholz. These concepts encompass active advocacy to seek an egalitarian redistribution of resources and decision-making processes that promote, and most importantly, implement equal housing opportunities (Davidoff, 1965; Frieden, 1967; Krumholz, 1982; Thomas, 1994; Zapata & Bates, 2015).

Lastly, should the government deter housing discrimination? Unquestionably yes. At the state level, legislation should remove the barriers preventing the state's substantial equivalency with the Federal Fair Housing Act. The state and local municipalities should also ramp up efforts to implement the Fair Housing Act and the AFFH rule. Public awareness campaigns may offer an additional avenue to deter discrimination across the state. A recent study in New York by Fang et al. (2019) suggests that government-sponsored informational campaigns emphasizing anti-discrimination laws and potential penalties for violations may reduce incidences of discrimination. Future research should examine a similar intervention in Wisconsin and assess whether perceived housing discrimination and residential quality change.

4.6. References

Blank, R. M., Dabady, M., & Citro, C. F. (2004). Causal inference and the assessment of racial discrimination *Measuring racial discrimination*. Washington, DC: The National Academies Press.

Council of State Governments. (2011). *In search of growth: An economic checkup of the midwestern states*. Retrieved from https://www.csgmidwest.org/publications/documents/insearchofgrowth.pdf

Davidoff, P. (1965). Advocacy and pluralism in planning. *Journal of the American Institute of Planners, 31*(4), 331-337.

Desmond, M., & An, W. (2015). Neighborhood and network disadvantage among city dwellers. *Sociological Science, 2*, 329-350.

Desmond, M., & Shollenberger, T. (2015). Forced displacement from rental housing: Prevalence and neighborhood consequences. *Demography, 52*, 1751-1772.

Eligon, J., & Gebeloff, R. (2016). Affluent and black, and still trapped by segregation: Why well-off black families end up living in poorer areas than white families with similar or even lower incomes. *New York Times*. 8/20/2016

Elo, I. T., Mykyta, L., Margolis, R., & Culhane, J. F. (2009). Perceptions of neighborhood disorder: The role of individual and neighborhood characteristics. *Social science quarterly, 90*(5), 1298-1320.

Fair Housing Act, Pub. L. No. 90-448 (1968).

Fang, A. H., Guess, A. M., & Humphreys, M. (2019). Can the government deter discrimination? Evidence from a randomized intervention in New York City. *Journal of Politics, 81*(1), 127-141.

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Frieden, B. (1967). The changing prospects for social planning. *Journal of the American Institute of Planners*(33), 311-323.

Gennarelli, R., & Goodman, M. (2014). *Using SAS to examine internal consistency and to develop community engagement scores* Paper presented at the SAS Support.

Gordon, C. (2019). *Race in the heartland: Equity, opportunity, and public policy in the midwest*. Retrieved from https://www.epi.org/files/uploads/Race-in-the-Midwest-FINAL-Interactive-1.pdf

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Greenberg, M., & Crossney, K. (2007). Perceived neighborhood quality in the united states: Measuring outdoor, housing and jurisdictional influences. *Socio-Economic Planning Sciences, 41*(3), 181-194.

Habib, R., Mahfoud, Z., Fawaz, M., Basma, S. H., & Yeretzian, J. S. (2009). Housing quality and ill health in a disadvantaged urban community. *Public Health, 123*(2), 174-181.

Hale, L., Hill, T. D., Friedman, E., Nieto, F. J., Galvao, L. W., Engelman, C. D., Malecki, K. M. C., & Peppard, P. E. (2013). Perceived neighborhood quality, sleep quality, and health status: Evidence from the survey of the health of Wisconsin. *Social Science & Medicine, 79*, 16-22.

Hanley, J. A., & McNeil, B. J. (1982). The meaning and the use of the area under a receiver operating characteristic (roc). *Radiology, 143*(1), 29-36.

Krumholz, N. (1982). A retrospective view of equity in planning: Cleveland 1969-1979. *Journal of the American Planning Association, 48*(2), 163-183.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American Community Survey. *Cityscape, 21*(1), 63-85.

Levine, M. (2013). *Perspectives on the current state of the Milwaukee economy*. Retrieved from Center for Economic Development, University of Wisconsin-Milwaukee: http://www4.uwm.edu/ced/publications/perspectives.pdf

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Narine, L., & Shobe, M. A. (2014). Making sense of housing disparities research: A review of health and economic inequities. *Soc Work Public Health, 29*(1), 35-41.

Nieto, F. J., Peppard, P. E., Engelman, C. D., McElroy, J. A., Galvao, L. W., Friedman, E. M., Bersch, A. J., & Malecki, K. C. (2010). The Survey of the Health of Wisconsin (SHOW): A novel infrastructure for population health research: Rationale and methods. *BMC Public Health, 10*(1), 785.

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The Fair Housing Act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Oakes, J. M. (2014). Invited commentary: Repeated measures, selection bias, and effect identification in neighborhood effect studies. *American Journal of Epidemiology, 180*(8), 785-787.

Open housing law, Wisconsin Statute 106.50 (1968, 2015).

Osypuk, T. L., & Acevedo-Garcia, D. (2010). Beyond individual neighborhoods: A geography of opportunity perspective for understanding racial/ethnic health disparities. *Health & Place, 16*(6), 1113-1123.

Pager, D., & Shepherd, H. (2008). The sociology of discrimination: Racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol, 34*, 181-209.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rao, J., & Scott, A. J. (1981). The analysis of categorical data from complex surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association, 76*, 221–230.

Rao, J., & Scott, A. J. (1987). On simple adjustments to chi-square tests with survey data. *The Annals of Statistics, 15*, 385–397.

Rosenblatt, P., & Cossyleon, J. E. (2018). Pushing the boundaries: Searching for housing in the most segregated metropolis in America. *City & Community, 17*(1), 87-108.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America* (First Edition). New York: Liveright Publishing Corporation.

SAS Institute. (2019). The logistic procedure: Rank correlation of observed responses and predicted probabilities. Retrieved from https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_logistic_sect042.htm.

Schreiber-Gregory, D. (2017). *Multicollinearity: What is it, why should we care, and how can it be controlled?* Paper presented at the SAS Support.

Stokes, J. E. (2019). Trajectories of perceived neighborhood quality across the life course: Sociodemographic determinants and implications for well-being. *Social Science Research, 79*, 181-193.

Thomas, J. M. (1994). Planning history and the black urban experience: Linkages and contemporary implications. *Journal of Planning Education and Research, 14*(1), 1-11.

U.S. Government Accountability Office. (2010). *Housing and community grants: HUD needs to enhance its requirements and oversight of jurisdictions' fair housing plans*. Retrieved from www.gao.gov/new.items/d10905.pdf.

US Department of Housing and Urban Development. (2018). Affirmatively furthering fair housing: Streamlining and enhancements *83 FR 40713* (pp. 40713-40715). Federal Register: Office of the Federal Register.

Williams, D. R., Yan, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socioeconomic status, stress and discrimination. *J Health Psychol, 2*(3), 335-351.

Williams, M., & Seicshnaydre, S. (2017). The legacy and promise of disparate impact. In G. Squires (Ed.), *The fight for fair housing: Causes, consequences, and future implications of the 1968 federal Fair Housing Act.* New York, NY: Routledge.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Yang, T. C., Chen, D., & Park, K. (2016). Perceived housing discrimination and self-reported health: How do neighborhood features matter? *Annals of behavioral medicine: a publication of the Society of Behavioral Medicine, 50*(6), 789-801.

Yang, T. C., & Chen, D. H. (2018). A multi-group path analysis of the relationship between perceived racial discrimination and self-rated stress: How does it vary across racial/ethnic groups? *Ethnicity & Health, 23*(3), 249-275.

Yang, T. C., Chen, I. C., Kim, S., & Choi, S. W. (2018). Differential investments and opportunities: How do neighborhood conditions moderate the relationship between perceived housing discrimination and social capital? *Social Science Research, 72*, 69-83.

Yang, T. C., & Sun, F. N. (2019). A longitudinal analysis of how perceived discrimination gets under the skin: Investigating gender and racial/ethnic differences. *Euramerica, 49*(2), 243-285.

Zapata, M. A., & Bates, L. K. (2015). Equity planning revisited. *Journal of Planning Education and Research, 35*(3), 245-248.

4.7. Tables

Table 4.1. Selected residential quality characteristics by geographic level

Measures	Category	Code	Wisconsin (N=2,704)[1] % (SE)	Milwaukee metro (N=559)[1] % (SE)
Housing characteristics				
Year Built	At/prior 1978	0	61.9 (2.6)	71.3 (7.2)
	Post 1978	1	38.1 (2.6)	28.7 (7.2)
Overcrowd	Yes	0	1.9 (0.4)	4.1 (1.6)
	No	1	98.1 (0.4)	95.9 (1.6)
Neighborhood characteristics				
Perceived crime	Unsafe	0	2.5 (0.4)	4.9 (1.0)
	Safe	1	97.5 (0.4)	95.1 (1.0)
Perceived safety due to traffic	Unsafe	0	10.5 (0.9)	14.8 (2.7)
	Safe	1	89.5 (0.9)	85.2 (2.7)
Proximity to basic amenities	Walk to < 3	0	72.5 (1.9)	68.8 (4.9)
	Walk to ≥ 3	1	27.5 (1.9)	31.2 (4.9)
Pleasantness	Unpleasant	0	18.8 (1.3)	23.4 (3.6)
	Pleasant	1	81.1 (1.3)	76.6 (3.6)
Residential quality (combined)				
IBE Quality Index[2]	Low	0	17.9 (1.3)	21.9 (2.8)
	moderate-high	1	82.1 (1.3)	78.1 (2.8)

1. Data from the Survey of the Health of Wisconsin (SHOW), 2009-2013. Weighted to the Wisconsin population at each corresponding geographical level, at T2.
2. Immediate built environment (IBE) quality index based on combined housing and neighborhood factors

Table 4.2. Residential characteristics by response to perceived housing discrimination

		Housing discrimination exposure, *weighted*[1]							
		Wisconsin				Milwaukee Metro			
Measures	Category	%Yes (SE) N=187	%No (SE) N=2,517	ChiSq (Y vs. N)		%Yes (SE) N=67	%No (SE) N=492	ChiSq (Y vs. N)	
Housing characteristics									
Year Built	**At/prior 1978**	**62.2 (6.4)**	**61.8 (2.6)**	**0.01**		**77.0 (10.8)**	**71.0 (7.4)**	**0.3**	
	After 1978	37.8 (6.4)	38.2 (2.6)			23.0 (10.8)	29.0 (7.4)		
Overcrowd	**Yes**	**4.3 (1.9)**	**1.7 (0.4)**	**3.9**	*	**7.4 (4.9)**	**3.6 (1.7)**	**0.8**	
	No	95.7 (1.92)	98.3 (0.4)			92.7 (4.9)	96.4 (1.7)		
Neighborhood characteristics									
Proximity to amenities	**Walk to < 3**	**71.5 (4.4)**	**72.4 (2.0)**	**0.04**		**73.0 (6.6)**	**67.8 (5.2)**	**0.5**	
	Walk to ≥ 3	28.5 (4.4)	27.6 (2.0)			27.0 (6.6)	32.2 (5.2)		
Perceived crime	**Unsafe**	**7.2 (2.0)**	**2.1 (0.3)**	**17.4**	***	**15.5 (4.6)**	**3.8 (1.0)**	**16.2**	***
	Safe	92.8 (2.0)	97.9 (0.3)			84.5 (4.6)	96.2 (1.0)		
Perceived traffic	**Unsafe**	**25.1 (4.4)**	**9.5 (0.9)**	**21.8**	***	**34.7 (7.9)**	**12.9 (2.9)**	**8.6**	**
	Safe	74.9 (4.4)	90.5 (0.9)			65.3 (7.9)	87.1 (2.9)		
Pleasantness	**Unpleasant**	**42.2 (5.1)**	**16.9 (1.4)**	**34.3**	***	**49.9 (6.4)**	**20.4 (3.8)**	**20.2**	***
	Pleasant	57.7 (5.1)	83.1 (1.4)			50.1 (6.4)	79.6 (3.8)		
Residential quality (combined)									
IBE Quality Index	**Low**	**39.2 (4.8)**	**16.1 (1.3)**	**32.6**	***	**45.7 (7.7)**	**19.1 (3.0)**	**12.1**	**
	Moderate-high	60.8 (4.8)	83.9 (1.3)			54.3 (7.7)	90.9 (3.0)		

* $p < 0.05$

** $p < 0.01$

***$p < 0.001$

1. Data from the Survey of the Health of Wisconsin (SHOW), 2009-2013 at the state and Milwaukee metropolitan level. Values weighted to the Wisconsin population, T2. Percentages are by group categories. Undesirable residential features are in boldface.

Table 4.3. Summarized logistic regression results for low residential quality

Parameters of interest	Model 1[1]		Model 2[1]		Model 3[1]		Model 4[1]	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Housing discrimination exposure	3.37*	2.21-5.14	2.34*	1.50-3.65	2.45*	1.56-3.85	2.42*	1.55-3.79
Residence duration					1.15	0.80-1.65	1.15	0.80-1.65
Milwaukee Metro							1.44	0.96-2.16
N		2,704		2,592		2,555		2,555
AIC		16,670,196		14,899,190		13,765,661		13,717,155
Likelihood Ratio		48.88		7.80		8.53		8.36
Rank correlation index		0.559		0.671		0.679		0.683

*p <0.001

Note: Model 1 is unadjusted. Only includes exposure to housing discrimination. Model 2 adjusts for SES characteristics including gender, age, education level, racial and ethnic construct, citizenship household income, and unemployment. Model 3 adjusts for SES characteristics included in Model 2 and residence duration (>1 year vs. ≤1 year). Model 4 adjusts for SES, residence duration and location (Milwaukee Metro vs. rest of the state).

1. Models for low immediate built environment (IBE) quality index, weighted to the Wisconsin population at T2.

Table 4.4. Summarized fixed-effects models by gender and racial/ethnic categories

		Low Residential Quality (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.42***	1.55 - 3.79
Gender interaction model	Male*HDE (1|0)	1.82	0.84 - 3.95
	Female*HDE (1|0)	3.20***	1.96 - 5.23
	HDE*(female|male)	1.88	0.78 - 4.52
	Non-HDE*(female|male)	1.07	0.79 - 1.43
Race and ethnicity interaction model	Non-Hispanic White (NHW)*HDE(1|0)	2.54**	1.38 - 4.66
	Non-Hispanic Black (NHB)*HDE (1|0)	2.06	0.70 - 6.05
	Hispanic (H)*HDE (1|0)	0.78	0.13 - 4.65
	Other (O)*HDE (1|0)	6.62**	1.62 - 27.0
	HDE*(NHB|NHW)	1.15	0.43 - 3.07
	HDE*(H|NHW)	0.89	0.16 - 4.83
	HDE*(O|NHW)	1.96	0.58 - 6.59
	Non-HDE*(NHB|NHW)	1.42	0.71 - 2.85
	Non-HDE*(H|NHW)	2.90**	1.35 - 6.22
	Non-HDE*(O|NHW)	0.75	0.31 - 1.83

***$p < 0.001$

** $p < 0.01$

* $p < 0.05$

1. Weighted to the Wisconsin population at T2. LS means fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, and residence location (Milwaukee metro vs. the rest of the state).

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 4.5. Summarized fixed effects models by income, employment and education

		Low Residential Quality (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.42***	1.55 - 3.79
Household Income interaction model	(<$25K)*HDE (1|0)	2.18*	1.13 - 4.31
	($25K-$44.9K)*HDE (1|0)	1.85	0.72 - 4.75
	($45K-$74.9K)*HDE (1|0)	3.22**	1.35 - 7.66
	($75K-$100K)*HDE (1|0)	1.48	0.26 - 8.47
	(>$100k)*HDE (1|0)	7.25*	1.29 - 40.8
	HDE*(<$25K|>$100K)	0.91	0.15 - 5.36
	HDE*($25K-$44.9K|>$100K)	0.70	0.10 - 4.69
	HDE*($45K-$74.9K|>$100K)	1.25	0.19 - 8.17
	HDE*($75K-$100K|>$100k)	0.50	0.05 - 5.64
	Non-HDE*(<$25K|>$100K)	3.01***	1.59 - 5.69
	Non-HDE*($25K-$44.9K|>$100K)	2.73**	1.46 - 5.09
	Non-HDE*($45K-$74.9K|>$100K)	2.83***	1.61 - 4.96
	Non-HDE*($75K-$100K|>$100k)	2.45**	1.25 - 4.83
Employment status interaction model	Employed*HDE(1|0)	2.54**	1.45 - 4.42
	Unemployed*HDE (1|0)	2.25*	1.11 - 4.56
	HDE*(Unemployed|Employed)	1.52	0.65 - 3.71
	Non-HDE*(Unemployed|Employed)	1.71**	1.20 - 2.44
Education level interaction model	< HighSchool*HDE (1|0)	3.15*	1.01 - 9.81
	HighSchool/GED*HDE (1|0)	5.33***	2.09 - 13.6
	SomeCol/Assoc.deg*HDE (1|0)	1.29	0.67 - 2.48
	Bachelors' deg*HDE (1|0)	4.10**	1.61 - 10.5
	Graduate deg*HDE(1|0)	2.40	0.32 - 17.8
	HDE*(<HighSchool|Graduate deg)	4.05	0.43 - 38.2
	HDE*(HighSchool|Graduate deg)	6.49	0.78 - 54.0
	HDE*(SomeColAssocDeg|Graduate deg)	1.18	0.16 - 8.76
	HDE*(Bachelors deg|Graguate deg)	3.20	0.44 - 23.5
	Non-HDE*(<HighSchool|Graduate deg)	3.09**	1.50 - 6.36
	Non-HDE*(HighSchool|Graduate deg)	2.92***	1.58 - 5.38
	Non-HDE*(SomeCol/AssocDeg|Grad deg)	2.19*	1.17 - 4.09
	Non-HDE*(Bachelors deg|Graduate deg)	1.87*	1.02 - 3.44

***p < 0.001

** p < 0.01

* p < 0.05

[1.] Weighted to the Wisconsin population at T2. LS means fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, and residence location (Milwaukee metro vs. the rest of the state)

[2.] Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 4.6. Summarized fixed-effects models by age and marital status

		Low Residential Quality (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.42***	1.55 - 3.79
Age interaction model	<35 years old*HDE (1|0)	2.50***	1.27 - 4.89
	35-44 years old*HDE (1|0)	1.61	0.59 - 4.35
	45-54 years old*HDE (1|0)	3.44***	1.40 - 8.45
	55-64 years old*HDE(1|0)	2.09	0.59 - 7.36
	>64 years old*HDE(1|0)	0.67	0.06 - 8.43
	HDE*(<35|>64years old)	4.03	0.30 - 54.7
	HDE*(35-44|>64 years old)	2.14	0.15 - 30.7
	HDE*(45-54|>64 years old)	6.86	0.49 - 97.0
	HDE*(55-64|>64 years old)	2.91	0.17 - 51.2
	Non-HDE*(<35|>64years old)	1.11	0.71 - 1.74
	Non-HDE*(35-44|>64 years old)	0.91	0.55 - 1.52
	Non-HDE*(45-54|>64 years old)	1.37	0.85 - 2.20
	Non-HDE*(55-64|>64 years old)	0.96	0.59 - 1.56
Marital status interaction model	Married*HDE(1|0)	2.74**	1.35 - 5.56
	Widowed*HDE (1|0)	2.65	0.91 - 7.68
	Divorced/separated*HDE (1|0)	2.83	0.21 - 38.7
	Single Never Married*HDE (1|0)	2.32*	1.17 - 4.59
	Living w/ Partner*HDE (1|0)	0.80	0.18 - 3.65
	HDE*(Widowed | Married)	0.85	0.29 - 2.47
	HDE*(Divorced/separated | Married)	0.81	0.06 - 11.1
	HDE*(Single Never Married | Married)	1.03	0.36 - 2.93
	HDE*(Living w/ Partner | Married)	0.26	0.06 - 1.11
	Non-HDE*(Widowed | Married)	0.88	0.56 - 1.37
	Non-HDE*(Divorced/separated | Married)	0.78	0.40-1.54
	Non-HDE*(SingleNeverMarried | Married)	1.21	0.77 - 1.90
	Non-HDE*(Living w/ Partner | Married)	0.90	0.29 - 2.77

***p < 0.001

** p < 0.01

* p < 0.05

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, and residence location (Milwaukee metro vs. the rest of the state)

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 4.7. Summarized fixed-effects models by residence duration and location

		Low Residential Quality (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.42***	1.55 - 3.79
Residence duration interaction model[3]	Short residence*HDE(1|0)	2.21*	1.06 - 4.59
	Long residence*HDE (1|0)	2.54**	1.46 - 4.43
	HDE*(LongResidence|ShortResidence)	1.28	0.57 - 2.89
	Non-HDE*(LongResidence|ShortResidence)	1.11	0.75 - 1.66
Location interaction model	Outside Milwaukee Metro*HDE(1|0)	2.6***	1.50 - 4.51
	Milwaukee Metro*HDE (1|0)	2.11[t]	0.99 - 4.51
	HDE*(Milwaukee Metro|Outside MM)	1.20	0.52 - 2.78
	Non-HDE*(MilwaukeeMetro|OutMM)	1.48	0.95 - 2.31

***p < 0.001
** p < 0.01
* p < 0.05
[t] p < 0.1

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, and residence location (Milwaukee metro vs. the rest of the state)

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

3. Contrast in residence duration. Short residence is ≤1 year and Long residence is >1 year.

Table 4.8. Multivariate linear regression results for low residential quality

	IBE sum score[1]		Factor-weighted IBE sum score[2]	
Parameter of interest	**Standardized regression coefficient**	***Pr* > |*t*|**	**Standardized regression coefficient**	***Pr* > |*t*|**
Housing discrimination exposure	-0.09	0.005	-0.13	0.003
N	2,555		2,155	
R-squared	0.111		0.093	
Root mean squared error	0.869		0.411	

Note: Each model is weighted to T2 and the Wisconsin population and controlled for SES characteristics including gender, age, education level, racial and ethnic construct citizenship, household income, unemployment residence duration (>1 year vs. ≤1 year) and location (Milwaukee metro vs. else in state).

1. Equally-weighted residential factors.

2. Weighted using principal components analysis (PCA), only the first factor used.

Table 4.9. Logistic regression results for low residential quality by cohort groups

	2009-2011 Cohort		2011-2013 Cohort	
Parameter of interest	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure	1.81*	1.03-3.19	3.30**	1.91-5.71
N	1,961		1,615	
AIC	8,349,589		8,315,344	
Likelihood Ratio	7.36		6.33	
Rank correlation index	0.680		0.694	

*p <0.05

** p <0.001

Note: Each model is weighted to T2 and the Wisconsin population and controlled for SES characteristics including gender, age, education level, race/ethnicity, marital status, citizenship, household income, unemployment residence duration (>1 year vs. ≤1 year) and location (Milwaukee metro vs. else in state).

4.8. Appendix

Table A.4.1. Wisconsin sample population characteristics for responses on low residential quality and perceived housing discrimination, unweighted

			Reside in Low-quality		Experienced Housing discrimination	
Measure	Categories	N	n	%	n	%
Gender	Male	1165	202	17.3%	77	6.6%
	Female	1539	285	18.5%	110	7.1%
Age	**< 35**	**615**	**132**	**21.5%**	**67**	**10.9%**
	35-44	462	78	16.9%	36	7.8%
	45-54	635	121	19.1%	54	8.5%
	55-64	604	99	16.4%	25	4.1%
	65-74	388	57	14.7%	5	1.3%
Education attainment	**< High School**	**178**	**55**	**30.9%**	**33**	**18.5%**
	High school or GED	571	131	22.9%	39	6.8%
	Some College or Assoc. Degree	1057	192	18.2%	83	7.9%
	Bachelor's degree	595	79	13.3%	20	3.4%
	Graduate degree	299	28	9.4%	12	4.0%
Marital status	Married	1724	272	15.8%	68	3.9%
	Widowed	96	15	15.6%	4	4.2%
	Divorced/separated	**351**	**66**	**18.8%**	**48**	**13.7%**
	Never married	**437**	**112**	**25.6%**	**53**	**12.1%**
	Living w/ partner	**92**	**21**	**22.8%**	**13**	**14.1%**
Race/ethnicity	Non-Hispanic white	2366	367	15.5%	106	4.5%
	Non-Hispanic Black	**154**	**63**	**40.9%**	**46**	**29.9%**
	Hispanic	**68**	**22**	**32.4%**	**13**	**19.1%**
	Other	**112**	**33**	**29.5%**	**22**	**19.6%**
US citizenship	Non-citizen	27	7	25.9%	1	3.7%
	Citizen	2676	479	17.9%	186	7.0%
Income	**<$25,000**	**587**	**165**	**28.1%**	**94**	**16.0%**
	$25,000-$44,999	501	92	18.4%	33	6.6%
	$45,000-$74,999	662	114	17.2%	34	5.1%
	$75,000-$99,999	361	47	13.0%	9	2.5%
	>$100,000	494	41	8.3%	11	2.2%
Unemployed	No	2201	341	15.5%	108	4.9%
	Yes	**495**	**141**	**28.5%**	**78**	**15.8%**

Note: Sample population characteristics of respondents of the Survey of the Health of Wisconsin (SHOW) from 2009-2013. Characteristics in boldface are of disadvantaged groups. Residential quality based on the immediate built environment (IBE) index.

Table A.4.2. Logistic regression results for low residential quality including all covariates

	Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI
Parameters of interest						
Housing discrimination exposure	2.34***	1.50-3.65	2.45***	1.56-3.85	2.42***	1.55-3.79
Residence duration			1.15	0.80-1.65	1.15	0.80-1.65
Milwaukee Metro					1.44	0.96-2.16
Gender (Ref. = Male)						
Female	1.10	0.82-1.47	1.15	0.88-1.52	1.15	0.87-1.51
Age group (Ref. = 64+ year old)						
<35 years old	1.26	0.80-2.00	1.12	0.70-1.78	1.13	0.71-1.79
35-44 years old	1.02	0.61-1.70	0.87	0.53-1.43	0.87	0.53-1.42
45-54 years old	1.50	0.95-2.35	1.45	0.92-2.28	1.44	0.92-2.28
55-64 years old	1.08	0.68-1.72	0.97	0.61-1.54	0.96	0.60-1.52
Education attainment (Ref. = Graduate degree)						
< High school	2.88**	1.35-6.17	3.18**	1.51-6.70	3.36**	1.61-7.00
High school or GED	2.71***	1.51-4.87	3.109***	1.70-5.58	3.18***	1.77-5.71
Some college or Associates degree	1.82*	1.05-3.15	1.96*	1.07-3.60	2.02*	1.12-3.64
Bachelor's degree	1.67	0.95-2.95	1.89*	1.05-3.40	1.92*	1.09-3.38
Marital status (Ref. = Married)						
Divorced or separated	0.73	0.38-1.40	0.78	0.40-1.52	0.78	0.41-1.51
Widowed	0.81	0.54-1.20	0.89	0.60-1.31	0.89	0.60-1.33
Single, never married	1.10	0.69-1.76	1.20	0.76-1.90	1.19	0.75-1.89
Living with partner	0.68	0.26-1.81	0.73	0.27-1.99	0.71	0.25-2.04
Racial and ethnic category (Ref. = Non-Hispanic White)						
Non-Hispanic Black	1.53	0.94-2.51	1.63	0.99-2.68	1.35	0.78-2.35
Hispanic	2.39**	1.28-4.46	2.58**	1.35-4.92	2.30*	1.18-4.50
Other Race or Ethnicity	1.01	0.53-1.93	1.06	0.54-2.05	1.06	0.54-2.05
Citizenship status (Ref. = US Citizen)						
Non-US citizen	2.34	0.60-9.01	2.51	0.60-10.49	2.36	0.57-9.74
Household Income (Ref. = > $100,000)						
<$25,000	2.14**	1.22-3.76	2.62**	1.44-4.74	2.75**	1.50-5.02
$25,000-$44,999	1.88*	1.04-3.40	2.38**	1.32-4.28	2.48**	1.37-4.48
$45,000-$74,999	2.21**	1.30-3.76	2.64***	1.52-4.59	2.73***	1.58-4.71
$75,000-$100,000	1.73	0.93-3.24	2.18*	1.14-4.19	2.25*	1.17-4.31
Employment status (Ref. = Employed)						
Unemployed	1.62**	1.13-2.33	1.71**	1.20-2.42	1.68**	1.19-2.38
Model diagnostics						
N	2,592		2,555		2,555	
AIC	14,899,190		13,765,661		13,717,155	
Likelihood Ratio	7.80		8.53		8.36	
Rank correlation index	0.671		0.679		0.683	

***p < 0.001
** p < 0.01
* P < 0.5

Note: Model 2 adjusts for SES including gender, age, education level, race/ethnicity citizenship, household income, unemployment. Model 3 adjusts for SES and residence duration (>1 year vs. ≤1 year). Model 4 adjusts for residence location (Milwaukee metro vs. the rest of the state).

CHAPTER 5:

The Extent Perceived Housing Discrimination Associates with Housing Instability Risk: Analysis of a Representative Sample of the Wisconsin Population, 2009-2013

5.1. Introduction

This study is the second of three examining reported housing discrimination from a state-wide sample population in Wisconsin. Through the series, I attempt to advance our understanding of life course housing discrimination from the context of experienced disparate treatment of people when accessing housing due to their physical, social or economic characteristics (Blank et al., 2004; Pager & Shepherd, 2008; Rothstein, 2017) and associations with disparate outcomes in quality of life conditions of one subpopulation group over another (Williams & Seicshnaydre, 2017; Jargowsky et al., 2019; O'Regan & Zimmerman, 2019). Housing discrimination as an issue of disparate treatment and as a contributing factor to disparate impacts are addressed in the Fair Housing Act and standards under the Affirmatively Furthering Fair Housing (AFFH) (O'Regan & Zimmerman, 2019).

The Fair Housing Act (42 U.S.C § 3601), originally enacted in 1968 and amended in 1988, prohibits the discrimination of individuals based on their race, color, religion, sex, national origin, disability or familial status during the sale, rental, financing or other housing-related services. The Act also requires the federal government to "provide, within constitutional limitations, for fair housing throughout the United States… affirmatively further the purposes of [fair housing]" (42 U.S.C §3608(d)). This section of the Act has been also interpreted by researchers as the accountability piece to address disparate impacts resulting from housing discrimination (O'Regan & Zimmerman, 2019). Nearly 50 years after enacting the Fair Housing Act, the US Department of Housing and Urban Development (HUD) issued the AFFH rule in

2015. The AFFH emphasizes the Fair Housing Act's requirement to address disparate impacts resulting from housing discrimination.

In Wisconsin, no known jurisdiction within the state has issued a comprehensive assessment of disparate impacts as required under the 2015 AFFH rule other than a broader analysis of impediments (AI) to fair housing.[17] This is largely due to delays in the enforcement of the AFFH rule (83 FR 683) and, more recently, proposed changes to the existing rule (80 FR 159).[18] Also, the state of Wisconsin's Open Housing Law (Wis. Stat. § 106.50), which attempts to mirror the Federal Fair Housing Act, lacks substantial equivalency with the Federal statute (Wisconsin, 2015). These issues limit the state's capacity to enforce properly the Fair Housing Act. With the lack of proper enforcement, it is plausible to postulate that housing discrimination and their contributing disparate impacts prevail in the state.

In this study, I examine: 1) the extent a perceived housing discrimination associates with increased odds for housing instability risk, and 2) whether the association (if any) between perceived exposure to housing discrimination and housing instability risk differ by social and residential characteristics of one subpopulation over another in Wisconsin. I also examine whether residential quality conditions influence disparate outcomes of housing instability risk among individuals that experienced housing discrimination. Throughout this study, I use

[17] The state has currently available an Analysis of Impediments (AI) to Fair Housing published in 2015 which is a broad assessment outlining the demographic, economic and social composition of the state, administrative rules relevant to housing, data on housing discrimination complaints, impediments to fair housing and general actions to overcome impediments. However, researchers have argued that AIs are inconsistent and ineffective (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019).

[18] In January 2018, HUD announced it was delaying implementation of the AFFH rule and that jurisdictions were to return to conducting AIs during the delay. In August 2019, HUD announced is proposing changes to the AFFH rule, especially in the fair housing assessment and reporting process.

perceived housing discrimination and experienced housing discrimination interchangeably, which refers to self-reported housing discrimination exposure during the life course.

Previous research suggests that housing discrimination contributes to housing instability because it can constraint the choices of where an individual can access housing and whether they can remain stably housed (Desmond et al., 2015; Desmond & Shollenberger, 2015; Kleit et al., 2016; Priester et al., 2017; DeLuca et al., 2019). Also, studies (Drukker et al., 2005; Boggess & Hipp, 2010) suggest a link between residential quality and housing instability. For instance, a series of studies in the Milwaukee metropolitan area using survey and ethnographic data collected from 2009 to 2011 (Desmond et al., 2015; Desmond & Shollenberger, 2015; Desmond, 2016), show that poor residential quality conditions contribute to forced displacements and evictions. Similarly, individuals previously evicted were more likely to be steered into substandard housing which in turn influenced housing instability in an on-going cycle (Desmond et al., 2015). A recent study by Rosenblatt and Cossyleon (2018) based on in-depth interviews in Milwaukee County revealed that experiences of discrimination when seeking a rental unit, as reported by the sample population interviewed, constrained residents' choices to live in higher-quality neighborhoods in the suburbs. Also, residents believed discrimination contributed to their experiences of housing instability (Rossenblatt and Cossyleon, 2018, p. 96). However, empirical research about underlying factors potentially contributing to housing instability and poor residential quality conditions, such as housing discrimination, is lacking (Kleit et al., 2016; DeLuca et al., 2019). Therefore, this study will contribute to the housing policy and planning research literature by furthering our understanding of the potential association between experienced discrimination and housing instability risk while also considering residential quality factors.

A study by Priester et al. (2017) in the Atlanta metropolitan area is among the first known research that empirically unveiled the extent perceived discrimination associated with an increased risk of housing instability among a sample population mainly comprised of middle-income African American women. While the Atlanta research did not account for residential quality conditions, Priester's study shows that the rate of discrimination is higher among individuals at risk of housing instability. These findings are important because housing instability is considered a precursor to homelessness, particularly among "at-risk populations" (Montgomery et al., 2013; Daoud et al., 2016; Priester et al., 2017; Batterham, 2019). However, characteristics defining "at-risk" populations for housing instability and homelessness have been long debated (Priester et al., 2017; Batterham, 2019).

Homelessness is defined as a lack of housing. Broadly, the lack of housing is tied with other factors such as not having a permanent or longer-term housing, overcrowded conditions such as "doubling-up" with another household, or any other unstable or non-permanent situation (Desmond et al., 2015; Flemming & Burns, 2015; Desmond, 2016). Individuals and households at risk of instability and vulnerable to become homeless have been broadly described in previous research (Fitzpatrick, 2005; Flemming & Burns, 2015; Priester et al., 2017). For instance, a study conducted with a large homeless sample in Los Angeles County identified characteristics such as extremely low income, financial insecurity, previous homeless status, disability, being male and/or Black among the most common factors of individuals that were homeless or at-risk of homelessness (Flemming & Burns, 2015). Other studies also identified pre-existing physical and mental health issues (Zerger et al., 2014), substance abuse, and adverse traumatic experiences such as domestic violence (Barata & Stewart, 2010; Daoud et al., 2016; Brush et al., 2018). However, as Batterham (2019) notes, "risk" is defined using the factors that are over-represented

in the population of interests. Such an approach tends to obscure the relationship between risk factors and their broader causes (Batterham, 2019). Therefore, understanding the potential underlying factors to housing instability risk, such as discrimination, may help identify characteristics of potentially vulnerable and "at-risk" populations.

The potential impact of discrimination on housing instability among historically marginalized groups, particularly females and African Americans or Blacks is also worth noting. Priester et al. (2017) and other researchers (Barata & Stewart, 2010; Daoud et al., 2016; Desmond, 2016; Desmond & Gershenson, 2017) found that African Americans and female-headed households with children were disproportionally impacted by discrimination from landlords and more prone to housing instability. Audit studies suggest that African Americans are treated less favorably when it comes to terms and conditions offered in the rental agreements and during home buying processes (Turner, 2008). Noting that the discrimination may impact differently marginalized groups, in this study, I also seek to unveil whether perceived housing discrimination increases the likelihood of housing instability risk for individuals by individual categories of gender, age, racial and ethnic construct, education level, marital status, household income, employment status, and two location categories (the Milwaukee metro region and the rest of the state).

In this study, I focus on five years after the Great Recession (2009-2013) and acknowledge the historical and multidimensional context of housing discrimination. Research shows that discriminatory practices such as "reverse redlining" in the 2000s, which primarily targeted historically marginalized households into home lending markets, contributed to the 2008 Great Recession (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017; McClure et al., 2019). In combination with prevalent patterns of residential segregation and on-going

discrimination in rental and lending markets, disparities in residential conditions likely to continue after the Great Recession (Foster & Kleit, 2014; Rothstein, 2017).

From 2009 to 2013, Wisconsin fair housing agencies received 1,888 housing discrimination complaints and, on a combined average, 358 complaints per year.[19] In 2011 alone, the agencies received a total of 440 complaints, the highest in the 5-year interval. Based on these reported discrimination incidences, this study draws our attention to the extent experienced housing discrimination may associate with housing instability risk and may influence disparities among social groups and by geography within the state.

5.2. Methods

5.2.1. Setting and data

The primary geographical focus in this study is the state of Wisconsin with additional analysis at the Milwaukee metro level. I use 2009-2013 data from the Survey of the Health of Wisconsin (SHOW). The SHOW is a population-based survey with objective and subjective measures including demographic characteristics, self-reported environmental factors and social experiences among other issues. The SHOW includes a representative sample of non-institutionalized adults (ages 21 to 74 years old) that reside in the state of Wisconsin. Data is collected at three portions which include an in-home interview (T1), a post-interview self-administered questionnaire (T2), and a follow-up which may include in-clinic exams (T3). Further details about the SHOW methodology, data collection and validity are described in detail by Nieto et al. (2010) and Hale et al. (2013).

[19] In Wisconsin, housing discrimination complaints are received by three different agencies: the US Department of Housing and Urban Development, the State Department of Workforce Development Equal Rights Division and the Metropolitan Milwaukee Fair Housing Council.

In this study, the sample size at the state level is 3113. I use data collected during T1 and T2 and apply sample weights to T2 for consistency with the measures of interest. This drops the sample size to 2704 at the state level. At the Milwaukee metro, the sample size at T2 is 559.

5.2.2. Measures of interest

5.2.2.1. Housing discrimination exposure

Housing discrimination exposure serves as the **main explanatory variable**. An exposure to housing discrimination in this study is an "anytime" perceived event of being unfairly treated when finding a place to live, accessing housing or remaining in the neighborhood. This may include a one-time event or multiple events throughout an individual's life. SHOW recorded this data based upon the Detroit Area Study of Discrimination and Williams et al. (1997) at T2. The variable is coded as a binary variable to denote "yes/no" to perceived housing discrimination.

5.2.2.2. Housing instability risk

Housing instability risk serves as **the outcome variable** in this study. I compute this variable from SHOW responses on measures of residential mobility and financial stress because these are significantly correlated and when combined, unidimensional.[20] Respondents were considered "at risk of housing instability" if they met at least one of the residential mobility measures and indicated any level of financial stress. Residential mobility measures include responses indicating that individuals resided at their current address for a year or less, reported a change in residence over the last year, or both.[21] The financial stress measure is based on

[20] Although the standard Cronbach alpha for the combined housing instability measure is 0.55, each measure is significantly associated, and unidimensional per the >1 eigenvalue criterion used in principal components analysis.

[21] I interpret the measures of short residence duration and recent move as indicators of residential mobility, meaning that participants have been residing for a short time (a year of less) due to a recent move.

individual self-reported level of stress related to meeting basic needs (including paying for housing, food and utility bills) over the last year. These measures were re-coded to binary and weighted to T2. The binary variable for housing instability risk is interpreted as "at-risk" (1) and "no risk" (0) in logistic regression models. The combination of short residence duration, recent move, and financial constraints have been used as indicators of potential housing instability in studies by Priester et al. (2017), Bailey et al. (2016) and Kushel et al. (2006).

5.2.2.3. The Milwaukee metro

I incorporate a dummy variable, "Milwaukee metro" to compare responses from participants that reside in the Milwaukee metro versus the rest of the state. Making a distinction between the Milwaukee metro and the rest of the state is important due to the large population (largest in the state of Wisconsin) and severe racial and income segregation (Landis, 2019) in this region. This variable represents the geographical location of the sample population residing in any of the four counties – Milwaukee, Waukesha, Ozaukee, Washington – corresponding to the Milwaukee metro in Wisconsin during 2009 to 2013.

5.2.2.4. Control variables

Individual control variables, including demographic measures, are obtained from the SHOW. These variables are: age (less than 35, 35-44, 45-54, 55-64, 65-74), race (Non-Hispanic White, Non-Hispanic Black, Hispanic and Other), gender (female, male), relationship status (married, separated/divorced, widowed, never married, living with partner), income level (less than $25,000, $25,000-$44,999, $45,000-$74,999, $75,000-$99,999, $100,000 or more), educational attainment (less than high school, high school degree or equivalent – GED, some college or associate degree, bachelor's degree, graduate degree or higher), employment status

(unemployed, employed), and citizenship status (US citizen and not US citizen). Consistent with the methodology presented by Priester et al. (2017) on housing instability risk and self-reported experience to discrimination, I include duration at the current residence as a continuous covariate to control for residential mobility (which is also a factor included in the outcome variable "risk of housing instability" and expected to confound). Lastly, due to a potential influential role of perceived residential quality on housing instability as suggested by (Drukker et al., 2005; Boggess & Hipp, 2010; Chung et al., 2012), I include a binary-coded residential quality variable, the immediate built environment (IBE) index, which is a combined housing and neighborhood quality measure.[22] Control variables are weighted to T2 for consistency with predictor and outcome variables in statistical analyses.

5.2.3. Statistical analysis

I use SAS version 9.4 to analyze the extent of housing discrimination exposure associates with the likelihood of housing instability risk. If findings suggest the association is significant, I also assess whether the association varies among SES categories and by contrasts in residential quality and residence location. Additional analyses test for the robustness of findings and assess whether the outcome substantially varies by the timeframe of the data collected.

5.2.3.1. Bivariate analysis

I first examine potential two-way associations between housing discrimination exposure and housing instability risk factors for a weighted sample population at the state and at the Milwaukee metro levels. I use the Rao-Scott Chi-Square test statistic for complex survey design (Rao & Scott, 1981, 1987). This initial analysis allows exploring the extent each risk factor

[22] A detailed description on the IBE quality index is available in chapters 3 and 4.

(housing mobility and financial stress) and the combined "risk of housing instability" variable differ by a reported presence or absence of housing discrimination exposure.

5.2.3.2. Regression analysis

Using logistic regressions, I examine the extent of exposure to housing discrimination associates with an increased likelihood of housing instability risk. I control for potential confounders in the following order: 1) demographic and individual SES characteristics, 2) residence duration in years, 3) IBE quality and 4) residence location (Milwaukee metro vs the rest of the state). Additional regression models explore whether the outcome varies by demographic characteristics such as income and race, IBE quality, and residence location using interaction terms and computing least-square means of fixed effects for all possible pairwise comparisons on the logit scale. For each model, I conduct hypothesis tests of no association between predictors and the outcome utilizing the likelihood ratio method and compute confidence intervals at the 95% confidence level for each parameter. I also assess for multicollinearity among parameters using the following three criteria: 1) variance inflation factor (VIF) larger than ten; 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero) and a large corresponding condition index (Schreiber-Gregory, 2017). To measure the predictive accuracy of each model, I compute the index of rank correlation, which gives an estimate of the area under the receiver operating characteristic curve when the response variable is binary (SAS Institute, 2019).

To test the robustness of findings, I conduct a sensitivity analysis for the adjusted model. I do this by computing two adjusted multivariate linear regression (MLR) models for alternate outcome variables expressed in a continuous format. The two alternate outcome variables are sum scores of the characteristics utilized to develop the housing instability risk measure (i.e.,

residential mobility and financial stress). The first outcome variable an equally weighted sum score and the second outcome variable is a weighted-factor score computed using Principal components analysis (PCA). The weighted-factors score is developed by multiplying the first factor of PCA with each related characteristics utilized to develop the housing instability risk measure because the first PCA factor explains the most variance (Gennarelli & Goodman, 2014). Each model is controlled for potential confounders including demographic SES, residence duration and location.

Lastly, I split the data into two cohorts sharing the year 2011 in common (2009-2011 and 2011-2013) to examine the extent findings from a cross-sectional analysis for the group that participated in the SHOW right after the Great Recession (2009-2011) vary from a cross-sectional analysis for the group that participated during the years 2011-2013. For each cohort, I conduct adjusted logistic regression models controlling for potential confounders including demographic SES, residence duration and location.

5.3. Findings

5.3.1. Sample population characteristics

Among the 3,113 individuals interviewed in the SHOW across the state, 2,704 responded to the follow-up questionnaire including the perceived housing discrimination exposure inquiry. Of these respondents, 57% are female, 21% obtained a high school or GED as the highest education level attained, 64% are married, 6% are Non-Hispanic Black, 23% have an annual household income under $25,000, and 18% are unemployed yet not retired. Among the 571 SHOW participants in the Milwaukee metro, 559 responded to the housing discrimination question. Characteristics of these respondents are somewhat comparable to the overall state

sample population but the racial construct composition, marital status and percentage of unemployed yet not retired individuals differed from the overall state sample with higher percentages of Non-Hispanic Blacks (22%) and unemployed yet not retired individuals (26%) and a lower percentage of married individuals (57%).

5.3.1.1. Housing discrimination exposure

Among the sample population at the state level, 187 reported having perceived an exposure to housing discrimination sometime during their lifetime. The proportion of individuals exposed is roughly 1 out of 15 Wisconsin residents (7.4%; 95% CI [5.8%, 9.0%]). Among the sample population in the Milwaukee metro, 67 reported having perceived an exposure to housing discrimination which translates to approximately 1 in 10 Milwaukee metro residents (9.9%; 95% CI [6.4%, 13.3%]). While the Milwaukee Metro and the rest of the state appear to differ on the percentage of perceived exposure to housing discrimination, a Rao-Scott Chi-square test at the 0.05 alpha level ($X^2 = 3.19$, $p=0.07$) suggests that differences are statistically indistinguishable, albeit marginally. Despite this, additional analysis compares the Milwaukee metro to the rest of the state and examines perceived housing discrimination exposure against housing instability risk factors.

Also, among subgroups in the sample population, approximately 1 in 3 Non-Hispanic Blacks reported housing discrimination - the highest ratio among the social categories in my study. In comparison, approximately 1 in 22 Non-Hispanic Whites reported housing discrimination. Due to these observations suggesting differences in perceived housing discrimination reporting among racial groups, the additional analysis compares racial categories and other SES categories on the extent perceived housing discrimination associates with housing instability risk.

5.3.1.2. Reported housing instability risk factors

Table 5.1 shows the descriptive statistics for residential mobility, financial stress and the combined measure for housing instability risk for a weighted sample population at the state and the Milwaukee metro levels. Among residential mobility measures reported by the sample population, less than 20% of people at the state and the Milwaukee metro level reside for a year or less or moved within the last 12 months. Over half of the sample population at both geographic levels reported any level of financial stress related to meeting basic needs such as paying for housing, food and utilities. Lastly, approximately 15% of the sample population exhibit a risk for housing instability based on the criteria of meeting at least one of the residential mobility measures and indicating any level of financial stress. Among these, 77% are Non-Hispanic White and roughly half are females, under 35 years of age, attended college but did not obtain a bachelors' degree, and earn in their household less than 25,000.[23]

5.3.2. Bivariate analysis findings

While the percentage of reported residential mobility factors and the overall measure of housing instability risk were relatively low among the sample population at the state and at the Milwaukee metro levels, individuals exposed to housing discrimination exhibited significantly higher percentages of these conditions. **Table 5.2** reports the results of the bivariate analysis exploring for potential two-way associations and the extent housing instability risk factors and the combined housing instability risk measure differ by whether individuals perceived housing discrimination or not, for a weighted sample population at the state and at the Milwaukee metro levels. Residential mobility factors including a recent move and short residence duration are

[23] Sociodemographic characteristics of individuals in the sample population at risk of housing instability, as defined in this study, are available in the appendix (Table A.5.1).

twice higher in percentage points among individuals exposed to housing discrimination compared to unexposed individuals. This difference is statistically significant according to Rao-Scott Chi-Square tests the state and Milwaukee Metro levels. Similarly, the combined housing instability risk measure appears twice higher in percentage points among individuals exposed to housing discrimination compared to those unexposed. The differences in proportions between exposed and non-exposed groups were also significant at the state level (X^2 = 55.3, p<0.0001) and at the Milwaukee metro level (X^2 =11.4, p=0.003). Financial stress is roughly 30% to 50% points higher and statistically significant among individuals exposed to housing discrimination compared to those unexposed at the Milwaukee metro and at the state level respectively. Lastly, when comparing the Milwaukee metro against the rest of the state, no statistically distinguishable differences were observed between individuals exposed to housing discrimination and those not exposed meeting the conditions for housing instability risk (X^2 = 0.72, p = 0.40).

5.3.3. Logistic regression findings

Table 5.3 shows the summarized results of adjusted logistic regression models examining the extent housing discrimination exposure associates with the likelihood of housing instability risk as opposed to no risk. All models were controlled for individual SES characteristics including gender, age, education attainment, relationship status, racial and ethnic constructs, citizenship status, household income and unemployment. Results from Model 1 show that housing discrimination exposure positively associates with the outcome and suggests that exposed individuals in the sample population are more than twice likely of being at risk for housing instability (OR = 2.76; 95% CI [1.50, 5.07]). Adjusting for residence duration in years in addition to individual SES characteristics, Model 2 shows that housing discrimination exposure

positively and significantly associates with the likelihood for housing instability, albeit at a reduced partial effect (OR = 2.63; 95% CI [1.40, 4.93]; p = 0.003).

Model 3 and 4 adjusts for residential quality based on the IBE quality index, and residence location (Milwaukee metro versus the rest of the state), respectively. As shown in Model 3, the inclusion of residential quality in the adjusted model slightly increases the partial effect of housing discrimination exposure on the outcome of housing instability risk (OR = 2.70; 95% CI [1.43-5.07]. However, the odds ratio slightly rose for most covariates which suggests that residential quality has an additive partial effect in the model. Model 4 shows that the inclusion of residence location, comparing the Milwaukee metro versus the rest of the state, also increases the partial effect of perceived housing discrimination exposure on the outcome of housing instability risk (OR = 2.73; 95% CI [1.44, 5.17]) while remaining significant (p <0.002) in the adjusted model. Interestingly, the odds ratio for individual demographic groups against their reference category including age, Non-White racial and ethnic groups, unmarried living with a partner and unemployed people increased with the inclusion of residence location but not for other demographic categories, which might be due to slight differences in the sample population composition between the Milwaukee metro and the rest of the state. According to Model 4, the confounding variables with positive and significant associations with the odds for housing instability risk when other covariates are held constant or at reference, include age (all categories versus older than 64 years of age), non-citizen (versus US citizen), household income lower than $45,000 and between $75,000 and $100,000 (versus income over $100,000), and residence duration in years. Conversely, residence location comparing the Milwaukee metro and the rest of the state is not significantly associated with the outcome (OR = 0.72; 95% CI [0.43, 1.20]; p = 0.20), which suggests that the difference in these geographic locations by themselves

have a negligible effect on the outcome. The odds ratios and their corresponding confidence intervals for all covariates in each model (1-4) are available in the appendix (**Table A.5.2**). Among all models, Model 4 shows the best fit according to the Akaike Information Criterion (*AIC* = 10,577,871) and the highest predictive ability according to the index of rank correlation (*c* = 0.87).

5.3.3.1. Population subgroup analysis: Interactions and least-square means results

Based on findings in this study suggesting that housing discrimination exposure is associated with an increased likelihood of having housing instability risk, I then examined whether the association varies among demographic SES categories and by contrasts in residential quality and geographic location within Wisconsin. According to adjusted models with an interaction term between housing discrimination exposure and contrasting levels of SES categories, residence duration and location **(Tables 5.4 to 5.7**), statistically distinguishable associations between a perceived housing discrimination exposure and the outcome were only observed at the 0.05 alpha level for contrasting age groups. Additionally, least-square means of fixed effects for all possible pairwise comparisons of interactions terms revealed noteworthy findings for individual SES and residential categories. Among such findings, individuals exposed to housing discrimination in the sample population that are middle-aged (between 45-54 years of age), in the "other" racial and ethnic construct category (neither Non-Hispanic White, Non-Hispanic Black or Hispanic), married or that earned an annual household income between $45,000 and $74,999, are roughly five times or more likely at risk of housing instability compared to unexposed individuals in the same categories, albeit with large margins for the actual population at the 95% confidence level. Significant odds ratios were also observed among other SES categories exposed to housing discrimination including males, low income (earning

less than $25,000), and young adults under 35 years of age compared to unexposed people in the same categories. Results are unavailable for non-US citizens, widows, and individuals between 65 and 74 years of age due to the lack of sufficient sample reporting both housing discrimination exposure and measures of housing instability risk. In the next sections, I describe the results for each demographic and residential category more in detail.

5.3.3.1.1. Results by gender

Among males, the odds of housing instability risk are higher when exposure to housing discrimination occurred, compared to the absence of exposure (OR = 3.78; 95% CI [1.63, 8.78]). However, among females, the association between exposure of housing discrimination on the odds of housing instability risk is less significant; we find it at the 0.1 alpha (OR =1.98; 90% CI [1.09, 3.61]). Among individuals exposed to housing discrimination, a difference in gender is not significantly associated with housing instability risk. **Table 5.4** reports these results.

5.3.3.1.2. Results by racial and ethnic categories

Among individuals that are Non-Hispanic White or in the "other" racial and ethnic category (neither Hispanic, Non-Hispanic White or Non-Hispanic Black), housing discrimination exposure significantly associates with increased odds for housing instability risk (OR = 3.23; 95% CI [1.53, 6.81]; OR = 9.25; 95% CI [1.71, 50.1]), respectively. However, among Non-Hispanic Blacks and Hispanics, there is no observed association between the presence or absence of exposure to housing discrimination and a change in the odds for housing instability risk. Among individuals exposed to housing discrimination, the odds for housing instability risk were marginally distinguishable between Non-Hispanic Blacks and the reference category (Non-Hispanic White) at the 0.1 alpha. These findings suggest that Non-Hispanic Whites that experienced housing discrimination have higher odds for housing instability risk compared to

Non-Hispanic Blacks that experienced housing discrimination (OR = 2.86; 90% CI [1.12, 7.30]) under fixed effects. The results are also shown in **Table 5.4.**

5.3.3.1.3. Results by household income level

Among individuals that earned an annual household income under $25,000 or between $45,000 and $74,999 in the sample population, housing discrimination exposure significantly associates with increased odds for housing instability risk as shown by the odds ratio and the confidence intervals for each group (OR = 2.16; 95% [1.10, 4.24]; OR = 9.37; 95% CI [3.36, 26.2]), respectively. Among individuals earning modest annual household incomes (between $25,000 and $44,999) and among those earning higher annual household incomes (over $75,000), an exposure to housing discrimination compared to the lack thereof was not statistically associated with housing instability risk. Among those exposed to housing discrimination, the odds for housing instability risk were not statistically distinguishable between the reference group (household income above $100,000) and each income level. However, among individuals that did not report perceived housing discrimination, the contrast in household incomes under $45,000 and the reference group is statistically distinguishable and significantly associated with the outcome. **Table 5.5** reports these results.

5.3.3.1.4. Results by employment status

Among the unemployed, housing discrimination exposure is not significantly associated with housing instability risk (95% CI [0.82, 4.88]). However, among employed individuals, housing discrimination exposure significantly associates with the outcome suggesting an increased in odds for housing instability risk (OR = 3.23; 95% CI [1.59-6.58]). Among individuals exposed to housing discrimination, the difference in employment status (unemployed

vs. employed) is negligible on odds for housing instability risk. These results are also shown in **Table 5.5.**

5.3.3.1.5. Results by education level

Among individuals without post-secondary education (i.e., did not complete high school and those that obtained a high school diploma or GED), housing discrimination exposure is not statistically associated with housing instability risk. Similar results were also observed for individuals with bachelor's degree which suggest no significant association between housing discrimination exposure and the odds for housing instability risk for each of these education level categories. However, individuals with some college or an associate degree that were exposed to housing discrimination had relatively high odds of housing instability risk compared to unexposed individuals in the same education level group (OR = 2.94; 95% CI [1.29, 6.74]). Also, exposed individuals with a graduate degree also show high odds for housing instability risk compared to unexposed in the same educational attainment group, albeit with large confidence intervals (OR = 12.7; 95% CI [1.96, 82.4]).

Among individuals exposed to housing discrimination, the contrast between the lowest and highest education level (i.e., less than high school and graduate degree attainment, respectively) is the only comparison statistically distinguishable different and significantly associated with the outcome (OR = 0.11; 95% CI [0.02-0.86]; p = 0.035). However, the association is negative, and the estimate shows large confidence intervals. **Table 5.5** shows these results.

Additional analysis utilizing the Rao-Scott Chi-squared test comparing the lowest and the highest education level groups among those exposed to housing discrimination in the sample population, reveals that the percentage of individuals with the lowest education level reporting

measures of housing instability risk are statistically not different to the percentage of individuals with the highest educational level attained ($X^2 = 6.93$, $p = 0.14$). For instance, 42.4% (95% CI [25.0%, 59.8%]) of exposed individuals in the lowest educational level group met the definition of housing instability risk based on the inclusion criteria described herein compared to 20.1% (95% CI [0%, 42.2%]) of exposed individuals in the highest education level group. While the exposed group in the lowest education level seems to have a larger percentage of housing instability risk, the large confidence intervals due to low sample size and large standard errors for each group provoke inconclusive inferences.

5.3.3.1.6. Results by age group

Among young and middle-aged adults (i.e., under 35 years of age and between 45 and 54 years of age, respectively) housing discrimination exposure is significantly associated with increased odds for housing instability risk as shown by the odds ratio and the confidence intervals for each group (OR = 3.16; 95% CI [1.15, 8.73]; OR = 4.57; 95% CI [1.91, 10.9]), respectively. Among individuals in the moderate age group (between 35 to 44 years of age) and among those mature (between 55 and 64 years of age), housing discrimination exposure is not significantly associated with the probability of housing instability risk.

Among individuals that did not report perceived housing discrimination, young and moderate age groups compared against the reference category are not statistically different or significantly associated with the outcome. However, the contrast between middle-aged and mature adults individuals that did not report perceived housing discrimination is statistically distinguishable and significantly associated negatively with the outcome (OR = 0.57; 95% CI [0.34, 0.95]) suggesting that older, mature, adults are at higher risk of instability compared to middle-aged adults. Lastly, among individuals exposed to housing discrimination, the contrasts

between each age group and their reference category (i.e., mature adults, between 55 to 64 years of age) are statistically distinguishable and significantly associated with housing discrimination risk.[24] This suggests that the difference in age is relevant to the odds for housing instability risk among those discriminated. **Table 5.6** reports results by age group and by contrasts in age groups.

5.3.3.1.7. Results by marital status

Results by marital status show that housing discrimination exposure is significantly associated with housing instability risk for married individuals in the sample population (OR = 5.28; 95% CI [2.32, 12.0]) but not for other marital status categories. Among individuals exposed to housing discrimination, the odds for housing instability risk are statistically indistinguishable for the contrast between each marital status category and the reference category (married). Among individuals that did not report perceived housing discrimination, the contrast between singles (never married) and married are statistically associated with housing instability risk (OR = 1.72; 95% CI [1.03, 1.89]) but the other contrasts of marital status category against married analyzed in this study are not statistically distinguishable or significantly associated with the outcome. **Table 5.6** shows these results.

5.3.3.1.8. Results by residential quality

Among individuals residing in moderate-high IBE quality in the sample population, housing discrimination exposure increases the odds for housing instability risk, as shown by the odds ratio (OR = 3.84; 95% CI [1.90, 7.78]). However, among individuals residing in low IBE quality, housing discrimination exposure is not associated with increased nor decreased the odds

[24] Note that due to lack of samples from the oldest age group (65-74 years of age) reporting both housing discrimination exposure and housing instability risk factors, the reference group used on this analysis is the 55-64 years of age group.

for housing instability risk (95% CI [0.53, 3.54]). These results suggest that housing discrimination exposure is relevant for housing instability risk only in moderate-high IBE quality.

Among individuals that were exposed to housing discrimination, results reveal a statistical difference between moderate-high and low IBE quality on the odds for housing instability risk, albeit at the 0.1 alpha level (OR = 2.50; 90% CI [1.11, 5.62]). But among individuals that did not report perceived housing discrimination, a contrast in residential quality was not statistically distinguishable or associated with the outcome of housing instability risk. **Table 5.7** reports these results.

5.3.3.1.9. Results by two locations: the Milwaukee Metro and the rest of the state

Among individuals residing in the Milwaukee metro, housing discrimination exposure is not significantly associated with either an increase or decrease in the likelihood for housing instability risk (95% CI [0.81, 6.58]). However, among individuals residing outside the Milwaukee metro in Wisconsin, the odds for housing instability risk are significant for individuals exposed to housing discrimination compared to unexposed individuals within the same geography (OR = 2.95; 95% CI [1.36, 6.39]). Lastly, among individuals exposed to housing discrimination and among those unexposed, a contrast in residence location is not statistically distinguishable nor significantly associated with housing instability risk. The results are also shown in **Table 5.7.**

5.3.4. Robustness check and additional analysis

5.3.4.1. Robustness check 1: Assessing for potential multicollinearity

For each model, I assessed multicollinearity among parameters. I used the: 1) variance inflation factor (VIF) larger than ten (10); 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero) and a large corresponding condition index (Schreiber-Gregory, 2017). Following each criterium, no concerns of multicollinearity were observed.

5.3.4.2. Robustness check 2: Alternate regression models

Two adjusted MLR models were developed to test for the robustness of findings from this study. The first model uses a sum score of binary-coded housing instability risk conditions including residential mobility (short residence duration and a recent move) and financial stress. The lowest value of the score is 0 and the highest 3 denoting the presence of the two residential mobility conditions and financial stress. The second model uses also a sum score of all the three housing instability risk conditions but weighted to the first factor obtained with PCA. All models were controlled for potential confounders including SES, residence duration in years, residential quality and location. Also, regression coefficients standardized to allow for comparability.

As reported in **Table 5.8,** results from both MLR models suggest a significant positive association between housing discrimination exposure and housing instability risk. The first model shows that housing discrimination exposure, compared to non-exposure, increases the housing instability risk score by 0.116 standard deviation units. The second model based on the factor-weighted score shows somewhat stronger effects but comparable. According to the second model, housing discrimination exposure, compared to non-exposure, increases housing instability risk by 0.123 standard deviation units. The slight difference in the results is likely due

to the weighting scheme from PCA which weighted residential mobility measures higher, and these measures correlated with the housing discrimination variable. Nonetheless, the direction and significance of the association observed in both MLR adjusted models is consistent with previous observations in this study suggesting that perceived housing discrimination exposure significantly associates with an increase in housing instability risk.

5.3.4.3. Robustness check 3: Split-cohort analysis

Due to a three-consecutive year increase in housing discrimination complaints filed state-wide after the Great Recession which peaked in 2011, I assessed whether findings from this study substantially vary by the timeframe of the data collected. As shown in Table 9 adjusted logistic regressions on samples from two cohort groups (i.e., cohort 1: 2009-2011, cohort 2: 2011-2013) from the SHOW reveal that the association between housing discrimination exposure and housing instability risk is significant for both groups and not substantially different. For cohort 1, housing discrimination exposure increases the odds for housing instability risk by 284 percent (OR = 2.84; 95% CI [1.52, 5.32]. For cohort 2, housing discrimination exposure increases the odds for housing instability risk by 264 percent (OR = 2.64; 95% CI [1.08, 6.44]). The degree of significance for cohort 1 is higher than cohort 2 at the 0.05 alpha as noted by their p-values (0.001 and 0.03, respectively).

5.4. Discussion

This study is the second in a series of three that examined reported exposure to housing discrimination from a state-wide sample population in Wisconsin from 2009 to 2013. My principal aim through this research is to advance our understanding of discrimination from the perspective of perceived disparate treatment through the life course when procuring housing or

remaining in the neighborhood and for both, examine whether housing discrimination influences disparate outcomes. Building upon the assumption that discrimination through the life course is cumulative, I hypothesized that: 1) perceived housing discrimination associates with the likelihood of housing instability risk, and 2) whether the association between housing discrimination and housing instability risk differ by social and residential characteristics of one subpopulation over another in Wisconsin.

Results suggest that experienced housing discrimination significantly associates with housing instability risk. Individuals residing in Wisconsin from 2009 to 2013 who perceived housing discrimination are more than twice likely to be at risk of housing instability compared to their counterparts that perceived no discrimination. The relationship remained significant when controlling for socioeconomic characteristics and residential factors including duration, quality, and location. Additional analysis using a sum score and PCA for housing instability risk confirmed the direction and significance of the findings showing a significant positive association between perceived exposure to housing discrimination and housing instability risk. In addition to these findings, I observed noteworthy differences in housing instability risk factors such as short residence duration, a recent move, and financial stress for people in Wisconsin that reported perceived housing dissemination and those that did not. For instance, the percent of individuals that experienced housing discrimination and experienced a short residence duration and the percent of individuals that experienced discrimination and a recent move is roughly twice as high compared to their non-discriminated counterparts, at both the state and the Milwaukee metro levels. Also, at both geographic levels, individuals that experienced housing discrimination reported statistically significantly higher financial stress compared to their non-discriminated counterparts. Therefore, these observations and findings suggest the potential

detrimental effect of perceived housing discrimination on single and combined measures of housing instability risk in a sample population of Wisconsin.

This study also adds context with regards the five years after the Great Recession, a relevant timeframe in which the state also received a somewhat intensified amount of housing discrimination complaints peaking in 2011. Additional analysis from this study shows that the association between housing discrimination exposure and housing instability risk is significant, yet, not substantially different among groups that participated in the SHOW between 2009 and 2011 and between 2011 and 2013. However, the degree of significance for the group that participated earlier is higher likely because the percent of the sample population that reported perceived housing discrimination and met the conditions for housing instability risk in the 2009-2011 group were slightly higher (but not statistically different) from the sample in the 2011-2013 group.[25] It is important to note that shortly after the Great Recession, the housing market in Wisconsin was struggling to recover due to historically high levels of unemployment and major changes in housing occupancy from ownership to rental in some of the state's most populated cities which can contribute to financial stress (Cancel Martinez et al., 2018). Nevertheless, this study adds evidence new evidence suggesting that after the Great Recession, the overall sample population in Wisconsin that perceived housing discrimination were more likely to have a risk for housing instability.

When examining this study's second hypothesis, least-square means of fixed revealed noteworthy findings. This study suggests that among the unexposed sample population in

[25] Among the sample population, 47.7% (95% CI [36.6%, 58.8%] that participated in the SHOW from 2009 to 2011 reported perceived housing discrimination and met the conditions for housing instability risk. In comparison, 32.5% (95% CI [20.7%, 44.5%]) reported perceived housing discrimination and met the conditions for housing instability risk. Note the overlapping confidence intervals which suggest no statistical differences.

Wisconsin (those that did not perceive housing discrimination), older adults are more likely at risk of housing instability compared to younger adults. This comparison is only statistically significant in the outcome between mature (between 55 and 64 years old) and middle-aged adults (between 45 and 54 years old). Also, among those that did not perceive housing discrimination, individuals that earn in their household less than $45,000 per year or are single (never married) have significant odds for housing instability risk compared to their higher-income and married counterparts. These findings are consistent with previous studies suggesting that older age, low income and not-married status contribute to the risk of housing instability (Fitzpatrick, 2005; Flemming & Burns, 2015; Batterham, 2019). However, these studies did not account for discrimination as a mechanism intersecting with social categories. Once exposure to housing discrimination is operationalized in the mechanism assessing associations with housing instability risk among individual social groups, the effect of discrimination appears also significant for individuals in affluent or privileged social groups.

Results from analysis in this study suggest that the effect of perceived housing discrimination can be particularly relevant for specific social groups in the sample population, including some in historically marginalized categories and some with privileged status. For instance, individuals exposed to housing discrimination in the sample population that are middle-aged (between 45-54 years of age), in the “other” racial and ethnic construct category (neither Non-Hispanic White, Non-Hispanic Black or Hispanic), married or that earned an annual household income between $45,000 and $74,999, are roughly five times or more likely at risk of housing instability compared to unexposed individuals in the same social categories. Significant odds for housing instability risk were also observed among other groups exposed to housing discrimination, including young adults under 35 years of age, individuals that went to college but

did not obtain a bachelors' degree, Non-Hispanic Whites, individuals earning less than $25,000 in annual household income and those employed, compared to unexposed people in the same categories. Also, both males and females that experienced housing discrimination sometime during their life course have increased odds for housing instability risk compared to those non-discriminated in the same gender categories. However, while effect size is not statistically different, the significance for males is higher than females.

The odds for housing instability risk among presumably privileged groups such as middle-class, employed, married and Non-Hispanic Whites are noteworthy findings that seem to counteract previous studies attempting to identify the social characteristics of individuals at risk for housing instability. However, most research literature focus on lower-income individuals and the associations between instability and outcomes of unemployment, poverty, and prior homelessness status without accounting for experienced discrimination (Bartlett, 1997; Drukker et al., 2005; Kushel et al., 2006; Desmond, 2015). Findings from this study suggest that experienced housing discrimination matters and significantly influences the likelihood of housing instability risk for middle-class, employed and married individuals in Wisconsin. For instance, compared to their non-discriminated counterparts, middle-class, married, or employed Wisconsin residents that perceived housing discrimination are more than three times likely to have housing instability risk. Therefore, this study contributes to the research evidence and offers a different perspective on perceived discrimination as a potential risk factor for housing instability among presumably privileged groups in Wisconsin.

Surprisingly, results from this study suggest that for Non-Hispanic Blacks, the experience of housing discrimination makes no difference on the increasing nor decreasing the odds for housing instability risk. One plausible explanation to this is that a comparable percentage of

Non-Hispanic Blacks at risk of housing instability and not at risk of instability reported perceived housing discrimination.[26] Other groups in which a perceived exposure to housing discrimination also made no difference on the odds for housing instability risk include people between 35 and 44 years of age and between 55 and 64 years of age, individuals without any college and individuals with a bachelor's degree, singles that are divorced, separated, widowed or living with a partner or never married, Hispanics, and individuals with either modest (between $25,000 and $44,999) or high (at or above $75,000) annual household incomes, compared to their unexposed counterparts in the same group. The lack of statistical significance of perceived housing discrimination on the likelihood of housing instability risk for some of these groups, and thus our inability to reject the null hypothesis, is due to relatively high percentages of reported housing discrimination in both conditions - at risk and at no risk of housing instability. Therefore, future studies should investigate further the rate of perceived housing discrimination among these groups with a larger sample size and determine whether other factors influence or counter risks of housing instability.

For the estimated population in Wisconsin that perceived housing discrimination, no statistically significant differences were observed in the likelihood of housing instability risk for one subpopulation group over their reference category, except for the contrast in age against their reference category (55-56 years old). The contrast is age, especially between young (under 35 years of age) and mature adults (between 55 and 64 years of age), is noteworthy because, for those non-discriminated in the sample population, the difference between these age groups were not statistically significant on the odds for housing instability risk. But among those

[26] For instance, 22.1% (95% CI [6.9%, 37.2%]) of Non-Hispanic Blacks reported perceived housing discrimination and met the conditions for housing instability risk and 26.1% (95% CI [14.5%, 37.7%]) of Non-Hispanic Blacks reported perceived discrimination but did not met the conditions for housing instability risk in this study.

discriminated in the sample population, the difference between these age groups is statistically significant on the odds for housing instability risk. Young adults have higher odds for housing instability risk compared to older adults. This contrast is interesting because the experience of housing discrimination contributes to the likelihood of housing instability risk and such is significantly different between young and mature adults when controlling for socioeconomic and residential factors. Previous research noted that young adults are more likely to double-up in shared living arrangements which did not always play a positive role in providing stable housing (Skobba & Goetz, 2013; Kang, 2019). However, neither of these studies considered the potential influential effect of perceived housing discrimination on housing instability risk among contrasting age groups. Therefore, this study offers a new perspective on the influential role housing discrimination has on housing instability risk by age groups and suggests a potential higher risk among discriminated young adults.

Results from this study reveal important observations on two regions in Wisconsin, the Milwaukee metro region and the rest of the state. First, the effect of perceived housing discrimination on housing instability risk is particularly relevant for individuals residing outside the Milwaukee Metro. Results show that among these individuals, housing discrimination increases the odds for housing instability risk by roughly three times compared to those non-discriminated residing in the same region, controlling for SES and residence duration. This finding is interesting because no other known study to date has examined the potential association between housing discrimination and housing instability risk in Wisconsin outside the Milwaukee metro. Previous studies examining the potential effects of discrimination in Wisconsin (Desmond et al., 2015; Desmond & Gershenson, 2017; Rosenblatt & Cossyleon, 2018) limited their scope to the Milwaukee metropolitan area due to the region's prominent and

prevalent racial segregation history tied to housing discrimination. Surprisingly, results show no statistically significant associations between perceived housing discrimination and housing instability risk for individuals residing in the Milwaukee metro. Yet, the initial bivariate analysis suggested a somewhat higher percentage of discriminated individuals meeting the definition of housing instability risk compared to those discriminated but not meeting the definition of instability risk in this study. It is plausible to believe that the difference in population means, if any, is not large enough to be detected with the given sample size. Future studies should examine this geography with a larger sample.

Lastly, this study finds that when perceived housing discrimination is operationalized in the analysis, discrimination significantly associates with increased odds for housing instability risk among individuals residing in moderate-high residential quality conditions but not among individuals residing in low residential quality conditions. These findings seem to counter previous research suggesting that individuals in low residential quality conditions are prone to housing instability (Desmond et al., 2015; Kleit et al., 2016; Desmond & Gershenson, 2017). But such studies did not operationalize perceived housing discrimination in their analysis. Therefore, this study offers a new perspective on the influential role housing discrimination has on housing instability risk among individuals in higher residential quality conditions. Further research should identify the social characteristics of individuals that perceived housing discrimination, reside in higher quality conditions and are at risk of housing instability with a larger sample size. For instance, the "type" of housing instability risk associated with discrimination by income categories are worth exploring. Previous research suggests that the combination of residential mobility and financial stress may be experienced differently among middle class versus low-income individuals (Desmond et al., 2015).

5.4.1. Limitations

This study has several limitations. First, this is a cross-sectional study relying mostly on self-reported measures from interviews and questionnaires. Second, the theoretical mechanisms are not exhaustive and may not have thoroughly captured or measured housing discrimination and housing instability risk. While this study assumes that the experience of housing discrimination is cumulative over lifetime and that perceptions serve as a proxy for truthful recent experiences, the measure of self-reported perceived housing discrimination over the life course obtained from the SHOW is subjective and does not explicitly capture the number of discriminatory events and the time these occurred. Housing instability risk, as the main combined measure for residential mobility and financial stress, rely on dichotomized self-reported measures from SHOW participants. Therefore, there is some potential data loss. Also, the SHOW does not collect data on the reason for short residence duration or a recent move which inhibits making inferences on whether a previous experience of housing discrimination influences "push" or "pull" mobility motives combined with financial stress. Additionally, while this study controlled for residence duration in years consistent with a similar previous study (Priester et al., 2017), housing status (i.e., renting or owning) was not recorded in the SHOW for all the years used in this study. Therefore, this limits our findings and identifying further which individuals in the sample population are more likely at risk of housing instability.

Third, the data utilized in this study focuses on the state of Wisconsin. While the state population is typical of others in the mid-west and rustbelt (Council of State Governments, 2011), findings should not be generalized to other populations. Fourth, the variation in perceived housing discrimination is small and this variable may not account for much of the variation in the odds for housing instability risk among subgroups. Therefore, it is likely that among some

subgroups, the difference in population means, if any, is not large enough to be detected with the given sample size. It is important to note that a relatively small percent, only 7.4% of survey respondents or roughly 1 out of 15 Wisconsin residents have perceived housing discrimination. Lastly, while this study suggests that the relationship between perceived housing discrimination and housing instability risk is in overall significant based on robust analysis with a representative sample population in Wisconsin, due to the aforementioned limitations, one should not infer causality.

5.5. Conclusion

5.5.1. Study contributions and future research

This study contributes to the research literature in three ways. First, this study shows that a perceived exposure to housing discrimination significantly associates with the likelihood of housing instability risk in a representative sample of the Wisconsin population. Second, findings show the extent housing instability risk may vary once housing discrimination is operationalized in the mechanism by appearing significant in some social groups but not in others. For instance, findings from this study reveals that groups with apparent privileged status such as Non-Hispanic Whites, married and middle-class employed households may become at risk of housing instability when discriminated in the housing market which appears to counter the general notion posed by existing research literature on housing instability but that did not account for discrimination as an exposure mechanism among social constructs. Findings from this study also suggest that the association between perceived housing discrimination and housing instability risk can be particularly relevant among individuals earning low household income, young, among both males and females and among those in the “other” racial and ethnic construct category (neither Non-Hispanic White, Non-Hispanic Black or Hispanic). Lastly, this study

closes gaps in knowledge by providing social and geographical context on the relevance an exposure to lifetime housing discrimination may have on housing instability risk, particularly during the 5-year timeframe post-Recession in Wisconsin. Understanding the characteristics of groups at risk of housing instability when they have been exposed to housing discrimination is important because it illuminates a new level of understanding of the interaction between social stratification and discrimination.

To date, no known study has examined the extent a perceived housing discrimination associates with housing instability risk for a representative sample population in the state of Wisconsin. As previously discussed, most studies examining the potential effect of housing discrimination focused in urban areas. This study, therefore, expands to a larger geographical level while also comparing associations between perceived housing discrimination and housing instability risk among two geographical levels, the Milwaukee metro and the rest of the state. This is important because Wisconsin ranks among the top in the nation with the most segregated metropolis as a result of historical and prevalent patterns of housing discrimination (Landis, 2019). Yet, this study finds that the effect of perceived housing discrimination on housing instability risk is not statistically significant in the Milwaukee metro but in the rest of the state. Therefore, this warrants additional research to examine the state at smaller geographical units (e.g., county, census tract) with a larger sample size.

Since it is unclear to determine, based on the data used in this study, whether a previous experience of housing discrimination influences “push” or “pull” mobility motives combined with financial stress, future studies should assess the motives for residential mobility among individuals that experienced housing discrimination. Previous research (Bartlett, 1997; DeLuca et al., 2013; Desmond & Shollenberger, 2015) attempted to differentiate between “push” and

"pull" factors related to mobility. Under some circumstances, a move may be intentional, with a "pull" motive, aimed at meeting new and better housing needs or carried by changes in family composition such as getting married or having children (Rossi, 1980; Desmond & Shollenberger, 2015). However, recent research has also unveiled the unintentional or forced mobility motives known as "push" factors often related to poverty or being priced out of staying ((Desmond & Shollenberger, 2015). Therefore, it is important to further study the role of experienced housing discrimination and clarify between "push" and "pull" factors.

Future research should also explore potential interrelationships between perceived housing discrimination, housing instability, residential quality conditions, and outcomes in mental health. A study by Desmond and Kimbro (2015) on low-income urban mothers found that housing instability is linked to psychological distress and depression. Additional research show links between housing discrimination and stress, anxiety and depression (Williams et al., 2003; Williams & Mohammed, 2009; Anderson, 2013; Sirin et al., 2015; American Psychological Association, 2016). However, the mechanisms revealing the extent housing discrimination associates with residential conditions, including residential quality and instability risk, and health status in Wisconsin remains understudied. My next study in these series of three will explore these mechanisms more in detail utilizing data on reported exposure to housing discrimination from a state-wide sample population in Wisconsin Post-Recession, from 2009 to 2013.

5.5.2. Policy implications

As we ponder the 50th anniversary of the Fair Housing Act and proposed regulatory changes presenting additional challenges (O'Regan, 2019), this is an important time to understand the extent of disparate impacts in a mid-western state. As Greenberg et al. (2016) noted, a disparate impact of people experiencing housing instability, or at risk of instability, can

be argued as a violation of the federal Fair Housing Act because experienced housing discrimination disproportionately impacts residents. This study advanced our understanding about housing discrimination from the context of an exposure to disparate treatment and its association with potential disparate outcomes on the risk of housing instability for a representative sample population in Wisconsin. This approach is consistent upon interpretations of the Fair Housing Act and interpretations and the AFFH rule acknowledging the legacy of housing discrimination from both contexts.

The urban and regional planning practice and housing policies continue to face challenges despite some advances such as deeming illegal the explicit practice of housing discrimination. Among prominent challenges in Wisconsin, the lack of substantial equivalency with the Federal Fair Housing Act limits the capacity of properly enforcing fair housing across the state. This, in turn, may exacerbate disparate impacts among Wisconsin residents, not only among historically marginalized groups (e.g., Non-whites, females, low income) on their likelihood of remaining stably housed but also among those in the middle-class. Therefore, findings in this study presents housing discrimination as a potentially universal issue that can impact a broader population. This is important for the urban and regional planning discourse and housing policies because existing policies are meant to expand equal housing opportunities for all, including preventing housing instability (and homelessness in its most extreme form), yet housing discrimination prevails as an equity problem. This means that in Wisconsin not everyone has equal opportunities to feel stably housed. As Batterham (2019) notes, policy and legislation can impact positively on preventing housing instability and its most extreme form, homelessness, by acting directly through the implementation of anti-discrimination measures. Furthermore,

considering the potential implications of housing discrimination on housing instability risk among Wisconsin residents may help inform initiatives aiming at preventing housing instability.

5.6. References

American Psychological Association. (2016). *Stress in America: The impact of discrimination*. Retrieved from https://www.apa.org/news/press/releases/stress/2015/impact-of-discrimination.pdf

Anderson, K. F. (2013). Diagnosing discrimination: Stress from perceived racism and the mental and physical health effects. *Sociological Inquiry, 83*(1), 55-81.

Bailey, K. T., Cook, J. T., de Cuba, S. E., Casey, P. H., Chilton, M., Coleman, S. M., Cutts, D. B., Heeren, T. C., Rose-Jacobs, R., Black, M. M., & Frank, D. A. (2016). Development of an index of subsidized housing availability and its relationship to housing insecurity. *Housing Policy Debate, 26*(1), 172-187.

Barata, P. C., & Stewart, D. E. (2010). Searching for housing as a battered woman: Does discrimination affect reported availability of a rental unit? *Psychology of Women Quarterly, 34*(1), 43-55.

Bartlett, S. (1997). The significance of relocation for chronically poor families in the USA. *Environment and urbanization, 9*(1), 121-131.

Batterham, D. (2019). Defining "at-risk of homelessness": Re-connecting causes, mechanisms and risk. *Housing Theory & Society, 36*(1), 1-24.

Blank, R. M., Dabady, M., & Citro, C. F. (2004). Causal inference and the assessment of racial discrimination *Measuring racial discrimination*. Washington, DC: The National Academies Press.

Boggess, L. N., & Hipp, J. R. (2010). Violent crime, residential instability and mobility: Does the relationship differ in minority neighborhoods? *Journal of Quantitative Criminology, 26*(3), 351-370.

Brush, B. L., Gultekin, L. E., Dowdell, E. B., Saint Arnault, D. M., & Satterfield, K. (2018). Understanding trauma normativeness, normalization, and help seeking in homeless mothers. *Violence Against Women, 24*(13), 1523-1539.

Cancel Martinez, Y., Peterangelo, J., & Henken, R. (2018). *The cost of living: Milwaukee county's rental housing trends and challenges*. Retrieved from https://wispolicyforum.org/research/the-cost-of-living-milwaukee-countys-rental-housing-trends-and-challenges/

Chung, W. T., Gallo, W. T., Giunta, N., Canavan, M. E., Parikh, N. S., & Fahs, M. C. (2012). Linking neighborhood characteristics to food insecurity in older adults: The role of perceived safety, social cohesion, and walkability. *Journal of Urban Health, 89*(3), 407-418.

Council of State Governments. (2011). *In search of growth: An economic checkup of the midwestern states*. Retrieved from https://www.csgmidwest.org/publications/documents/insearchofgrowth.pdf

Daoud, N., Matheson, F. I., Pedersen, C., Hamilton-Wright, S., Minh, A., Zhang, J., & O'Campo, P. (2016). Pathways and trajectories linking housing instability and poor health among low-income women experiencing intimate partner violence (ipv): Toward a conceptual framework. *Women & Health, 56*(2), 208-225.

DeLuca, S., Garboden, P., & Rosenblatt, P. (2013). Segregating shelter: How housing policies shape the residential locations of low-income minority families. *Annals of the American Academy of Political and Social Sciences, 647*, 268-299.

DeLuca, S., Wood, H., & Rosenblatt, P. (2019). Why poor families move (and where they go): Reactive mobility and residential decisions. *City & Community, 18*(2), 556-593.

Desmond, M. (2015). Unaffordable America: Poverty, housing, and eviction. *Fast Focus: Institute for Research on Poverty*, *22*, 1-6.

Desmond, M. (2016). *Evicted: Poverty and profit in the American city*. New York: Crown.

Desmond, M., & Gershenson, C. (2017). Who gets evicted? Assessing individual, neighborhood, and network factors. *Social Science Research, 62*, 362-377.

Desmond, M., Gershenson, C., & Kiviat, B. (2015). Forced relocation and residential instability among urban renters. *Social Service Review, 89*(2), 227-262.

Desmond, M., & Kimbro, R. T. (2015). Eviction's fallout: Housing, hardship, and health. *Social Forces*.

Desmond, M., & Shollenberger, T. (2015). Forced displacement from rental housing: Prevalence and neighborhood consequences. *Demography, 52*, 1751-1772.

Drukker, M., Kaplan, C., & van Os, J. (2005). Residential instability in socioeconomically deprived neighbourhoods, good or bad? *Health & Place, 11*(2), 121-129.

Fair Housing Act, Pub. L. No. 90-448 (1968).

Fitzpatrick, S. (2005). Explaining homelessness: A critical realist perspective. *Housing, Theory and Society, 22*(1), 1-17.

Flemming, D., & Burns, P. B. (2015). *All alone: Antecedents of chronic homelessness*. Homeless Policy Research Institute.

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Gennarelli, R., & Goodman, M. (2014). *Using SAS to examine internal consistency and to develop community engagement scores* Paper presented at the SAS Support.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Hale, L., Hill, T. D., Friedman, E., Nieto, F. J., Galvao, L. W., Engelman, C. D., Malecki, K. M. C., & Peppard, P. E. (2013). Perceived neighborhood quality, sleep quality, and health status: Evidence from the Survey of the Health of Wisconsin. *Social Science & Medicine, 79*, 16-22.

Jargowsky, P. A., Ding, L., & Fletcher, N. (2019). The Fair Housing Act at 50: Successes, failures, and future directions. *Housing Policy Debate, 29*(5), 694-703.

Kang, S. (2019). Why low-income households become unstably housed: Evidence from the panel study of income dynamics. *Housing Policy Debate, 29*(4), 559-587.

Kleit, R. G., Kang, S., & Scally, C. P. (2016). Why do housing mobility programs fail in moving households to better neighborhoods? *Housing Policy Debate, 26*(1), 188-209.

Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low-income Americans. *Journal of General Internal Medicine, 21*(1), 71-77.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American Community Survey. *Cityscape, 21*(1), 63-85.

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Montgomery, A. E., Fargo, J. D., Byrne, T. H., Kane, V. R., & Culhane, D. P. (2013). Universal screening for homelessness and risk for homelessness in the veterans' health administration. *Am J Public Health, 103 Suppl 2*, S210-211.

Nieto, F. J., Peppard, P. E., Engelman, C. D., McElroy, J. A., Galvao, L. W., Friedman, E. M., Bersch, A. J., & Malecki, K. C. (2010). The Survey of the Health of Wisconsin (SHOW), a novel infrastructure for population health research: Rationale and methods. *BMC Public Health, 10*(1), 785.

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The Fair Housing Act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Pager, D., & Shepherd, H. (2008). The sociology of discrimination: Racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol, 34*, 181-209.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rao, J., & Scott, A. J. (1981). The analysis of categorical data from complex surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association, 76*, 221–230.

Rao, J., & Scott, A. J. (1987). On simple adjustments to chi-square tests with survey data. *The Annals of Statistics, 15*, 385–397.

Rosenblatt, P., & Cossyleon, J. E. (2018). Pushing the boundaries: Searching for housing in the most segregated metropolis in America. *City & Community, 17*(1), 87-108.

Rossi, P. (1980). *Why families move* (2nd ed.). Beverly Hills, CA: Sage.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America* (First Edition ed.). New York: Liveright Publishing Corporation.

SAS Institute. (2019). The logistic procedure: Rank correlation of observed responses and predicted probabilities. Retrieved from https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_logistic_sect042.htm.

Schreiber-Gregory, D. (2017). *Multicollinearity: What is it, why should we care, and how can it be controlled?* Paper presented at the SAS Support.

Sirin, S. R., Rogers-Sirin, L., Cressen, J., Gupta, T., Ahmed, S. F., & Novoa, A. D. (2015). Discrimination-related stress effects on the development of internalizing symptoms among Latino adolescents. *Child Development, 86*(3), 709-725.

Skobba, K., & Goetz, E. G. (2013). Mobility decisions of very low-income households. *Cityscape, 15*, 155-172.

Turner, M. A. (2008). Limits on housing and neighborhood choice: Discrimination and segregation in u.S. Housing markets. *Indiana Law Review, 41*(3), 797-816.

U.S. Government Accountability Office. (2010). *Housing and community grants: HUD needs to enhance its requirements and oversight of jurisdictions' fair housing plans*. Retrieved from www.gao.gov/new.items/d10905.pdf.

US Department of Housing and Urban Development. (2018a). Affirmatively furthering fair housing: Extension of deadline for submission of assessment of fair housing for consolidated plan participants *83 FR 683* (pp. 683-685). Federal Register: Office of the Federal Register.

US Department of Housing and Urban Development. (2018b). Affirmatively furthering fair housing: Streamlining and enhancements *83 FR 40713* (pp. 40713-40715). Federal Register: Office of the Federal Register.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/ethnic discrimination and health: Findings from community studies. *American Journal of Public Health, 93*(2), 200-208.

Williams, D. R., Yan, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socioeconomic status, stress and discrimination. *J Health Psychol, 2*(3), 335-351.

Williams, M., & Seicshnaydre, S. (2017). The legacy and promise of disparate impact. In G. Squires (Ed.), *The fight for fair housing: Causes, consequences, and future implications of the 1968 federal fair housing act*. New York, NY: Routledge.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Zerger, S., Bacon, S., Corneau, S., Skosireva, A., McKenzie, K., Gapka, S., Campo, P. O., Sarang, A., & Stergiopoulos, V. (2014). Differential experiences of discrimination among ethnoracially diverse persons experiencing mental illness and homelessness. *Bmc Psychiatry, 14*.

5.7. Tables

Table 5.1. Residential mobility, financial stress and the combined measure for housing instability risk at the state and the Milwaukee Metro levels

Characteristics	Category	Code	Wisconsin (N=2,704)[1] % (SE)	Milwaukee metro (N=559)[1] % (SE)
Residential mobility				
Residence duration	> 1 year	0	83.3 (1.4)	83.3 (2.2)
	≤ 1 year	1	16.7 (1.4)	16.7 (2.2)
Moved within the past 12 months	No	0	86.4 (1.1)	89.9 (2.1)
	Yes	1	13.6 (1.1)	10.1 (2.1)
Financial stress				
Worry about meeting basic needs[2]	No	0	43.4 (1.4)	44.8 (3.2)
	Yes	1	56.6 (1.4)	55.2 (3.2)
Housing instability risk				
At risk[3]	No	0	85.2 (1.2)	87.0 (2.0)
	Yes	1	14.8 (1.2)	13.0 (2.0)

[1.] Data from the Survey of the Health of Wisconsin (2009-2013) weighted to the Wisconsin population, T2. Percentages are by characteristics.

[2.] Based on any level of perceived stress related to meeting basic needs (housing, food, utilities)

[3.] Meets at least one residential mobility measure and indicated any level of financial stress.

Table 5.2. Perceived housing discrimination exposure and housing instability risk measures

		Housing discrimination exposure, *weighted*[1]							
		Wisconsin				Milwaukee Metro			
Measures	Category	%Yes (SE) N=187	%No (SE) N=2,517	ChiSq (Y vs. N)		%Yes (SE) N=67	%No (SE) N=492	ChiSq (Y vs. N)	
Residential mobility									
Residence duration	**≤ 1 year**	**37.3 (5.2)**	**15.0 (1.5)**	**24.2**	*******	**38.0 (8.1)**	**14.5 (2.5)**	**10.1**	******
	> 1 year	62.7 (5.2)	85.0 (1.5)			62.0 (8.1)	85.5 (2.5)		
Recent move[2]	**Yes**	**35.7 (4.8)**	**11.7 (1.0)**	**57.5**	*******	**21.3 (6.3)**	**9.0 (2.2)**	**5.6**	*****
	No	64.3 (4.8)	88.3 (1.0)			78.7 (6.3)	91.0 (2.2)		
Financial stress									
Worry about meeting basic needs[3]	**Yes**	**80.7 (3.3)**	**54.7 (1.4)**	**36.8**	*******	**74.8 (5.7)**	**53.4 (3.5)**	**9.8**	******
	No	19.3 (3.3)	45.3 (1.4)			25.2 (5.7)	46.6 (3.5)		
Housing instability risk									
At risk[4]	**Yes**	**40.9 (4.8)**	**12.9 (1.2)**	**55.3**	*******	**34.5 (7.7)**	**10.8 (2.3)**	**11.4**	*******
	No	59.1 (4.8)	87.1 (1.2)			65.5 (7.7)	89.2 (2.3)		

* $p < 0.05$

** $p < 0.01$

***$p < 0.001$

1. Survey of the Health of Wisconsin (2009-2013), data weighted to the Wisconsin population, T2. Percentages in bold denote housing instability risk factors.

2. Recently moved residence within a year.

3. Based on any level of perceived stress related to meeting basic needs (housing, food, bills).

4. If meeting at least one of the residential mobility measures and indicated any level of financial stress.

Table 5.3. Summarized logistic regression results for housing instability risk

	Model 1[1]		Model 2[1]		Model 3[1]		Model 4[1]	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure[2]	2.76*	1.50-5.07	2.63*	1.40-4.93	2.70*	1.43-5.07	2.73*	1.44-5.17
Residence duration			0.85*	0.77-0.94	0.85*	0.77-0.95	0.85*	0.77-0.94
Residential quality[3]					1.16	0.72-1.85	1.13	0.71-1.80
Milwaukee metro[4]							0.72	0.43-1.20
N		2,591		2,555		2,555		2,555
AIC		11,865,365		10,609,784		10,605,231		10,577,871
Likelihood Ratio		17.7		23.47		22.58		22.02
Rank correlation index		0.82		0.87		0.87		0.87

*p <0.01

1. Models weighted to the Wisconsin population at T2.
2. Self-reported perceived housing discrimination exposure vs. non-exposure.
3. Residential quality based on the dichotomous immediate built environment (IBE) index, moderate-high vs. low.
4. Milwaukee metro vs. the rest of the state.

Note: All models adjust for individual SES characteristics including gender, age, education level, race/ethnicity citizenship, marital status, household income and unemployment.

Table 5.4. Summarized fixed-effects models by gender and racial/ethnic categories

		Housing Instability Risk (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.73**	1.44 - 5.17
Gender interaction model	Male*HDE (1|0)	3.78**	1.63 - 8.78
	Female*HDE (1|0)	1.98^{t}	0.97 - 4.05
	HDE*(female|male)	0.50	0.21 - 1.18
	Non-HDE*(female|male)	0.95	0.67 - 1.33
Race and ethnicity interaction model	Non-Hispanic White (NHW)*HDE(1|0)	3.23**	1.53 - 6.81
	Non-Hispanic Black (NHB)*HDE (1|0)	0.74	0.23 - 2.44
	Hispanic (H)*HDE (1|0)	2.59	0.32 - 21.2
	Other (O)*HDE (1|0)	9.25*	1.71 - 50.1
	HDE*(NHB|NHW)	0.35^{t}	0.12 - 1.07
	HDE*(H|NHW)	1.45	0.20 - 10.4
	HDE*(O|NHW)	2.18	0.55 - 8.70
	Non-HDE*(NHB|NHW)	1.52	0.64 - 3.60
	Non-HDE*(H|NHW)	1.81	0.64 - 5.14
	Non-HDE*(O|NHW)	0.76	0.23 - 5.51

***p < 0.001

** p < 0.01

* p < 0.05

^{t} p < 0.1

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, residential quality based on the IBE quality index (moderate-high vs. low) and residence location (Milwaukee metro vs. the rest of the state).

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 5.5. Summarized fixed effects models by income, employment and education

		Housing Instability Risk (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.73**	1.44 - 5.17
Household Income interaction model	(<$25K)*HDE (1|0)	2.16*	1.10 - 4.24
	($25K-$44.9K)*HDE (1|0)	1.10	0.33 - 3.66
	($45K-$74.9K)*HDE (1|0)	9.37***	3.36 - 26.2
	($75K-$100K)*HDE (1|0)	3.34	0.23 - 48.7
	(>100k)*HDE (1|0)	2.24	0.28 - 18.1
	HDE*(<$25K|>$100K)	4.42	0.47 - 41.8
	HDE*($25K-$44.9K|>$100K)	2.04	0.20 - 21.3
	HDE*($45K-$74.9K|>$100K)	6.49	0.70 - 60.1
	HDE*($75K-$100K|>$100k)	3.57	0.16 - 78.4
	Non-HDE*(<$25K|>$100K)	4.58**	1.87 - 11.2
	Non-HDE*($25K-$44.9K|>$100K)	4.15***	1.90 - 9.07
	Non-HDE*($45K-$74.9K|>$100K)	1.55	0.69 - 3.45
	Non-HDE*($75K-$100K|>$100k)	2.39*	1.06 - 5.41
Employment status interaction model	Employed*HDE(1|0)	3.23**	1.59 - 6.58
	Unemployed*HDE (1|0)	2.00	0.82 - 4.88
	HDE*(Unemployed|Employed)	0.75	0.29 - 1.94
	Non-HDE*(Unemployed|Employed)	1.21	0.77 - 1.91
Education level interaction model	< HighSchool*HDE (1|0)	1.76	0.58 - 5.34
	HighSchool/GED*HDE (1|0)	2.09	0.60 - 7.31
	SomeCol/Assoc.deg*HDE (1|0)	2.94*	1.29 - 6.74
	Bachelors' deg*HDE (1|0)	2.93	0.58 - 14.7
	Graduate deg*HDE(1|0)	12.7**	1.96 - 82.4
	HDE*(<HighSchool|Graduate deg)	0.11*	0.02 - 0.86
	HDE*(HighSchool|Graduate deg)	0.15	0.02 - 1.28
	HDE*(SomeColAssocDeg|Graduate deg)	0.25	0.04 - 1.63
	HDE*(Bachelors deg|Graguate deg)	0.17	0.02 - 1.73
	Non-HDE*(<HighSchool|Graduate deg)	0.83	0.35 - 1.93
	Non-HDE*(HighSchool|Graduate deg)	0.90	0.41 - 1.98
	Non-HDE*(SomeCol/AssocDeg|Grad deg)	1.08	0.52 - 1.24
	Non-HDE*(Bachelors deg|Graduate deg)	0.73	0.37 - 1.45

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

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, residential quality based on the IBE quality index (moderate-high vs. low) and residence location (Milwaukee metro vs. the rest of the state).

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 5.6. Summarized fixed-effects models by age and marital status

		Housing Instability Risk (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.73**	1.44 - 5.17
Age interaction model[3]	<35 years old*HDE (1|0)	3.16*	1.15 - 8.73
	35-44 years old*HDE (1|0)	2.57	0.77 - 8.57
	45-54 years old*HDE (1|0)	4.57***	1.91 - 10.9
	55-64 years old*HDE(1|0)	0.29	0.07 - 1.27
	>64 years old*HDE(1|0)	--	--
	HDE*(<35|55-64 years old)	11.69**	2.31 - 59.1
	HDE*(35-44|55-64 years old)	7.02*	1.20 - 41.1
	HDE*(45-54|55-64 years old)	9.02**	1.87 - 43.5
	Non-HDE*(<35|55-64 years old)	1.07	0.60 - 1.88
	Non-HDE*(35-44|55-64 years old)	0.79	0.43 - 1.44
	Non-HDE*(45-54|55-64 years old)	0.57*	0.34 - 0.95
	Non-HDE(1|0)*(<35|55-64 years old)	0.19**	0.07 - 0.58
Marital status interaction model	Married*HDE(1|0)	5.28***	2.32 - 12.0
	Widowed*HDE (1|0)	--	--
	Divorced/separated*HDE (1|0)	1.61	0.70 - 3.74
	Single Never Married*HDE (1|0)	1.88	0.55 - 6.41
	Living w/ Partner*HDE (1|0)	2.81	0.51 - 15.5
	HDE*(Widowed | Married)	--	--
	HDE*(Divorced/separated | Married)	0.46	0.09 - 2.35
	HDE*(Single Never Married | Married)	0.62	0.11 - 3.41
	HDE*(Living w/ Partner | Married)	1.00	0.22 - 4.63
	Non-HDE*(Widowed | Married)	1.77	0.61 - 5.16
	Non-HDE*(Divorced/separated | Married)	1.49	0.86 - 2.57
	Non-HDE*(SingleNeverMarried | Married)	1.72*	1.03 - 1.89
	Non-HDE*(Living w/ Partner | Married)	1.87	0.63 - 5.52

***p < 0.001

** p < 0.01

* p < 0.05

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, residential quality based on the IBE quality index (moderate-high vs. low) and residence location (Milwaukee metro vs. the rest of the state).

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

3. Due to lack of samples from the oldest age group (65-74 years of age) reporting both HDE and housing instability risk, the reference group used on this analysis is the 55-64 years of age group.

Table 5.7. Summarized fixed-effects models by residential quality and location

		Housing Instability Risk (N=2,555)	
Model[1]	**Measures of interest**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	2.73**	1.44 - 5.17
Residential quality interaction model	Moderate-High IBE*HDE(1|0)	3.84***	1.90 - 7.78
	Low IBE*HDE (1|0)	2.50[t]	0.95 - 6.57
	HDE*(Moderate-High IBE|Low IBE)	3.42**	1.54 - 7.56
	Non-HDE*(Moderate-High IBE|Low IBE)	0.89	0.54 - 1.46
Location interaction model	Outside Milwaukee Metro*HDE(1|0)	2.95**	1.36 - 6.39
	Milwaukee Metro*HDE (1|0)	2.31	0.81 - 6.58
	HDE*(Milwaukee Metro|Outside MM)	0.59	0.20 - 1.75
	Non-HDE*(MilwaukeeMetro|OutMM)	0.75	0.42 - 1.34

***p < 0.001
** p < 0.01
* p < 0.05
[t] p < 0.1

1. Weighted to the Wisconsin population at T2. Fixed-effects models adjusted for SES (gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income), residence duration in years, residential quality based on the IBE quality index (moderate-high vs. low) and residence location (Milwaukee metro vs. the rest of the state).

2. Perceived housing discrimination exposure (HDE, self-reported) vs. Non-exposure.

Table 5.8. Multivariate linear regression results for housing instability risk

	HIR sum score[1]		Factor-weighted HIR sum score[2]	
Parameter of interest	**Standardized regression coefficient**	***Pr*** **>** **|*t*|**	**Standardized regression coefficient**	***Pr*** **>** **|*t*|**
Housing discrimination exposure	0.116	0.001	0.123	0.002
N	2,555		2,548	
R-squared	0.287		0.283	
Root mean squared error	0.739		0.523	

Note: Each model weighted to T2 and the Wisconsin population and controlled for SES characteristics including gender, age, education level, race/ethnicity, marital status citizenship, household income, unemployment, residence duration, residential quality based in the IBE quality index and location (Milwaukee Metro vs. rest of WI).

1. Sum-score housing instability risk (HIR) measures; includes residential mobility and financial stress.
2. Same HIR measures but weighted using principal components analysis (PCA); only first factor used.

Table 5.9. Logistic regression results for housing instability risk by cohort groups

	2009-2011 cohort		2011-2013 cohort	
Parameter of interest	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure	2.84**	1.52-5.32	2.64*	1.08-6.44
N	1,961		1,615	
AIC	6,245,870		6,063,697	
Likelihood Ratio	17.51		12.30	
Rank correlation index	0.88		0.86	

*p <0.05
** p <0.001

Note: Each model is controlled for SES characteristics including gender, age, education level, Race/ethnicity, marital status, citizenship, household income, unemployment, residence duration, residential quality based on the binary IBE quality index (moderate-high vs. low IBE) and location (Milwaukee Metro vs. rest of the state). Both cohorts include sample population from 2011.

5.8. Appendix

Table A.5.1. Sample population characteristics at risk of housing instability in Wisconsin

			Housing instability risk, *weighted*[1]		
Characteristic	Category	N	Count Yes	% Yes	SE
Gender	Male	1191	155	51.8	3.0
	Female	1567	207	48.2	3.0
Age	< 35	624	191	53.7	3.9
	35-44	474	63	19.6	3.5
	45-54	645	57	14.8	2.7
	55-64	616	45	11.0	1.8
	65-74	399	6	0.9	0.5
Education attainment	< High School	190	32	8.5	2.0
	High school or GED	580	74	18.5	2.8
	Some college or assoc. degree	1079	180	50.9	3.3
	Bachelor's degree	605	49	15.1	2.4
	Graduate degree	300	27	7.0	2.1
Marital status	Married	1752	125	37.9	3.9
	Widowed	97	7	1.5	0.6
	Divorced/separated	359	76	16.9	2.6
	Never married	455	129	35.9	4.2
	Living w/ partner	91	25	7.9	2.2
Race/ethnicity	Non-Hispanic White	2405	280	77.5	3.2
	Non-Hispanic Black	162	39	9.7	2.5
	Hispanic	72	20	6.0	1.6
	Other	115	23	6.8	2.0
US citizenship	Non-citizen	29	3	0.5	0.3
	Citizen	2728	359	99.5	0.3
Income	<$25,000	609	174	46.7	3.8
	$25,000-$44,999	507	79	23.3	3.0
	$45,000-$74,999	674	55	16.8	2.7
	$75,000-$99,999	366	26	8.0	2.0
	>$100,000	498	17	5.1	1.6
Unemployed	No	2243	251	68.4	3.5
	Yes	506	111	31.6	3.5
Location	Rest of the state	2187	292	79.0	3.2
	Milwaukee Metro	571	70	21.0	3.2
Residential quality	Low	499	81	21.0	2.7
	Moderate-high	2259	281	79.0	2.7

1. Sampling weights applied to T2, to reflect the Wisconsin population.

Table A.5.2. Logistic regression results for housing instability risk including all covariates

	Model 1		Model 2		Model 3		Model 4	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Explanatory variable (Ref. = No exposure)[1]								
Housing discrimination exposure	2.76**	1.50-5.07	2.63**	1.40-4.93	2.70**	1.43-5.07	2.73**	1.44-5.17
Gender (ref. = Male)								
Female	0.86	0.63-1.18	0.86	0.62-1.18	0.86	0.62-1.19	0.86	0.62-1.19
Age group (Ref. = 64+ year old)								
<35 years old	21.3***	7.34-61.9	5.82***	2.01-16.8	5.87**	2.04-16.9	5.97**	2.08-17.1
35-44 years old	11.8***	3.96-35.2	4.19***	1.45-12.1	4.21**	1.46-12.2	4.27**	1.48-12.3
45-54 years old	6.12**	2.03-18.5	3.36*	1.10-10.3	3.42*	1.12-10.5	3.47*	1.14-10.6
55-64 years old	5.85**	1.89-18.1	4.55**	1.49-13.9	4.55**	1.49-13.9	4.62**	1.51-14.1
Education attainment (Ref. = Graduate degree)								
< High school	0.44	0.19-1.05	0.63	0.27-1.47	0.65	0.28-1.48	0.62	0.27-1.42
High school/GED	0.55	0.26-1.17	0.75	0.37-1.53	0.77	0.38-1.55	0.77	0.38-1.54
Some college/AD	0.77	0.39-1.52	0.97	0.49-1.92	0.98	0.50-1.92	0.97	0.50-1.88
Bachelor's degree	0.58	0.31-1.10	0.65	0.34-1.23	0.65	0.34-1.22	0.65	0.35-1.20
Marital status (Ref. = Married)								
Widowed	1.51	0.50-4.56	1.41	0.48-4.14	1.40	0.48-4.10	1.41	0.48-1.08
Divorced/separated	1.58[t]	0.93-2.69	1.2	0.69-1.09	1.20	0.69-2.09	1.20	0.69-2.09
Single/not married	1.36	0.80-2.30	1.50	0.90-2.48	1.50	0.90-2.49	1.50	0.89-2.51
Living with partner	1.78	0.77-4.12	1.73	0.71-4.24	1.71	0.69-4.23	1.73	0.70-4.26
Race and ethnicity (Ref. = Non-Hispanic White)								
NonHispanicBlack	1.11	0.55-2.23	0.87	0.44-1.75	0.88	0.44-1.78	1.06	0.50-2.27
Hispanic	1.54	0.66-3.56	1.55	0.62-3.86	1.59	0.65-3.88	1.75	0.69-4.47
Other	1.38	0.58-3.28	1.05	0.41-2.71	1.06	0.41-2.75	1.07	0.43-2.64
Citizenship status (Ref. = US Citizen)								
Non-US citizen	0.11*	0.02-0.60	0.11*	0.02-0.65	0.12*	0.02-0.66	0.12*	0.02-0.69
Household Income (Ref. = > $100,000)								
<$25,000	7.18***	3.13-16.5	4.58***	1.97-10.6	4.64***	1.99-10.8	4.39***	1.85-10.4
$25,000-$44,999	4.96***	2.27-10.9	3.82***	1.79-8.13	3.85***	1.80-8.23	3.71***	1.72-7.98
$45,000-$74,999	2.27*	1.08-4.79	2.01[t]	0.96-4.18	2.03[t]	0.97-4.25	1.96[t]	0.92-4.16
$75,000-$100,000	2.37*	1.10-5.12	2.47*	1.13-5.40	2.49*	1.14-5.44	2.42*	1.10-5.28
Employment status (Ref. = Employed)								
Unemployed	1.22	0.77-1.93	1.09	0.72-1.67	1.10	0.72-1.69	1.12	0.73-1.73
Additional controls								
Residence duration			0.85**	0.77-0.94	0.85**	0.77-0.95	0.85**	0.77-0.94
Residential quality (Ref. = low IBE quality)								
Moderate-high IBE quality					1.16	0.72-1.85	1.13	0.71-1.80
Residence location (Ref. = Wisconsin, excluding Milwaukee Metro)								
Milwaukee Metro							0.72	0.43-1.20
Model diagnostics								
N		2,591		2,555		2,555		2,555
AIC		11,865,365		10,609,784		10,605,231		10,577,871
Likelihood Ratio		17.7		23.47		22.58		22.02
Rank correlation		0.816		0.87		0.87		0.87

***p< 0.001

** p < 0.01

* P < 0.5

[t] p < 0.1

1. Self-reported perceived housing discrimination exposure vs. non-exposure.

Note: All models adjusted for gender, age, education, race/ethnicity, citizenship, household income, unemployment.

CHAPTER 6:

The Extent Housing Discrimination Exposure Associates with Stress, Anxiety and Depression: Evidence from the Survey of the Health of Wisconsin, 2009-2013

6.1. Introduction

This is the third and last study in this series exploring reported housing discrimination from a state-wide sample population in Wisconsin Post-Recession, from 2009 to 2013. The series attempt advancing our understanding of housing discrimination from the context of experienced disparate treatment of people when accessing housing due to their physical, social or economic characteristics (Blank et al., 2004; Pager & Shepherd, 2008; Rothstein, 2017) and associations with disparate outcomes in quality of life conditions of one subpopulation group over another (Williams & Seicshnaydre, 2017; O'Regan & Zimmerman, 2019). In this study, I specifically focus on the outcomes of stress, anxiety and depression as indicators of psychological disorders based on research suggesting strong associations between housing discrimination and poor mental health (Williams & Mohammed, 2009; Yang et al., 2016; Williams et al., 2019).

In public health policy, racism, a form of discrimination on the basis of race, was recently acknowledged as a public health crisis based on the argument posed by epidemiologist Dr. Sandro Galea which describes racism as “a problem affecting a large number of people, threatening health over the long term, and requiring adopting large-scale solutions” (Galea, 2017; Wisconsin Public Health Association, 2018; Williams et al., 2019). In May 2018, the Wisconsin Public Health Association (WPHA) passed a resolution declaring racism as a public health crisis and called for state-wide action (Wisconsin Public Health Association, 2018). Later, in May 2019, the Milwaukee County Executive signed a similar resolution, becoming the first county in the nation to recognize racism as a “cause of persistent racial discrimination in housing,

education, employment and criminal justice… and as a social determinant of health" (Abele & Nicholson, 2019). While these resolutions are groundbreaking, these are not explicitly tied to address discrimination in housing nor its impact on the quality of life and public health of residents. Support for equal treatment under the law is a broadly held value. Laws at the federal and state level have been adopted to address housing discrimination and promote equal housing opportunities with outstanding gaps in implementation.

In federal housing policy, the Fair Housing Act (42 U.S.C § 3601), originally enacted in 1968 and amended in 1988, prohibits the discrimination of individuals on the basis of race, color, religion, sex, national origin, disability or familial status during the sale, rental, financing or other housing-related services. The statute also requires the federal government to "provide, within constitutional limitations, for fair housing throughout the United States… affirmatively further the purposes of [fair housing]" (42 U.S.C §3608(d)). The mandate for fair housing, interchangeably referred also as "equal housing opportunity", has been interpreted as an accountability piece to address disparate impacts resulting from housing discrimination (O'Regan & Zimmerman, 2019). However, it wasn't until nearly 50 years after the original enactment of the Fair Housing Act that the US Department of Housing and Urban Development (HUD) issued the Affirmatively Furthering Fair Housing (AFFH) rule which outlines the standards to comprehensively assess and address the disparate impacts related to discrimination, and affirmatively further fair housing thought the nation.[27] In Wisconsin, no known jurisdiction has

[27] Under the AFFH rule, state and local governments that receive federal funding from Community Development Block Grants (CBGD) are required to take "significant actions… that affirmatively furthers fair housing by, for example, increasing fair housing choice or decreasing disparities in access to opportunity." (24 C.F.R. § 5.152).

yet issued a comprehensive assessment as required under the AFFH rule.[28] This is largely due to delays in the AFFH enforcement (83 FR 683) and, more recently, proposed changes to the existing rule (80 FR 159).[29] Also, the state of Wisconsin's Open Housing Law (Wis. Stat. § 106.50), which attempts to complement the federal Fair Housing Act, lacks substantial equivalency with the federal statute, limiting the state's capacity to properly enforce their fair housing obligations (Wisconsin, 2015). With the lack of enforcement capacity, it is plausible to postulate that housing discrimination and their contributing disparate impacts prevail in the state.

From 2009 to 2013, the fair housing agencies in Wisconsin received a total of 1,888 housing discrimination complaints. In 2011 alone, the agencies received a total of 440 complaints, the highest in the 5-year interval after the Great Recession. It is also important to note that during this timeframe, the state's housing market was still struggling to recover and major changes in housing occupancy occurred in the state's most populated cities (Cancel Martinez et al., 2018). Also, research shows that discriminatory practices in the 2000s contributed to the 2008 Great Recession (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017; McClure et al., 2019). In combination with prevalent patterns of historic and on-going discrimination in rental and lending markets, disparities in residential conditions continue after the Great Recession (Foster & Kleit, 2014; Rothstein, 2017).

[28] The state has currently available an Analysis of Impediments (AI) to Fair Housing published in 2015. However, researchers have argued that AIs are inconsistent and ineffective due to limited enforcement and accountability of jurisdictions (U.S. Government Accountability Office, 2010; O'Regan & Zimmerman, 2019).

[29] In January 2018, HUD announced it was delaying implementation of the AFFH rule and that jurisdictions were to return to conducting AIs during the delay. In August 2019, HUD announced is proposing changes to the AFFH rule, especially in the fair housing assessment and reporting process.

Based on the occurrences of housing discrimination in Wisconsin, as suggested by complaint data from the state's fair housing agencies, I analyze the extent self-reported perceived housing discrimination exposure associates with mental health outcomes of stress, anxiety and depression and whether such exposure influences disparities among social groups and by geography within the state. Furthermore, I examine whether perceived housing discrimination increases the likelihood of stress, anxiety, or depression for individuals by gender, age, racial and ethnic construct, education level, marital status, household income, employment status and two location categories (the Milwaukee metro region and the rest of the state). Additionally, I examine whether residential conditions such as residential quality and housing instability risk influence the likelihood of stress, anxiety and depression among individuals that perceived housing discrimination exposure. Throughout the analysis, I control for socioeconomic and residential factors, self-reported general fair/poor health status, and self-reported life shocks that occurred over the past 12 months such as the recent death of a close friend or family member. A word about terminology – in this study, I use perceived housing discrimination and experienced housing discrimination interchangeably, which refers to self-reported housing discrimination exposure during the life course. I also use psychological outcomes and mental health outcomes interchangeably to refer to the outcomes of stress, anxiety and depression as indicators of psychological disorders.

Previous research suggests that discrimination is a social determinant of health (Williams & Mohammed, 2009; Krieger, 2012; Williams et al., 2019). The World Health Organization defines social determinants of health (SDH) as "the conditions in which people are born, grow, live, work and age" (WHO, 2017). SDHs are often referred to as "upstream" issues or root-causes for health disparities that cannot be alone addressed in medical settings (Slade-Sawyer,

2014). Recent studies started to unveil discrimination as a contributing factor to inequitable residential conditions and health outcomes in three ways (Williams & Mohammed, 2009; Yang et al., 2016; Williams et al., 2019). First, discrimination may force individuals and families to live in undesirable or lower-quality neighborhoods or homes (Massey & Denton, 1993; Acevedo-Garcia & Lochner, 2003; Rosenblatt & Cossyleon, 2018).[30] Second, experienced discrimination associates with a higher risk of housing instability (Priester et al., 2017).[31] In turn, housing instability may contribute to worse mental health outcomes (Osypuk & Acevedo-Garcia, 2010; Desmond & Kimbro, 2015). Third, discrimination associates with poor self-reported health status and relates with stress, anxiety and depression in children and adults (Williams et al., 2003; Williams & Mohammed, 2009; Sawyer et al., 2012; Anderson, 2013; American Psychological Association, 2016; Benner et al., 2018; Williams et al., 2019). For instance, a study by the American Psychological Association (2016) found that regardless of the domain in which exposure to discrimination occurred (e.g., neighborhood, housing, employment), individuals that experienced discrimination are more likely to report stress and poorer health outcomes. According to the research, when people experience discrimination, depending on the degree, they are more likely at risk of anxiety and heighten state of vigilance, triggering further stress responses that may contribute to chronic conditions such as high blood pressure (Sawyer et al., 2012; American Psychological Association, 2016; Colen et al., 2018). Other studies suggest that repeated exposure to discrimination triggers the body to react chronically to stress which may also undermine the immune system (Gee et al., 2007; Yang & Sun, 2019). These findings

[30] See also Chapter 4 of this dissertation suggesting that perceived housing discrimination associates with lower residential quality.

[31] See also Chapter 5 of this dissertation suggesting that perceived housing discrimination associates with increased housing instability risk.

go in hand with other studies suggesting that discrimination is a stressor and an agent of disease (Link & Phelan, 1995; Williams & Mohammed, 2009; Yang et al., 2016; Williams et al., 2019).

In the housing field, Yang et al. (2016) found that perceived discrimination in housing transactions is associated with a higher likelihood of self-reported poor health among residents in the Philadelphia metropolitan area. Another study, in Southeastern Wisconsin, found that black women have a higher risk for colorectal mortality in a neighborhood with higher racial biases in mortgage lending processes, a form of housing discrimination (Zhou et al., 2017). More recently, Yang et al. (2018) found that perceived housing discrimination significantly associates with an increased likelihood of daily stress and medically diagnosed anxiety. While research on housing discrimination sparse, the mechanisms posed by these studies suggest that housing discrimination exposure is both, directly and indirectly, related to individual health outcomes and ultimately to disparities in population health outcomes impacting one group over another. Yet, more research is needed to better understand the underlying mechanisms and the extent housing discrimination influences disparities across subgroups, particularly among income, gender and racial and ethnic groups in Wisconsin.

Wisconsin is an important setting to study housing discrimination because the state is among a few that lacks substantial equivalency with the Fair Housing Act. Also, the state houses the most racially segregated metropolitan region (Landis, 2019). Despite this, Wisconsin has recently shown progressive initiates such as the WHPA's and Milwaukee County's resolutions to address racism as a public health crisis (Wisconsin Public Health Association, 2018; Abele & Nicholson, 2019), albeit at a broad level and not necessarily focused on the housing sector. Therefore, this study poses an opportunity to understand housing discrimination and their impacts on outcomes of mental health in Wisconsin and whether the effect of perceived housing

discrimination exposure on outcomes of mental health varies by subpopulation categories in the state.

A recent study by Yang and Chen (2018) is amongst the first known to operationalize experienced housing discrimination and self-reported mental health outcomes of stress across racial and ethnic constructs. The study shows that discrimination and self-reported stress is significantly associated in Non-Hispanic White, Hispanic and Non-Hispanic Black subpopulations (Yang & Chen, 2018). However, the authors found no significant differences in the association across racial and ethnic groups. Another study (Yang & Sun, 2019) using longitudinal data at a national scale, finds that perceived discrimination and self-reported health is not significantly associated among racial and ethnic groups nor among gender (males, females) when adjusting for other social issues. The mixed evidence for gender and racial groups underscores the need for further research to understand whether experienced housing discrimination associates with mental health and whether there are differences across sociodemographic categories. This study will provide an additional perspective on the extent a perceived housing discrimination exposure associates with stress, anxiety and depression by utilizing a representative sample population from Wisconsin and stratifying by gender, age, racial and ethnic constructs, education level, marital status, household income, employment status and location. This study is also unique because I account for residential conditions which have been previously suggested by Yang et al. (2016) to influence the pathway between experienced housing discrimination and health but continues understudied.

While explicit measures of cumulative exposure to housing discrimination are unavailable for the state of Wisconsin, in this study I assume that perceived housing discrimination might be a result of cumulative exposures through the life course, consistent with

observations from previous research (Gayman & Barragan, 2013; Grollman, 2014). Building upon this assumption of cumulative housing discrimination exposure and previous research, I hypothesize that: 1) residents in Wisconsin that perceived housing discrimination are more likely to have psychological outcomes of stress, anxiety or depression than residents that perceived no housing discrimination; 2) residential conditions such as the quality of the housing and neighborhoods and the risk of housing instability influence the relationship between perceived housing discrimination and the psychological outcomes; 3) perceived housing discrimination is relevant on psychological outcomes by individual social construct categories (e.g., gender, race/ethnicity, age, household income) and by location within the state; Lastly, I hypothesize that among those that perceived housing discrimination, the odds for psychological outcomes are distinguishable among contrasts in demographic categories (e.g., females vs. males, Non-Hispanic Blacks vs. Non-Hispanic Whites, low vs. high household income) and between the Milwaukee metro and the rest of the state of Wisconsin.

6.2 Methods

6.2.1. Setting and data

In this study, I use data from the Survey of the Health of Wisconsin (SHOW) collected from 2009 to 2013 at the state and at the Milwaukee metro levels. The SHOW is a population-based survey with a broad collection of objective and subjective indicators that include but is not limited to health, the residential environment, socio-economic characteristics, and self-reported social experiences. This study includes a representative sample of non-institutionalized adults with ages ranging from 21 to 74 years old. Participants were selected from random households using a two-stage probability-based cluster sampling approach. The data from the SHOW were collected at three times segments. The first segment includes an in-home interview (T1). The

second segment includes self-administered questionnaires (T2) and lastly, in-clinic exams (T3). Additional details on the survey methodology, data collection and validity of the SHOW can be found in Nieto et al. (2010) and Hale et al. (2013). In this study, I use data collected at T1 and T2 and apply sampling weights for consistency with the variables collected at T2.

While most of this study focuses on the state of Wisconsin, I conduct additional analysis at the Milwaukee metro level and make comparisons with the rest of the state. The initial sample size at the state level, collected at T1, is 3,113. When applying sampling weights to T2, the sample drops to 2,704. At the Milwaukee metro level, the sample size at T2 is 559.

6.2.2. Measures of interest

6.2.2.1. Housing discrimination exposure

Housing discrimination exposure serves as the **main explanatory variable**. An exposure to housing discrimination in this study is an "anytime" perceived event throughout the life course related to being unfairly treated when finding a place to live, accessing housing or remaining in the neighborhood. This may include a one-time event or multiple events throughout an individual's life course. The SHOW recorded this using a questionnaire based on the Detroit Area Study of Discrimination and Williams et al. (1997) at T2. The self-reported housing discrimination exposure variable was captured as "yes or no". I then re-coded the variable into binary format to denote the presence or absence of perceived housing discrimination exposure.

6.2.2.2. Mental health indicators: Stress, Anxiety and Depression (SAD)

Stress, anxiety and depression, herein under the acronym SAD, serve as individual indicators of psychological disorders and as the **main outcome variables in this study.** Each indicator is obtained from the long version of the depression, anxiety and stress scale (DASS)

distributed by the SHOW during T2. The DASS consists of a 42-item questionnaire based on Lovibond & Lovibond (1995) and Crawford (2005). The presence of SAD is identified when the severity rating of each disorder is above normal.[32] Then, I re-code each variable of SAD into binary format to denote normal and above normal status.

I also compute a combined variable indicating the presence of stress, anxiety or depression. The combined variable, herein "Any SAD", is used in a binary format to denote "any" or "none" presence of SAD above the normal in exploratory bivariate analyses and in logistic regression models. Because research suggests that the indicators of SAD are likely a dimension of psychological outcomes rather than an exclusive condition (Tran et al., 2013), I assessed the correlation of the binary-coded individual variables of SAD and observed significant correlations. The combined measures for "Any SAD" also show a standardized Cronbach alpha of 0.78. Additionally, the measures for "Any SAD" appear unidimensional according to the "less than 1" eigenvalue criterion in principal component analysis. Similar observations suggesting that indicators of stress, anxiety and depression, as collected by the DASS instrument, are unidimensional were recorded in previous research (Tran et al., 2013).

6.2.2.3. The Milwaukee metro

The variable "Milwaukee metro" dichotomizes the reported residential location of SHOW respondents into those in Milwaukee metropolitan area and those in the rest of the state. The "Milwaukee metro" variable represents the sample population residing in any of the four (4) counties – Milwaukee, Waukesha, Ozaukee, Washington – corresponding to the Milwaukee

[32] The severity rating ranges from 1 to 5 in which the lowest value indicates no concerning presence of the condition (thus, normal) and the highest value indicates an extreme presence of the condition. More details are in Chapter 3, Methodology.

metropolitan area. This variable is particularly relevant for this study because the Milwaukee metro has the largest population density in the state and previous studies suggest it is the most racially segregated metro in the nation (Landis, 2019).

6.2.2.4. Individual control variables

Individual control variables obtained from the SHOW include demographic and socioeconomic (SES) characteristics. These variables are: age (less than 35, 35-44, 45-54, 55-64, 65-74), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic and Other), gender (female, male), marital status (married, separated/divorced, widowed, never married, living with partner), household income (less than $25,000, $25,000-$44,999, $45,000-$74,999, $75,000-$99,999, $100,000 or more), educational attainment (less than high school, high school degree or equivalent – GED, some college or associate degree, bachelor's degree, graduate degree or higher) , employment status (unemployed, employed), and citizenship status (US citizen and not US citizen).

Additional variables from the SHOW are used to control for residential conditions and confounders related to health. These variables include the immediate built environment (IBE) quality index as an indicator for residential quality based on combined housing and neighborhood quality factors, housing instability risk based on combined residential mobility measures and self-reported financial stress, self-reported general fair/poor health status, and self-reported life shocks that occurred over the past 12 months such as "recent death of a close friend or family member". I apply T2 sampling weights to all control variables for consistency with the explanatory and outcome variables in statistical analyses. Variable coding, weighting and statistical analyses for this study were developed using SAS version 9.4.

6.2.3. Statistical analysis

6.2.3.1. Bivariate analysis

I first conduct bivariate analysis to examine for potential two-way associations between perceived housing discrimination exposure and the combined variable "Any SAD" for a weighted sample population at the state and at the Milwaukee metro levels. The additional bivariate analysis examines potential associations between housing discrimination exposure and each individual outcome of stress, anxiety and depression, and potentially confounding variables including fair-poor general health status and recent life shocks. I use the Rao-Scott Chi-Square tests which is a design-adjusted version of the Pearson Chi-Square test that adjusts for complex survey design (Rao & Scott, 1981, 1987).

6.2.3.2. Regression analysis

Using logistic regression models, I examine the extent perceived housing discrimination exposure associates with the likelihood of Any SAD and individual SAD outcomes. I control for potential confounders in the following order: 1) individual demographic and SES variables; 2) general fair-poor health status; 3) life shocks; 4) residential location (Milwaukee metro vs. rest of the state) 5) residential quality; and 6) housing instability risk. Additional regression models explore associations between perceived housing discrimination and the psychological outcome variables by SES categories, residential location, quality and by the presence of housing instability risk using a least-square means approach of fixed effects for all possible pairwise comparisons of interactions terms on the logit scale. To measure the predictive accuracy of each model, I compute the index of rank correlation, which estimates the area under the receiver operating characteristic curve when the response variable is binary (SAS Institute, 2019).

6.2.3.3. Robustness tests

To assess the robustness of findings, I conduct a sensitivity analysis for adjusted models. I do this by computing adjusted multivariate linear regression (MLR) models for the outcome variables expressed in a continuous format. The first model uses a variable (named "DASS Sum Score") based on the sum of individual scores from the DASS (Lovibond & Lovibond, 1995) obtained from the SHOW. The second, third and fourth models use DASS z-scores from the SHOW, also computed per Lovibond and Lovibond (1995) for each individual outcome of stress, anxiety, and depression. The analysis using MLR allows examining for potential associations between perceived housing discrimination exposure and the severity of stress, anxiety and depression instead of examining the presence/absence of any of these psychological disorders that are above normal levels. I adjust each model for potential confounders including SES characteristics, general health status, life shocks, residential quality and location.

Lastly, I split the data into two cohorts sharing the year 2011 in common (2009-2011 and 2011-2013). For each cohort, I conduct adjusted logistic regression models to assess the extent perceived housing discrimination exposure associates with the outcomes Any SAD, and individual outcomes of SAD. I control each model for confounders including SES, general health status, life shocks, residential quality and location. This additional analysis allows exploring the extent cross-sectional results for the group that participated in the SHOW right after the Great Recession (2009-2011) vary from the cross-sectional results for the group that participated a few years after the Recession (2011-2013).

6.3. Findings

6.3.1. Sample population characteristics

Among the 2,704 SHOW participants that responded to the questionnaire with the perceived housing discrimination exposure inquiry, 57% are female, 21% obtained a high school or GED as the highest education level attained, 64% are married, 6% are Non-Hispanic Black, 23% have an annual household income under $25,000, and 18% are unemployed and not retired. Characteristics of the 559 Milwaukee metro respondents are somewhat comparable to the overall state sample population minus in the racial construct composition, marital status and percentage of unemployed not retired individuals. The Milwaukee metro sample shows higher percentages of Non-Hispanic Blacks (22%) and unemployed yet not retired individuals (26%), and a lower percentage of married individuals (57%).

6.3.1.1. Housing discrimination exposure

Among the sample population at the state level, 187 individuals reported perceived housing discrimination exposure sometime during their lifetime. The proportion of individuals exposed is roughly 1 out of 15 Wisconsin residents (7.4%; 95% CI [5.8%, 9.0%]). Among the sample population in the Milwaukee metro, 67 individuals reported perceived housing discrimination which translates to approximately 1 out of 10 Milwaukee metro residents (9.9%; 95% CI [6.4%, 13.3%]). While the Milwaukee Metro and the rest of the state appear to differ on the percentage of perceived exposure to housing discrimination, a Rao-Scott Chi-square test (X^2 = 3.19, *p=0.07)* suggests that the proportions between locations for 90% of the actual population are statistically indistinguishable, albeit marginally. Based on this, additional analysis compares

the Milwaukee metro to the rest of the state and examines perceived housing discrimination exposure against outcomes of mental health.

Also, among subgroups in the sample population, approximately 1 in 3 Non-Hispanic Blacks reported housing discrimination - the highest ratio among the social categories in my study. In comparison, approximately 1 in 22 Non-Hispanic Whites reported housing discrimination. Due to these observations suggesting differences in perceived housing discrimination reporting among racial groups, the additional analysis compares racial categories and other SES categories on the extent perceived housing discrimination associates with outcomes of mental health.

6.3.1.2. Self-reported mental health indicators and life shocks

Table 6.1 shows the reported mental health indicators and potentially confounding factors such as general self-reported poor health status and life shocks for a weighted sample population at the state and the Milwaukee metro levels. At both geographic levels, less than 25% of the sample population were identified with the presence of Any SAD above normal levels. Less than 15% of the sample population were identified with any "above normal" levels of stress and anxiety, respectively, and close to 20% were identified with depression. Additionally, roughly 11% and 13% reported fair-poor general health status at the state and at the Milwaukee metro levels, respectively. Lastly, approximately 25% of the sample population at both geographic levels reported a life shock experience related to a recent death in the family or a close friend.

6.3.2. Bivariate analysis findings

Table 6.2 reports the results of bivariate analyses exploring for potential two-way associations for a weighted sample population at the state and at the Milwaukee metro levels. The presence of Any SAD was reported twice higher in percentage points among individuals exposed to housing discrimination compared to those unexposed. The difference between exposed and unexposed is statistically significant according to Rao-Scott Chi-Square tests for the combined measure Any SAD and for each individual indicator of stress, anxiety and depression, respectively (X^2 = 28.3, $p<0.0001$; X^2 = 55.5, p<0.0001; X^2 = 30.9, p<0.0001) at the state level. At the Milwaukee metro level, the difference between exposed and unexposed groups was statistically significant at the 0.05 alpha for the individual measures of stress and anxiety (X^2 = 4.95, p=0.026; X^2 =13.6, p = 0.0002) but not for depression (X^2 =3.6, p = 0.059). General fair-poor health was twice higher in percentage points among individuals exposed to housing discrimination compared to those unexposed in both geographic levels. No differences were observed between those that perceived housing discrimination and those that did not on recent life shocks based on the loss of a family member or close friend. Lastly, when comparing the Milwaukee metro against the rest of the state, no statistically distinguishable differences were observed between individuals that perceived housing discrimination and those that did not and meet the conditions for Any SAD (X^2 = 0.48, p = 0.49).

6.3.3. Logistic regression findings

Table 6.3 shows the summarized results of adjusted logistic regression models examining the extent perceived housing discrimination exposure associates with the likelihood of having Any SAD. All models are controlled for individual SES characteristics including gender, age, education attainment, relationship status, racial and ethnic constructs, citizenship status,

household income, unemployment, general health status and life shock. Results from Model 1 shows that housing discrimination exposure positively associates with the outcome of Any SAD and suggests that exposed individuals in the sample population are roughly twice more likely of having a presence of Any SAD (OR = 2.05; 95% CI [1.24, 3.37]). Adjusting for residence location (Milwaukee metro versus the rest of the state) in addition to individual SES and health-related confounders, Model 2 shows that housing discrimination exposure positively and significantly associates with the likelihood for Any SAD at a comparable partial effect (OR = 2.04; 95% CI [1.24, 3.37]). Conversely, residence location (comparing the Milwaukee metro and the rest of the state) is not significantly associated with the outcome (OR = 1.16; 95% CI [0.77, 1.73]; p = 0.48) which suggest that the difference between these geographic locations have a negligible effect on the outcome of Any SAD.

Model 3 and 4 adjusts for residential quality and housing instability risk, respectively. As shown in Model 3, the inclusion of residential quality in the adjusted model decreases the partial effect of housing discrimination exposure on the outcome of Any SAD (OR = 1.92; 95% CI [1.14, 3.23]). Model 4 shows that the inclusion of housing instability risk also decreases the partial effect of perceived housing discrimination exposure on the outcome of Any SAD (OR = 1.58; 95% CI [1.05, 2.39]). But perceived housing discrimination exposure remains significant (p =0.041) in Model 4. The reductions in the partial effect of housing discrimination exposure on the outcome of Any SAD suggest that residential quality and housing instability risk influences the outcome. Notably, residential quality and housing instability risk are positively and significantly associated with any SAD. Other confounding variables with positive and significant associations with the odds for any SAD, when other covariates are held constant or at reference, include age (all categories versus older than 64 years of age), bachelor's degree (versus graduate

degree), household income lower than $75,000 (versus income over $100,000), unemployed not retired (versus employed), fair-poor general health (versus excellent-good) and recent life shocks. Lastly, the variable Non-Hispanic Black (versus Non-Hispanic White) is the only a confounding variable with a significant negative association with the outcome. Among all models, Model 4 shows the best overall fit according to the Akaike Information Criterion (*AIC* = 16,111,500) and relatively high predictive ability according to the index of rank correlation (*c* = 0.72).

Table 6.4 shows the summarized results of adjusted logistic regression models examining the extent perceived housing discrimination exposure associates with the likelihood of each individual outcome of SAD. For each individual outcome, I computed four models. The first model adjusts for individual SES characteristics and health-related potential confounders. The second model adds the residence location variable (the Milwaukee metro vs the rest of the state). The third model adds residential quality and the fourth, housing instability risk. With the sequential addition of potential confounders into the models, the partial effect of housing discrimination exposure on each outcome decreased while remaining significant. Among the computed models, the fourth model shows the best overall fit and relatively high predictive ability for each individual outcome of SAD.[33] Therefore, I select the fourth model and describe a summary of noteworthy results.

The fourth model shows that housing discrimination exposure significantly associates with individual outcomes of SAD. Compared to their non-discriminated counterparts, exposed individuals in the sample population are about twice more likely to have stress and anxiety,

[33] The AIC and index of rank correlation are available in the appendix (Table A.6.1).

respectively (OR = 2.04, 95% CI [1.16, 3.59]; OR = 2.00, 95% CI [1.20, 3.33]); and roughly 80% more likely to have depression (OR = 1.79, 95% CI [1.02, 3.14]) when controlling for demographic factors, residential quality, location, self-reported fair-poor general health status and life stressors. Among confounding variables, age groups between 35 and 54 years old (versus older than 64 years), household income of less than $25,000 and between $45,000 and $74,999 (versus those earning more than $100,000), and fair-poor general health status are positively and significantly associated with each individual outcome of SAD. Among residential confounding variables, low residential quality is significantly positively associated only with anxiety and risk of housing instability only with depression. Conversely, the contrast in residence location, comparing the Milwaukee metro and the rest of the state, is not significantly associated with any of the individual outcomes of SAD. The odds ratios and their corresponding 95% confidence intervals for all covariates in the fourth model are available in the appendix (**Table A.6.2**).

6.3.3.1. Population subgroup analysis: Least-square means results

Based on findings in this study suggesting that housing discrimination exposure associated with an increased likelihood of the presence of Any SAD, I then examined whether the association varies among SES categories and by residential conditions. Also, additional analysis sought to identify which specific outcome of SAD does housing discrimination exposure associates with among subpopulation categories. Least-square means of fixed effects for all possible pairwise comparisons of interactions terms revealed noteworthy findings for individual SES and residential categories (**Tables 6.5 to 6.8**). However, due to the lack of sufficient samples from non-US citizens reporting both housing discrimination exposure and any SAD,

results are not reported for this group.[34] I describe the results for each SES and residential category in detail next.

6.3.3.1.1. Results by gender

Among females, the odds for Any SAD are about twice higher (OR = 2.12; 95% CI [1.18, 3.81]) for those that perceived housing discrimination exposure versus their non-discriminated counterparts in the sample population. When examining individual outcomes of SAD, perceived housing discrimination appears to have a stronger effect on the outcome of anxiety for females. For instance, the odds for anxiety are about three times higher (OR = 3.15; 95% CI [1.69, 5.86]) for females that perceived housing discrimination compared to non-discriminated females.

Among males, the association between perceived housing discrimination exposure on the odds for Any SAD, including individual outcomes of SAD, is not significant. Also, among individuals that perceived housing discrimination exposure, the difference between females and males is not statistically significant the odds of individual outcomes of SAD, except for anxiety at the 0.1 alpha (OR = 2.44; 90% CI [1.13, 5.24]). Lastly, among individuals that did not report perceived housing discrimination, the odds for any SAD are statistically indistinguishable between females and males. **Table 6.5** report these results.

6.3.3.1.2. Results by racial and ethnic constructs

Among Non-Hispanic Blacks, perceived housing discrimination exposure is significantly associated with increased odds for Any SAD, albeit with large confidence intervals (OR = 7.50;

[34] The sample size of non-US citizen is 26. Seven met the definition of Any SAD. Of these, none reported perceived housing discrimination. Of the 19 without Any SAD, one reported perceived housing discrimination. For samples this small, confidence intervals resulting from the analysis are extremely large.

95% CI [2.60, 21.6]). When examining individual outcomes of SAD for Non-Hispanic Blacks, perceived housing discrimination specifically associates with anxiety and depression (OR = 5.77; 95% CI [1.81, 18.4] and OR = 3.54; 95% CI [1.14, 11.04]), respectively. Among Non-Hispanic Whites, perceived housing discrimination exposure is associated with stress and anxiety at the 0.05 alpha (OR = 2.40; 95% CI [1.25, 4.63] and OR = 1.92; 95% CI [1.06, 3.45]), respectively, and marginally at the 0.1 alpha with depression (OR = 1.81; 90% CI [1.06, 3.12]). Among Hispanics, and individuals in the "other" racial/ethnic category (i.e., individuals neither Hispanic, Non-Hispanic Black or Non-Hispanic White), housing discrimination exposure is not statistically associated with either an increase or decrease in the odds for Any SAD nor individual outcomes of SAD.

Among individuals exposed to housing discrimination, the odds for individual outcomes of stress and anxiety were only statistically distinguishable for Hispanics and individuals in the "other" racial/ethnic category compared to the reference category (Non-Hispanic White). Results suggest that these racial and ethnic groups have lower odds for stress and anxiety compared to Non-Hispanic Whites when a housing discrimination exposure has occurred, albeit with substantially large intervals at the 95% confidence level. Lastly, among individuals that did not report perceived housing discrimination, Non-Hispanic Blacks and those in the "other" category show lower odds for depression and anxiety, respectively, compared to Non-Hispanic Whites. However, once exposed to housing discrimination, Non-Hispanic Blacks in the sample population show roughly four times higher odds for anxiety compared to unexposed Non-Hispanic Whites. **Table 6.5** also reports these results.

6.3.3.1.3. Results by household income level

Results by household income categories show that perceived housing discrimination is statistically associated with individual outcomes of SAD for some household income categories in the sample population even though the initial analysis shows that perceived housing discrimination was not statistically associated with the outcome "Any SAD" for household income categories below $100,000. In more detail, stratified analyses by household income levels suggest that perceived housing discrimination exposure:

1) Moderately associates with stress (OR = 1.85; 90% [1.08, 3.17]) and significantly associates with anxiety (OR = 2.45; 95% CI [1.14, 5.24]) for individuals that earn an annual household income below $25,000;

2) Significantly associates with stress (OR = 5.42; 95% CI [1.58, 18.6]) and with depression (OR = 4.03; 95% CI [1.23, 13.2]) for individuals that earn an annual household income between $25,000 and $44,999;

3) Moderately associates with anxiety (OR = 6.24; 90% CI [1.30, 30.0]) and significantly associates with depression (OR = 3.99; 95% CI [1.03, 15.5]), albeit with large confidence intervals, for individuals that earn an annual household income over $100,000; and

4) Is not statistically associated with "Any SAD" nor individuals outcomes of SAD for individuals that earn an annual household income between $45,000 and $100,000.[35]

Among individuals exposed to housing discrimination in the sample population, the odds for Any SAD and individual outcomes of SAD were not statistically distinguishable between the

[35] Results are unavailable for the household income group $75,000-$100,000 for due to the lack of responses reporting an exposure to housing discrimination, stress and anxiety for this group.

reference group (household income above $100,000) and each income level.[36] However, among individuals in the sample population that did not report perceived housing discrimination, people earning less than $25,000 and those earning between $45,000 and $74,999 in annual household income show at least twice as high odds for Any SAD and individual outcomes of SAD compared to individuals in the reference category (earning over $100,000 annual household income). Lastly, among individuals in the sample population that did not report perceived housing discrimination, individuals earning between $25,000 and $44,000 in annual household income appear to be more susceptible to depression only, compared to their non-discriminated counterparts in the reference category. **Table 6.6** reports these results.

6.3.3.1.4. Results by employment status

Among unemployed individuals, housing discrimination exposure statistically associates with the odds for stress and anxiety, respectively (OR = 2.22; 95% CI [1.23, 4.03] and OR = 2.26; 95% CI [1.11, 4.60]) but not for depression. Among employed individuals, housing discrimination exposure significantly associates with depression (OR = 2.05; 95% CI [1.02, 4.11]) but not for stress or anxiety. Among individuals exposed to housing discrimination, the odds for any SAD were not statistically distinguishable between employment status categories (unemployed vs. employed). However, among individuals that did not report perceived housing discrimination, a contrast in employment status is significantly associated with the outcome of depression (OR = 2.15; 95% CI [1.41, 3.28]). **Table 6.6** reports these results.

[36] Results are unavailable for the contrast in household income groups $75,000-$100,000 vs. the reference group due to missing data.

6.3.3.1.5. Results by education level

Among individuals without any college or associate degree, housing discrimination exposure is not statistically associated with the odds for Any SAD, including individual outcomes of SAD. Similar results were observed among those exposed versus non-exposed with bachelor's degrees. However, among individuals with an associate degree or that completed some college (but did not obtain a bachelor's degree), housing discrimination exposure significantly associates with the odds for stress and anxiety as shown by the odds ratio and their corresponding confidence intervals, (OR = 2.91; 95% CI [1.39, 6.10] and OR = 2.77; 95% CI [1.35, 5.68]) respectively. Among individuals with a graduate degree, housing discrimination exposure significantly associates with the outcome of depression (OR = 7.24; 95% CI [1.37, 38.4]), albeit with large confidence intervals.

Among individuals exposed to housing discrimination, the contrast between high school and graduate degree attainment is the only comparison among education level groups suggesting a statistically distinguishable and significantly association with the outcome variable "Any SAD" but with very large intervals at the 95% confidence level (OR = 0.16; 95% CI [0.03-0.81]; p = 0.03). When examining individual outcomes of SAD, the analysis revealed no statistically significant association between housing discrimination exposure and individual outcomes of SAD which suggests that the contrast between high school and graduate degree among discriminated individuals is statistically negligible on associating with the odds for individual outcomes of SAD.

Among individuals that did not report perceived housing discrimination, the comparison of individuals without any college or associate degree against the reference category (graduate degree) is not statistically distinguishable or significantly associated with Any SAD or individual

outcomes of SAD. But for those unexposed, the comparison between individuals with post-secondary education (i.e., some college, associate degree or that completed a bachelor's degree) against the reference category is statistically distinguishable and positively associated with the outcome of depression. These results are also reported in **Table 6.6.**

6.3.3.1.6. Results by age group

Results for age group categories suggest that perceived housing discrimination significantly associates with Any SAD, including the individual outcomes of SAD, for moderately-aged adults (between 35 and 44 years old), and significantly associates with the outcomes of stress and depression for mature adults (between 55 and 64 years old). Conversely, housing discrimination exposure is not significantly associated with the odds of Any SAD nor individual outcomes of SAD for young adults under 35 years of age and middle-age adults between 45 and 54 years of age. Also, no association between perceived housing discrimination exposure and the outcomes of anxiety and depression were observed for adults 64 years old and over.[37]

Among individuals exposed to housing discrimination, differences between individual age groups and the reference group (64 years old and over) are not statistically distinguishable nor significantly associated with the outcomes of anxiety and depression. Results are, however, unavailable for the outcome of stress due to no reporting of perceived housing discrimination and stress for the reference group (64 years old and older).

[37] Results are unavailable on the outcome of stress due to a lack of sufficient sample reporting discrimination and stress for this age group.

Lastly, among individuals that did not report perceived housing discrimination, all age groups against the reference group (64 years old and over) are statistically distinguishable and significantly associated with the outcome of stress. However, results on the comparison between age groups and their reference group (64 years old and over) for the outcomes of anxiety and depression are scattered. For instance, moderately-aged adults, against their reference group, show increased odds for anxiety and depression while young and middle-aged adults, against their reference group, show increased odds for the outcome of anxiety and depression. **Table 6.7** reports these results.

5.3.3.1.7. Results by marital status

Among married, perceived housing discrimination exposure is statistically associated with depression (OR = 2.64; 95% CI [1.09, 6.40]) and not with stress and anxiety. Among individuals living with a partner, perceived housing discrimination is statistically associated only with the outcome of stress (OR = 4.04; 95% CI [1.16, 14.1]). No statistically significant associations were observed for individuals that were never married or are divorced or separated.

Among individuals exposed to housing discrimination, the odds for Any SAD and individual outcomes of SAD are statistically negligible between the reference category (married) and each individual category of marital status. The difference between widowed and married that perceived housing discrimination did show moderate significance on the outcome of stress suggesting that married people may have a higher probability to experience stress compared to the widowed. But results also show very large confidence intervals (OR = 0.02; 95% CI [<0.1, 0.47]) which can be interpreted as negligible effects (Lee, 2016). **Table 6.7** also shows the results.

6.3.3.1.8. Results by residential quality

Among individuals in low residential quality, housing discrimination exposure is not statistically associated with the odds for Any SAD nor individual outcomes of SAD. However, among individuals residing in moderate-high quality, housing discrimination exposure is statistically associated at the 0.05 alpha with individual outcomes of stress and anxiety (OR = 2.63; 95% CI [1.37, 5.04]; OR = 2.21; 95% CI [1.10, 4.46]), respectively; and at the 0.1 alpha with depression (OR = 1.95; 90% CI [1.06, 3.61]), as shown by the odds ratios and their corresponding confidence intervals.

Among individuals exposed to housing discrimination, residing in low quality as opposed to moderate-high quality makes no difference in the odds for any SAD nor the odds for individual outcomes of SAD. However, among individuals that did not report perceived housing discrimination, residing in low quality as opposed to moderate-high quality increases the odds for the outcome of anxiety (OR = 1.81; 95% CI [1.16, 2.82]). These results suggest that when individuals have similar lived experiences with regards to housing discrimination, low residential quality may not exacerbate outcomes of stress, anxiety or depression. But if we compare individuals with opposite experiences of housing discrimination and residential quality, disparities appear notable. For instance, individuals in the sample population that perceived housing discrimination and live in low residential quality are more likely to have anxiety (OR = 3.23; 95% CI [1.62, 6.46]) and depression (OR = 2.12; 95% CI [1.08, 4.47]) compared to individuals that reported no perceived housing discrimination and live in moderate-high residential quality. **Table 6.8** reports these results.

6.3.3.1.9. Results by risk of housing instability

Among individuals at risk of housing instability, housing discrimination exposure significantly associates with the outcome of stress and moderately associates with the outcomes of anxiety and depression, as shown by the odds ratios and their corresponding confidence intervals (OR = 2.69; 95% CI [1.08, 6.75]; OR = 2.23; 90% CI [1.10, 4.49] and OR = 2.46; 90% CI [1.12, 5.40]), respectively. Among individuals exposed to housing discrimination, the risk of housing instability is statically associated with depression (OR = 3.09; 95% CI [1.20, 7.95]) but not for stress or anxiety. Similarly, among individuals that did not report perceived housing discrimination, housing instability risk associates with increased odds for depression (OR = 1.78; 95% CI [1.15, 2.74]). However, the effect sizes for the sample population that perceived housing discrimination compared to those not discriminated against appeared higher for the outcome of depression. **Table 6.8** also reports these results.

6.3.3.1.9. Results by two locations: the Milwaukee Metro and the rest of the state

Among individuals residing in the Milwaukee metro, housing discrimination exposure is not significantly associated with the likelihood for Any SAD nor individual outcomes of SAD. However, among individuals residing elsewhere in Wisconsin outside the Milwaukee metro, housing discrimination exposure statistically associates with the odds for Any SAD, including individual outcomes of SAD.[38] Among individuals exposed to housing discrimination, the

[38] Among individuals in the Milwaukee metro that reported perceived housing discrimination, 17.5% (95% CI [9.2%, 25.8%]) met the conditions for Any SAD while 7.6% (95% CI [4.1%, 11.0%] did not. Note the overlapping confidence intervals which suggest differences are negligible for the Milwaukee metro sample. In comparison, among individuals residing elsewhere in Wisconsin that reported perceived housing discrimination, 14.2% (95% CI [9.7%, 18.8%]) met the conditions for Any SAD while 4.6% (95% CI [2.9%, 6.3%]) did not. The difference shown by the confidence intervals for the sample residing outside the Milwaukee metro is apparent.

contrast in the two residence locations is not statistically distinguishable nor significantly associated with the outcome. **Table 6.8** reports these results.

6.3.4. Robustness check and additional analysis

6.3.4.1. Robustness check 1: Assessing for potential multicollinearity

For each model, I assessed multicollinearity among parameters. I used the: 1) variance inflation factor (VIF) larger than ten; 2) Low tolerance (under 0.1), and 3) small eigenvalues (close to zero) and a large corresponding condition index (Schreiber-Gregory, 2017). Following each criterium, no concerns of multicollinearity were observed.

6.3.4.2. Robustness check 2: Alternate regression models

Adjusted MLR models tested for the robustness of findings from this study and suggest that perceived housing discrimination exposure positively associates with Any SAD and individual outcomes of SAD. As shown in **Table 6.9**, the MLR models reveal significant positive associations between housing discrimination exposure and the combined "DASS Sum Score" outcome variable; And between housing discrimination exposure and each score for stress, anxiety, depression. For perceived housing discrimination exposure, results show that the psychological disorder score, based on the sum of individual DASS scores, increases 0.13 standard deviation units. Also, perceived housing discrimination increases the stress, anxiety, and depression scores by 0.13, 0.12 and 0.11 standard deviation units, respectively. The direction and significance of the association observed in the MLR adjusted models appear consistent with previous observations in this study.

6.3.4.3. Robustness check 3: Split-cohort analysis

According to housing discrimination complaints filed state-wide after the Great Recession, reported incidences of housing discrimination increased for three-consecutive years peaking in 2011. Interestingly, the presence of any "above normal" conditions of stress, anxiety and depression (according to the variable "Any SAD") in the SHOW sample population also appears higher during the three consecutive years after the Great Recession. Roughly 25% of individuals that participated in the SHOW from 2009 to 2011 (which I named as cohort 1) met the conditions for "Any SAD" compared to 14% of individuals that participated from 2011 to 2013 (namely, cohort 2). The difference in Any SAD is statistically different among the two cohorts according to Rao-Scott Chi-Square tests ($X^2 = 9.93$, $p = 0.042$).

As reported in **Table 6.10**, adjusted logistic regressions on state samples from the two cohort groups reveal that the perceived housing discrimination exposure significantly associates with Any SAD and individual outcomes of SAD for cohort 1. However, for cohort 2, perceived housing discrimination exposure associated only with stress, and the association is distinguishable only at the 0.1 alpha as shown in **Table 6.11**. These findings suggest that the observed association between housing discrimination exposure and the outcomes of SAD are sensitive to the timing of the sample collected and potentially sensitive to the higher overall rate of Any SAD recorded from 2009 to 2011 among the Wisconsin sample population.

6.4. Discussion

This study is the last in this series that examined reported exposure to housing discrimination from a state-wide sample population in Wisconsin during the five years after the Great Recession, from 2009 to 2013. My principal aim throughout this research is to advance our

understanding of housing discrimination from the perspective of perceived disparate treatment through the life course when getting housing or remaining in the neighborhood and its potential association with disparate outcomes. In this last study, I focus on the outcomes of stress, anxiety and depression as indicators of psychological disorders. Building upon the assumption that experienced discrimination through the life course is cumulative, I hypothesized that: 1) residents in Wisconsin that perceived housing discrimination exposure are more likely to have stress, anxiety or depression than residents that perceived no housing discrimination; 2) residential quality and risk of housing instability influence the relationship between perceived discrimination and the indicators of psychological disorders; 3) perceived discrimination is relevant on indicators of psychological disorders by social demographic categories; and 4) among those that perceived housing discrimination, statistical differences are distinguishable on the odds for psychological outcomes are distinguishable among contrasts in demographic categories (e.g., females vs. males, Non-Hispanic Blacks vs. Non-Hispanic Whites, low vs. high household income) and between the Milwaukee metro and the rest of the state of Wisconsin.

While less than 20% of individuals residing in Wisconsin from 2009 to 2013 reported any level of stress, anxiety and depression above normal, individuals that perceived housing discrimination exposure reported roughly twice as high percentage points of these psychological disorders compared to individuals that reported no perceived housing discrimination. Logistic regression results revealed that, compared to their non-discriminated counterparts, individuals in the sample population that perceived housing discrimination exposure are about twice more likely to have stress and anxiety, and roughly 80% more likely to have depression. Further analysis confirmed the direction and significance of findings, providing substantial evidence of the detrimental effect of perceived housing discrimination on the outcomes of stress, anxiety and

depression. Results from this study support my first hypothesis and echo previous findings from Yang and Chen (2018) which suggests that perceived discrimination in housing transactions is associated with a higher likelihood of psychological stress and anxiety when also considering socioeconomic and residential conditions. Moreover, findings from this study support the evidence suggested by a 2015 research review indicating that self-reported discrimination is related not only to indicators of mental health and distress but to also defined psychiatric disorders such as depression (Lewis et al., 2015).

When examining the second hypothesis, adjusted least-square means of fixed effects revealed three noteworthy findings in stratified groups by residential quality category and experienced housing discrimination. First, among individuals that reported no perceived housing discrimination, residing in low quality as opposed to higher quality significantly and positively associates with anxiety. This finding is consistent with previous research suggesting that poor residential quality associates with psychosocial symptoms (Yen et al., 2009; Clark & Kearns, 2012) but did not include housing discrimination exposure in the pathway to health outcomes. When perceived exposure to housing discrimination is operationalized in the analysis, findings from this study reveal that the contrast in residential quality (low vs. moderate-high) does not associate with either an increase nor decrease in the odds for any stress anxiety or depression among individuals exposed to housing discrimination. This suggests that while lower residential quality may trigger anxiety among those non-discriminated, the contrast in residential quality has undetectable effects on changing the outcomes of mental health among those that experienced housing discrimination when adjusting for socioeconomic, location, general health and life stressors.

Second, housing discrimination exposure is more likely to impact the mental health of people living in moderate-high residential quality. For instance, individuals in moderate-high residential quality that were exposed to housing discrimination are more than twice likely to have stress and anxiety, and roughly twice more likely depressed compared to individuals that did not perceive an exposure to housing discrimination and reside in the same quality conditions. The significance and effect size of perceived discrimination is higher on the outcome of stress suggesting that the negative experience of housing discrimination triggers stress responses among those in higher-quality housing and neighborhoods. This finding is consistent with recent research noting that when a person ends up living in an affluent neighborhood, their sense of relative deprivation associated with experienced interpersonal or institutional discrimination may enhance their stress responses (Yang et al., 2018; Sampson, 2019), and in turn report poorer health (Yang et al., 2016).

Third, housing discrimination exposure has negligible effects on changing the outcomes of mental health among individuals residing in low quality. While the percentage of individuals in the sample population that perceived housing discrimination, met the conditions for Any SAD, and reside in low quality appear slightly higher (41.9%, 95 CI% [27.6%, 56.1%]) compared to those residing in the same low conditions with Any SAD but did not reported perceived housing discrimination (22.6%, 95% CI [16.6%, 28.7%]), the overlapping confidence intervals suggest that the differences are negligible. Previous research suggests that individuals living in poor housing conditions and undesirable areas, as a result of discrimination, have increased levels of anxiety and stress (Pollack et al., 2010; Bentley et al., 2012). However, a recent study by Yang et al. (2016) in Philadelphia finds that the adverse association of perceived housing discrimination with self-rated health is attenuated when people reported residing in less affluent neighborhoods.

One plausible explanation for the attenuation is that individuals' comparison with their neighbors may not generate the same sense of relative deprivation as a proxy of stress. This suggests that when individuals live in similar low-quality residential conditions, their experienced discrimination may not significantly exacerbate stress or other psychological symptoms compared to their counterparts that perceived no discrimination in the same residential environment. Nevertheless, these findings are carefully interpreted because when we compare individuals living in moderate-high residential quality that did not experience housing discrimination and individuals living in low residential quality that experienced housing discrimination - and adjust for SES, location, risk of housing instability, general health status and recent life shocks, results show that the odds are roughly tripled for anxiety and doubled for depression for those that experienced housing discrimination and live in low residential quality. Therefore, these findings show evidence of the detrimental and disparate impact of perceived housing discrimination exposure on the mental health of Wisconsin residents.

Further examination of the second hypothesis from this study suggests that housing instability risk influences the relationship between perceived housing discrimination and mental health outcomes. In stratified groups distinguishing between perceived housing discrimination and the presence/absence of housing instability risk, adjusted least-square means of fixed effects revealed another three noteworthy findings. First, among individuals that reported no perceived housing discrimination, housing instability risk significantly and positively associates with depression when controlling for the confounding variables (i.e., socioeconomic and residential factors, self-reported general fair/poor health status, and self-reported life shocks). Results from this study show that the likelihood for depression increases by 80% when individuals are at risk of housing instability, but not accounting for discrimination. Previous studies (Suglia et al.,

2011; Rollins et al., 2012; Desmond & Kimbro, 2015) suggest links between housing instability and depression but did not operationalize housing discrimination exposure in their analysis.

Second, when I include housing discrimination exposure into the analysis, the effect of housing instability risk on the outcome of depression appears higher, even after adjusting for the confounding variables noted herein. Results from this study show that among individuals in the sample population that perceived housing discrimination, the risk of housing instability roughly triples the likelihood of depression. This suggests that the combination of experienced housing discrimination and housing instability risk can amplify the odds for depression among Wisconsin residents. Furthermore, results from this study show that among individuals at risk of housing instability, the experience of housing discrimination significantly and positively associates with increased odds for stress, and moderately associates with anxiety and depression. This suggests that housing discrimination is likely a stressor among those already at risk of housing instability while for those discriminated the risk of housing instability exacerbates depressive symptoms. These findings appear consistent with psychological research suggesting that perceived discrimination acts as a stressor and discrimination-related stress is linked to depression (American Psychological Association, 2016; Carter et al., 2017; Williams et al., 2019).

Third, when we compare individuals that experienced housing discrimination and are at risk of housing instability against their non-discriminated and securely housed (not at risk) counterparts and adjust for confounding variables noted herein, results show notable disparities. Among the sample population in this study, individuals that experienced housing discrimination and are at risk of housing instability show more than twice as high odds for anxiety, more than three times as high odds for stress, and more than four times as high odds for depression compared to their non-discriminated and securely housed (not at risk) counterparts. This study,

therefore, provides empirical evidence of the combined effects of perceived housing discrimination and housing instability risk on outcomes of mental health for a representative sample of the Wisconsin population and suggests adverse disparities for residents that experienced housing discrimination.

When examining the third hypothesis, adjusted least-square means of fixed effects show that housing discrimination exposure is relevant to individual mental health outcomes by social categories when controlling for confounders. Here I summarize three main findings for each individual outcome of mental health examined in this study. First, perceived housing discrimination exposure significantly increases the odds for stress among individuals that are either female, Non-Hispanic White, between the ages of 35 and 44 or between 55 and 64, completed some college or an associate degree (but did not obtain a bachelor's degree), live with a partner and are not married, earn less than $45,000 in annual household income, or are unemployed. Second, perceived housing discrimination significantly increases the odds for anxiety among individuals that are either female, Non-Hispanic Black, Non-Hispanic White, between the ages of 35 and 44 or between 55 and 64, completed some college or an associate degree but did not obtain a bachelor's degree, earn less than $25,000 or earn more than $100,000 in annual household income, or are unemployed. Third, perceived housing discrimination significantly increases the odds for depression among individuals that are females, Non-Hispanic Black, between the ages of 35 and 44, obtained a graduate degree, married or widowed, earn between $25,000 and $44,999 or over $100,000 in annual household income, or are employed.

Among outstanding findings, results show that females in the sample population that perceived housing discrimination are more than twice likely to have stress and depression and more than three times likely to have anxiety compared to females that did not report perceived

housing discrimination. Notably, females are among the two social categories in this study in which perceived housing discrimination exposure increased the likelihood of all three psychological disorders. Individuals in the sample population exposed to housing discrimination between the ages of 35 and 44 also exhibited high odds for stress and depression (more than three times, respectively) and more than five times the odds for anxiety. Both categories show a higher significance of housing discrimination exposure on the outcome of anxiety. This suggests that experienced housing discrimination can be particularly detrimental to the mental health of females and moderately aged people likely in 'generation X' (born between 1965 and 1976).

Another outstanding finding is the relevant impact of perceived housing discrimination exposure on the mental health outcomes of Non-Hispanic Blacks and Non-Hispanic Whites. The effect of housing discrimination exposure appears more detrimental on the mental health outcomes of Non-Hispanic Blacks because among this group, those that perceived housing discrimination in the sample population exhibit more than five times higher odds for anxiety and more than three times higher odds for depression compared to their non-discriminated counterparts. The effect of housing discrimination on anxiety appears most significant. Among Non-Hispanic Whites, the effect of perceived housing discrimination exposure increases more than twice the odds for stress and roughly 92% the odds for anxiety with higher significance on stress. This suggests that among Non-Hispanic Whites housing discrimination acts more like a stressor while among Non-Hispanic Blacks experienced housing discrimination contributes to more detrimental psychological symptoms. Nevertheless, these findings underscore the influential effect of experienced housing discrimination on the mental health of both Non-Hispanic Blacks and Non-Hispanic Whites.

When examining the fourth hypothesis on whether there are potential differences across social categories among the sample population that were exposed to housing discrimination, results reveal slight differences between females and males and among racial and ethnic categories which I explain more in detail here.

Females in the sample population that experienced housing discrimination appear to have more than twice higher odds for anxiety compared to discriminated males. However, this difference is distinguishable at the 0.1 alpha suggesting moderate statistical differences among discriminated females and males in Wisconsin on the outcome of anxiety. Previous studies suggest that the impact of perceived discrimination on mental health is stronger among females than males (Finch et al., 2000; Hahm et al., 2010). However, a recent longitudinal study (Yang & Sun, 2019) shows that the direct effect of perceived discrimination on self-rated health (a different measure of health) is not statistically different between males and females. Despite mixed findings from previous studies, this study provides some evidence on the potential detrimental effects of experienced housing discrimination on the mental health of women in a representative sample population from Wisconsin.

Non-Hispanic Whites that experienced housing discrimination appear to have higher odds for stress and anxiety compared to discriminated Hispanics and individuals in the "other" racial category (neither Hispanic, Non-Hispanic White or Non-Hispanic Black). The difference might be due to how these groups internalize discriminatory experiences. Previous research suggests that because discrimination is rarer among whites, they may internalize discriminatory experiences different than non-whites (Kessler et al., 1999; Wellman, 2007; Yang & Sun, 2019). According to these studies, perceived discrimination may undermine whites' self-esteem which is tied to the social concept of "white privilege" (Wellman, 2007). In consequence, a decrease in

self-esteem related to discriminatory experiences can trigger higher levels of stress for whites compared to non-whites who have developed strategies for coping with frequent exposure to discrimination and may appear more resilient (Wellman, 2007; Yang & Sun, 2019).

Findings from this study also show that Non-Hispanic Whites and Blacks that perceived housing discrimination exposure are not statistically different on showing either higher or lower odds for stress, anxiety nor depression; rather their likelihood appears comparable when both groups have been exposed to housing discrimination. Two recent studies show similar findings suggesting that the effect of perceived discrimination on self-reported health might be universal regardless of whether individuals are Black or White (Yang & Chen, 2018; Yang & Sun, 2019). Nonetheless, as previously discussed, this study provides substantial evidence to recognize the disparate impacts perceived housing discrimination exposure has on mental health outcomes, particularly when comparing individuals that have been exposed to housing discrimination and those who have no in stratified analyses on social groups in Wisconsin.

When examining whether differences in mental health outcomes are distinguishable by the contrast in the two geographic locations in Wisconsin (Milwaukee metro vs. the rest of the state) for individuals that perceived housing discrimination, results show no statistically significant differences. This is consistent with previous analysis showing that, among residents in both locations that experienced housing discrimination, comparable percentages of the measure of Any SAD were reported. For instance, among individuals in the Milwaukee metro that reported perceived housing discrimination, 17.5% (95% CI [9.2%, 25.8%]) met the conditions for Any SAD. In comparison, 14.2% (95% CI [9.7%, 18.8%]) that reported perceived housing discrimination and reside elsewhere in Wisconsin met the conditions for Any SAD. Therefore,

these findings suggest that the impact of housing discrimination on mental health might be widespread regardless of the location.

This study also adds context with regards to the five years after the Great Recession, a relevant timeframe in which the state also received a somewhat intensified amount of housing discrimination complaints peaking in 2011. The reported presence of Any SAD, particularly stress, also varied through the years with slightly higher percentages from 2009 to 2011. Adjusted logistic regression models reveal that the association between housing discrimination exposure and Any SAD, and individual outcomes of SAD, are statistically significant from 2009 to 2011 but not for the subsequent years up to 2013 except for the outcome of stress. These findings suggest that the observed association between housing discrimination exposure and the outcomes of SAD are sensitive to the timing of the sample collected and potentially influenced by the Great Recession. It is important to note that during the three years after the Great Recession, the housing market in Wisconsin was struggling to recover due to high levels of unemployment and major changes in housing occupancy from ownership to rental in some of the state's most populated cities (Cancel Martinez et al., 2018). Unemployment and associated financial hardship are strongly associated with poor self-reported general health status and outcomes of mental health (Bentley et al., 2012; Tucker-Seeley et al., 2013). However, as shown in this study, housing discrimination contributes to unfavorable outcomes of mental health right after the Great Recession (2009-2011) and associates with stress through the timeframe of this study (2009-2013) even after controlling for socioeconomic factors such as unemployment, household income and self-reported fair/poor general health status.

Lastly, this study suggests potential long-term impacts of perceived housing discrimination on the mental health of residents and that the experience of discrimination might

precede the outcomes of mental health based on how the survey questions were posed. For instance, the framing of the housing discrimination question in the SHOW suggests that discrimination is something that occurred sometime during an individual's life course. In comparison, the questions about psychological symptoms of stress, anxiety and depression are based on recent experiences over the past week (prior to completing the SHOW questionnaire).[39] Therefore, even though data for this study were collected from 2009 to 2013, the measure of perceived housing discrimination encompass a broader timeframe and suggests an experience preceding the associated outcomes of mental health, particularly stress.

The order between housing discrimination exposure and mental health outcomes, with discrimination preceding the psychological disorder, has been recorded in other recent studies (Lewis et al., 2015; Yang & Chen, 2018) suggesting that stress, anxiety and depression are more likely a consequence rather than a cause of perceived housing discrimination. A recent study by Yang and Sun (2019) revealed similar observations on the potential long-term effects of experienced discrimination on self-rated health, based on longitudinal data at the national level. Individuals that experienced high levels of discrimination were less likely to report good overall health status 10 years later, controlling for socioenvironmental factors (Yang & Sun, 2019). Nevertheless, more studies should confirm the directionality of perceived housing discrimination and outcomes of mental health with longitudinal data in Wisconsin and elsewhere.

[39] The housing discrimination question in the SHOW is presented as follows: "Have you ever felt unfairly treated in getting housing or finding a place to live? (*For example, you were prevented from renting or buying a home in the neighborhood you wanted or were prevented from remaining in a neighborhood because neighbors made life so uncomfortable?*)." The premise "have you ever" implies a wide timeframe.

6.4.1. Limitations

This study has several limitations. First, this is a cross-sectional study relying on self-reported measures from interviews and questionnaires, most of which are subjective and non-exhaustive. For example, the measure of self-reported perceived housing discrimination over the life course obtained from the SHOW is subjective and does not explicitly capture the number of discriminatory events and the time these occurred. Also, the indicators of psychological disorders of stress, anxiety and depression, rely on dichotomized self-reported measures denoting the presence or absence of any level above normal. Therefore, there is some potential data loss. Second, this study focuses on the state of Wisconsin with additional comparisons between the Milwaukee metropolitan area and the rest of the state. While the state and Milwaukee metro population are typical of others in the mid-west and rustbelt (Council of State Governments, 2011), findings may not be generalizable to other populations. Third, the sample size of individuals that reported perceived housing discrimination is small and this variable may not account for much of the variation in the odds for stress, anxiety, and depression among subgroups. Therefore, it is likely that among some subgroups, the difference in population means, if any, is not large enough to be detected with the given sample size under fixed effects. Lastly, while this study suggests that the relationship between perceived housing discrimination and both combined and induvial outcomes of mental health are significant, based on robust analysis, one should be cautious to infer causality. Despite these limitations, findings from this study support previous research suggesting housing discrimination as a social determinant of health (Krieger, 2012; Yang et al., 2016; McClure et al., 2019).

6.5. Conclusion

6.5.1. Study contributions and future research

This study documents experienced housing discrimination in Wisconsin based on housing discrimination and survey data. Results show statistical evidence of the effects of housing discrimination exposure on the outcomes of stress, anxiety and depression, as indicators of psychological disorders, in a representative sample of the Wisconsin population right after the Great Recession. This study also provides context on the potential combined effects of experienced housing discrimination and residential conditions on psychological disorders. Lastly, this study illuminates our understanding of the potential effects of housing discrimination exposure on mental health outcomes in individuals by social categories and by two geographic locations in Wisconsin.

Findings from this study contribute to the research literature in several ways. First, this study suggests that housing discrimination exposure through the life course significantly increases the likelihood of stress, anxiety and depression. Second, this study suggests that housing discrimination exposure likely contributes to stress among individuals living in higher quality residential environments while the exposure alone may not contribute to changes in psychological outcomes among individuals in lower-quality residential environments. Third, this study shows the potential combined effects of housing discrimination exposure and housing instability risk on the outcomes of stress and depression. Fourth, this study shows that housing discrimination exposure disproportionally impacts women and Non-Hispanic Blacks in Wisconsin by exacerbating their likelihood of psychological disorders, particularly anxiety. Findings also suggest that housing discrimination is relevant on increasing the likelihood for psychological outcomes among a variety of other subgroups including Non-Hispanic Whites,

people moderately aged (between 35 and 44 year old), matures (between 55 and 64 year old), individuals earning under $45,000 and individuals earning over $100,000, employed and unemployed, married and non-married, and people with some college or an associate degree. Lastly, while this study finds that the impact of housing discrimination on mental health might be widespread across the state of Wisconsin, this study also adds new evidence on the disparate effects housing discrimination exposure, compared to non-exposure, has on increasing the likelihood of psychological outcomes among residents outside the Milwaukee Metro which are areas less populated and more rural.

While this study provides important social and geographical context on the relevance housing discrimination exposure has on mental health outcomes in Wisconsin, additional research should examine the potential impact of housing discrimination exposure on mental health in the state at smaller geographical units (e.g., county, census tract) when a larger sample size is made available. Research in Philadelphia and Detroit recently unveiled important relationships between discrimination and health outcomes at smaller geographical units (Yang 2016; McClure 2019). However, research in Wisconsin is limited.

Additional research, currently underway, will explore the potential combined effects of perceived housing discrimination exposure and historical housing discrimination using 20th-century racial segregation (red-lining) maps from five Wisconsin cities including Madison, Milwaukee, Racine, Kenosha and Oshkosh. The study will attempt to find whether recent self-reported health outcomes could be attributed to both perceived and historical forms of housing discrimination in these cities while also considering residential and socioeconomic factors. This will provide an in-depth angle of the potential long-term impacts of housing discrimination in Wisconsin and complement empirical statistical analysis performed at the state level.

Lastly, future research should replicate this study using more recent data and compare whether the association between perceived housing discrimination exposure and mental health outcomes vary. For instance, this study finds that the association between housing discrimination exposure and mental health is stronger among the sample population that participated closer to the Great Recession and less significant among those that participated roughly four years post-Recession. Researchers such as Williams and Mohammed (2009) suggest that studies examining discrimination should also consider potential outstanding events likely affecting large populations. Recessions and substantial changes in politics and polices could associate with hostility against certain social groups (Williams & Medlock, 2017; Leventhal et al., 2018). With recent changes in politics (e.g., the 2016 presidential election and the 2018 state elections) and housing policy at the federal (e.g., the 2015 AFFH rule) and state level (e.g., the 2017 Wisconsin Act 317), understanding the extent perceived housing discrimination associates with disparities in health outcomes is imperative to help advance equitable housing and health policies.[40]

6.5.2. Policy implications

As we ponder on the Fair Housing Act, enacted over 50 years ago, and recent declarations of racism as a public health crisis in Wisconsin, some policy implications can be drawn from this study. First and foremost, the fact that housing discrimination prevails in the state and contributes to disparities in mental health outcomes is an extensive health equity problem. This means that in Wisconsin not everyone has equal opportunities to be healthy.

[40] Wisconsin Act 317 enacted in 2017 amends the landlord-tenant law (Wis. Stat. section 704.07) to allow additional screening of tenants, including background check, credit worthiness, evictions filings publicly available in the state court system among other amendments.

Therefore, the state needs to advance interventions that meaningfully raise awareness of underlying sources of disparities and remove obstacles to housing and health.

In 2018, the WPHA declared racism, a form of discrimination, as a long-term public health threat requiring large-scale solutions (Wisconsin Public Health Association, 2018). A year later, Milwaukee County became the first county in the nation to declare racism as a public health emergency and as a "cause of persistent racial discrimination in housing … and as a social determinant of health" (Abele & Nicholson, 2019). Both declarations include a list of resolutions, and among these, a call for public policy advocacy and on building partnerships with other organizations to bring awareness on racism as a public health threat. While these declarations and their accompanying resolutions are groundbreaking, this study shows that perceived discrimination not only affects individuals based on their racial construct (racism) but also impacts people by their gender, age, income, education, employment, marital status, and residential conditions. Therefore, raising awareness on discrimination as a widespread problem encompassing race, gender and other social characteristics, and not specific to urban areas but also spread across sub-urbanities and rural communities outside the Milwaukee metro, may help address underlying sources of disparate outcomes and promote inclusive interventions to address both housing and health inequities. Interventions should also raise awareness of historical and current discriminatory experiences limiting residential and health improvements (McClure et al., 2019).

Housing discrimination is particularly relevant because a home is essential for the quality of life, health and economic prosperity at the individual, neighborhood and population level (Shaw, 2004; Cohen, 2011; Krieger, 2012; Desmond, 2016; Mehdipanah et al., 2018). As shown in this study, when perceived housing discrimination is combined with housing instability risk,

the impact on mental health is disproportional by increasing the odds of anxiety and depression for women and African Americans. Perceived housing discrimination has also detrimental effects on stress among individuals residing in higher-quality housing and neighborhoods. These findings add to the research literature underscoring the relevancy of housing discrimination as a stressor, an agent of anxiety and depression, and more importantly as a contributor to disparities in mental health.

As Greenberg et al. (2016) note, the disparate impact housing discrimination is a violation of the federal Fair Housing Act because experienced housing discrimination is disproportionately impacting residents by exacerbating their likelihood of poor mental health. Therefore, addressing historical and ongoing housing discrimination will require using an equity approach combining the concepts of health equity and equity planning. Health equity involves focused efforts to address avoidable social inequalities by emphasizing conditions for improving everyone's health, especially those who have experienced socioeconomic disadvantage or historical injustices (Braveman & Gruskin, 2003; Corburn, 2017). Equity planning involves adopting activist roles to advance an egalitarian redistribution of resources (Krumholz, 1982; Zapata & Bates, 2015). This includes developing and implementing interventions allowing equitable access to housing and eliminating discrimination. In Wisconsin, allowing a meaningful implementation of the Fair Housing Act and subsequent policies such as the 2015 AFFH rule is critically important especially now when the objectives of the Fair Housing Act are in jeopardy. As previously noted, the Fair Housing Act prohibits discrimination and requires the federal government to affirmatively advance fair housing. The AFFH rule lays out the process on how states and municipalities across the nation should advance their fair housing mandate, including, addressing disparate outcomes resulting from housing discrimination (O'Regan & Zimmerman,

2019). However, the nation and the state of Wisconsin faces serious challenges to enforce the Fair Housing Act and abide by the AFFH rule. For instance, the Wisconsin Open Housing Law's lack of substantial equivalency with the Fair Housing Act constitutes a barrier to access necessary resources to mitigate, and more importantly, eliminate housing discrimination (Wisconsin, 2015). Also, delays and recently proposed changes to AFFH rule implementation attempts to roll-back requirements to comprehensively assess the impact of housing discrimination and reduce disparities in housing-related outcomes (O'Regan, 2019). Therefore, reviewing the state's statute to allow meaningful implementation of the Fair Housing Act and taking long-overdue steps to mitigate the legacy of housing discrimination by understanding and addressing housing-related disparities are ways to advance health equity.

6.6. References

Abele, C., & Nicholson, M. (2019). *Resolution 19-397: Requesting approval to recognize April 1-7 as National Public Health Week and supporting Milwaukee county's commitment to achieve racial equity and transform systems and institutions impacting the health of our community*. County Legislative Information Center Milwaukee County Board of Supervisors Retrieved from https://milwaukeecounty.legistar.com/LegislationDetail.aspx?ID=3915601&GUID=107F6551-8B82-45A8-A870-9B7516DD81AD.

Acevedo-Garcia, D., & Lochner, K. (2003). Residential segregation and health. In I. Kawachi & L. F. Berkman (Eds.), *Neighborhoods and health* (pp. 265–281.). New York: Oxford University Press.

American Psychological Association. (2016). *Stress in America: The impact of discrimination*. Retrieved from https://www.apa.org/news/press/releases/stress/2015/impact-of-discrimination.pdf

Anderson, K. F. (2013). Diagnosing discrimination: Stress from perceived racism and the mental and physical health effects. *Sociological Inquiry, 83*(1), 55-81.

Benner, A. D., Wang, Y. J., Shen, Y. S., Boyle, A. E., Polk, R., & Cheng, Y. P. (2018). Racial/ethnic discrimination and well-being during adolescence: A meta-analytic review. *American Psychologist, 73*(7), 855-883.

Bentley, R., Baker, E., & Mason, K. (2012). Cumulative exposure to poor housing affordability and its association with mental health in men and women. *J Epidemiol Community Health, 66*(9), 761-766.

Blank, R. M., Dabady, M., & Citro, C. F. (2004). Causal inference and the assessment of racial discrimination *Measuring racial discrimination*. Washington, DC: The National Academies Press.

Braveman, P., & Gruskin, S. (2003). Defining equity in health. *J Epidemiol Community Health, 57*(4), 254-258.

Cancel Martinez, Y., Peterangelo, J., & Henken, R. (2018). *The cost of living: Milwaukee county's rental housing trends and challenges*. Retrieved from https://wispolicyforum.org/research/the-cost-of-living-milwaukee-countys-rental-housing-trends-and-challenges/

Carter, R. T., Lau, M. Y., Johnson, V., & Kirkinis, K. (2017). Racial discrimination and health outcomes among racial/ethnic minorities: A meta-analytic review. *Journal of Multicultural Counseling and Development, 45*(4), 232-259.

Clark, J., & Kearns, A. (2012). Housing improvements, perceived housing quality and psychosocial benefits from the home. *Housing Studies, 27*(7), 915-939.

Cohen, R. (2011). *The impacts of affordable housing on health: A research summary*.

Colen, C. G., Ramey, D. M., Cooksey, E. C., & Williams, D. R. (2018). Racial disparities in health among nonpoor African Americans and Hispanics: The role of acute and chronic discrimination. *Social Science & Medicine, 199*, 167-180.

Corburn, J. (2017). Urban place and health equity: Critical issues and practices. *Int J Environ Res Public Health, 14*(2).

Council of State Governments. (2011). *In search of growth: An economic checkup of the midwestern states*. Retrieved from https://www.csgmidwest.org/publications/documents/insearchofgrowth.pdf

Desmond, M. (2016). *Evicted: Poverty and profit in the American city*. New York: Crown.

Desmond, M., & Kimbro, R. T. (2015). Eviction's fallout: Housing, hardship, and health. *Social Forces*.

Fair Housing Act, Pub. L. No. 90-448 (1968).

Finch, B. K., Kolody, B., & Vega, W. A. (2000). Perceived discrimination and depression among Mexican-origin adults in California. *Journal of Health and Social Behavior, 41*(3), 295-313.

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Galea, S. (2017). Crying "crisis". Retrieved from https://www.bu.edu/sph/2017/04/23/crying-crisis/, 2017

Gayman, M. D., & Barragan, J. (2013). Multiple perceived reasons for major discrimination and depression. *Society and Mental Health, 3*(3), 203-220.

Gee, G. C., Spencer, M. S., Chen, J., & Takeuchi, D. (2007). A nationwide study of discrimination and chronic health conditions among Asian Americans. *American Journal of Public Health, 97*(7), 1275-1282.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Grollman, E. A. (2014). Multiple disadvantaged statuses and health: The role of multiple forms of discrimination. *Journal of Health and Social Behavior, 55*(1), 3.

Hahm, H. C., Ozonoff, A., Gaumond, J., & Sue, S. (2010). Perceived discrimination and health outcomes: A gender comparison among Asian-Americans nationwide. *Women's Health Issues, 20*(5), 350-358.

Hale, L., Hill, T. D., Friedman, E., Nieto, F. J., Galvao, L. W., Engelman, C. D., Malecki, K. M. C., & Peppard, P. E. (2013). Perceived neighborhood quality, sleep quality, and health status: Evidence from the Survey of the Health of Wisconsin. *Social Science & Medicine, 79*, 16-22.

Kessler, R. C., Mickelson, K. D., & Williams, D. R. (1999). The prevalence, distribution, and mental health correlates of perceived discrimination in the united states. *Journal of Health and Social Behavior, 40*(3), 208-230.

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health, 102*(5), 936-944.

Krumholz, N. (1982). A retrospective view of equity in planning: Cleveland 1969-1979. *Journal of the American Planning Association, 48*(2), 163-183.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American community survey. *Cityscape, 21*(1), 63-85.

Lee, D. K. (2016). Alternatives to p-value: Confidence interval and effect size. *Korean Journal of anesthesiology, 69*(6), 555-562.

Leventhal, A., Cho, J., Andrabi, N., & Barrington-Trimis, J. (2018). Association of reported concern over increasing societal discrimination and adverse behavioral health outcomes in late adolescence, 2016–2017. *Jama, 172*, 924-933.

Lewis, T. T., Cogburn, C. D., & Williams, D. R. (2015). Self-reported experiences of discrimination and health: Scientific advances, ongoing controversies, and emerging issues. In T. D. Cannon & T. Widiger (Eds.), *Annual review of clinical psychology, vol 11* (Vol. 11, pp. 407-440).

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior, 35*, 80-94.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scale*. Retrieved from http://trove.nla.gov.au/work/30421447

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass*. Cambridge, MA: Harvard Univ. Press.

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

Mehdipanah, R., Ramirez, J., Abedin, S., & F. Brown, S. (2018). Housing discrimination and health: Understanding potential linking pathways using a mixed-methods approach. *Social Sciences, 7*(10), 194.

Milwaukee Fair Housing Council. (2016). *Housing discrimination complaints filed: 2008-2016*.

Nieto, F. J., Peppard, P. E., Engelman, C. D., McElroy, J. A., Galvao, L. W., Friedman, E. M., Bersch, A. J., & Malecki, K. C. (2010). The Survey of the Health of Wisconsin (SHOW), a novel infrastructure for population health research: Rationale and methods. *BMC Public Health, 10*(1), 785.

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The Fair Housing Act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Open Housing Law, Wisconsin Statute § 106.50 (1968, 2015).

Osypuk, T. L., & Acevedo-Garcia, D. (2010). Beyond individual neighborhoods: A geography of opportunity perspective for understanding racial/ethnic health disparities. *Health & Place, 16*(6), 1113-1123.

Pager, D., & Shepherd, H. (2008). The sociology of discrimination: Racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol, 34*, 181-209.

Pollack, C. E., Griffin, B. A., & Lynch, J. (2010). Housing affordability and health among homeowners and renters. *American Journal of Preventive Medicine, 39*(6), 515-521.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rao, J., & Scott, A. J. (1981). The analysis of categorical data from complex surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association, 76*, 221–230.

Rao, J., & Scott, A. J. (1987). On simple adjustments to chi-square tests with survey data. *The Annals of Statistics, 15*, 385–397.

Rollins, C., Glass, N. E., Perrin, N. A., Billhardt, K. A., Clough, A., Barnes, J., Hanson, G. C., & Bloom, T. L. (2012). Housing instability is as strong a predictor of poor health outcomes as level of danger in an abusive relationship: Findings from the share study. *Journal of Interpersonal Violence, 27*(4), 623-643.

Rosenblatt, P., & Cossyleon, J. E. (2018). Pushing the boundaries: Searching for housing in the most segregated metropolis in America. *City & Community, 17*(1), 87-108.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America* (First Edition). New York: Liveright Publishing Corporation.

Sampson, R. J. (2019). Neighbourhood effects and beyond: Explaining the paradoxes of inequality in the changing American metropolis. *Urban Studies, 56*(1), 3-32.

SAS Institute. (2019). The logistic procedure: Rank correlation of observed responses and predicted probabilities. Retrieved from https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_logistic_sect042.htm.

Sawyer, P. J., Major, B., Casad, B. J., Townsend, S. S. M., & Mendes, W. B. (2012). Discrimination and the stress response: Psychological and physiological consequences of anticipating prejudice in interethnic interactions. *American Journal of Public Health, 102*(5), 1020-1026.

Schreiber-Gregory, D. (2017). *Multicollinearity: What is it, why should we care, and how can it be controlled?* Paper presented at the SAS Support.

Shaw, M. (2004). Housing and public health. *Annual Review of Public Health, 25*, 397-418.

Slade-Sawyer, P. (2014). Is health determined by genetic code or zip code? Measuring the health of groups and improving population health. *N C Med J, 75*(6), 394-397.

State of Wisconsin. (2016). *Fair housing discrimination complaints filed*. Wisconsin Civil Rights Bureau.

Suglia, S. F., Duarte, C. S., & Sandel, M. T. (2011). Housing quality, housing instability, and maternal mental health. *Journal of Urban Health-Bulletin of the New York Academy of Medicine, 88*(6), 1105-1116.

Tran, T. D., Tran, T., & Fisher, J. (2013). Validation of the depression anxiety stress scales (dass) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *Bmc Psychiatry, 13*, 24-24.

Tucker-Seeley, R. D., Harley, A. E., Stoddard, A. M., & Sorensen, G. G. (2013). Financial hardship and self-rated health among low-income housing residents. *Health Education & Behavior, 40*(4), 442-448.

U.S. Government Accountability Office. (2010). *Housing and community grants: Hud needs to enhance its requirements and oversight of jurisdictions' fair housing plans*. Retrieved from www.gao.gov/new.items/d10905.pdf.

US Department of Housing and Urban Development. (2017). *Fair housing violation complaints filed in Wisconsin: 2008-2016*.

US Department of Housing and Urban Development. (2018a). Affirmatively furthering fair housing: Extension of deadline for submission of assessment of fair housing for consolidated plan participants *83 FR 683* (pp. 683-685). Federal Register: Office of the Federal Register.

US Department of Housing and Urban Development. (2018b). Affirmatively furthering fair housing: Streamlining and enhancements *83 FR 40713* (pp. 40713-40715). Federal Register: Office of the Federal Register.

Wellman, D. (2007). Unconscious racism, social cognition theory, and the legal intent doctrine: The neuron fires next time. In H. Vera & J. R. Feagin (Eds.), *Handbook of the sociology of racial and ethnic relations* (pp. 39-65).

WHO. (2017). Social determinants of health: What are social determinants of health? Retrieved from http://www.who.int/social_determinants/sdh_definition/en/.

Williams, D. R., Lawrence, J. A., & Davis, B. A. (2019). Racism and health: Evidence and needed research. In J. E. Fielding (Ed.), *Annual review of public health, vol 40* (Vol. 40, pp. 105-125).

Williams, D. R., & Medlock, M. M. (2017). Health effects of dramatic societal events - ramifications of the recent presidential election. *New England Journal of Medicine, 376*(23), 2295-2299.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/ethnic discrimination and health: Findings from community studies. *American Journal of Public Health, 93*(2), 200-208.

Williams, D. R., Yan, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socioeconomic status, stress and discrimination. *J Health Psychol, 2*(3), 335-351.

Williams, M., & Seicshnaydre, S. (2017). The legacy and promise of disparate impact. In G. Squires (Ed.), *The fight for fair housing: Causes, consequences, and future implications of the 1968 federal Fair Housing Act*. New York, NY: Routledge.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Wisconsin Public Health Association. (2018). *2018 resolution: Racism is a public health crisis*. Retrieved from Wisconsin Public Health Association: https://cdn.ymaws.com/www.wpha.org/resource/resmgr/2018_folder/WPHA_Racial_Equity_Resolutio.pdf

Yang, T. C., Chen, D., & Park, K. (2016). Perceived housing discrimination and self-reported health: How do neighborhood features matter? *Annals of behavioral medicine: a publication of the Society of Behavioral Medicine, 50*(6), 789-801.

Yang, T. C., & Chen, D. H. (2018). A multi-group path analysis of the relationship between perceived racial discrimination and self-rated stress: How does it vary across racial/ethnic groups? *Ethnicity & Health, 23*(3), 249-275.

Yang, T. C., Chen, I. C., Kim, S., & Choi, S. W. (2018). Differential investments and opportunities: How do neighborhood conditions moderate the relationship between perceived housing discrimination and social capital? *Social Science Research, 72*, 69-83.

Yang, T. C., & Sun, F. N. (2019). A longitudinal analysis of how perceived discrimination gets under the skin: Investigating gender and racial/ethnic differences. *Euramerica*, *49*(2), 243-285.

Yen, I. H., Michael, Y. L., & Perdue, L. (2009). Neighborhood environment in studies of health of older adults a systematic review. *American Journal of Preventive Medicine*, *37*(5), 455-463.

Zapata, M. A., & Bates, L. K. (2015). Equity planning revisited. *Journal of Planning Education and Research*, *35*(3), 245-248.

Zhou, Y. H., Bemanian, A., & Beyer, K. M. M. (2017). Housing discrimination, residential racial segregation, and colorectal cancer survival in Southeastern Wisconsin. *Cancer Epidemiology Biomarkers & Prevention*, *26*(4), 561-568.

6.7. Tables

Table 6.1. Mental health indicators and life shocks by geographic levels

Characteristics	Category	Code	Wisconsin (N = 2,704) [1] % (SE)	Milwaukee Metro (N = 559)[1] % (SE)
Individual Mental Health Indicators				
Stress	None	0	88.2 (0.9)	88.9 (1.7)
	Any	1	11.8 (0.9)	11.1 (1.7)
Anxiety	None	0	89.4 (0.8)	88.2 (1.8)
	Any	1	10.6 (0.8)	11.8 (1.8)
Depression	None	0	82.9 (1.2)	80.2 (2.8)
	Any	1	17.1 (1.2)	19.8 (2.8)
Combined Mental Health Indicator				
Any SAD[2]	No	0	78.0 (1.2)	76.3 (2.8)
	Yes	1	22.0 (1.2)	23.7 (2.8)
General Health Status				
Fair/poor general health	No	0	89.3 (0.8)	87.4 (1.7)
	Yes	1	10.7 (0.8)	12.6 (1.7)
Life Shock				
Recent death in the family or friends	No	0	75.0 (1.4)	74.0 (3.6)
	Yes	1	25.0 (1.4)	26.0 (3.6)

[1.] Data from the Survey of the Health of Wisconsin (2009-2013) weighted to the Wisconsin population at each corresponding geographical level, at T2.
[2.] Presence of any stress, anxiety or depression condition based on binary-coded DASS-42 (Lovibond & Lovibond, 1995)

Table 6.2. Perceived housing discrimination and health indicators by geographic level

		Housing discrimination exposure, *weighted*[1]							
		Wisconsin				Milwaukee Metro			
Measures	Categories	% Yes (SE) N=187	% No (SE) N=2,517	ChiSq (Y vs. N)		% Yes (SE) N=67	% No (SE) N=490	ChiSq (Y vs. N)	
Individual Mental Health Indicators									
Stress	**Any**	**27.6 (4.7)**	**10.4 (0.8)**	**28.3**	*******	**20.7 (5.2)**	**10.1 (1.9)**	**5.0**	*****
	None	72.4 (4.7)	89.6 (0.8)			79.3 (5.2)	89.9 (1.9)		
Anxiety	**Any**	**28.3 (3.8)**	**8.9 (0.7)**	**55.5**	*******	**28.5 (6.0)**	**9.9 (1.9)**	**13.6**	*******
	None	71.7 (3.8)	91.1 (0.7)			71.5 (6.0)	90.1 (1.9)		
Depression	**Any**	**36.2 (5.0)**	**15.4 (1.0)**	**30.9**	*******	**31.4 (7.0)**	**18.0 (2.8)**	**3.6**	**ᵗ**
	None	63.8 (5.0)	84.6 (1.0)			68.6 (7.0)	82.0 (2.8)		
Combined Mental Health Indicator									
Any SAD[2]	**Yes**	**44.3 (5.0)**	**20.1 (1.1)**	35.4	***	**41.1 (7.5)**	**21.3 (2.9)**	7.0	**
	No	55.7 (5.0)	79.9 (1.1)			58.9 (7.5)	78.7 (2.9)		
General Health status									
Fair/poor general health	**Yes**	**23.0 (3.5)**	**9.7 (0.8)**	24.1	***	**24.0 (5.6)**	**11.0 (1.7)**	7.1	**
	No	77.0 (3.5)	90.3 (0.8)			76.0 (5.6)	89.0 (1.7)		
Life Shock									
Recent death in the family or friends	**Yes**	**32.7 (4.7)**	**24.3 (1.5)**	3.8		**37.1 (9.4)**	**24.9 (3.8)**	2.0	
	No	67.3 (4.7)	75.7 (1.5)			62.9 (9.4)	75.1 (3.8)		

ᵗ *p <0.1*

* p < 0.05

** p < 0.01

***p <0.001

1. Data from the Survey of the Health of Wisconsin (2009-2013) weighted to the Wisconsin population, T2. Values in bold shows presence of the condition.

2. Presence of any stress, anxiety or depression based on the 42-DASS (Lovibond & Lovibond, 1995).

Table 6.3. Summarized logistic regression results for Any SAD

	Model 1[1]		Model 2[1]		Model 3[1]		Model 4[1]	
Measures of interest	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure[2]	2.05**	1.24-3.37	2.04**	1.24-3.37	1.92*	1.14-3.23	1.58*	1.05-2.39
Milwaukee Metro[3]			1.16	0.77-1.73	1.13	0.75-1.72	1.15	0.77-1.72
Low residential quality[4]					1.49*	1.08-2.04	1.53*	1.11-2.11
At risk of housing instability[5]							1.95***	1.40-2.73
N		2,564		2,564		2,564		2,564
AIC		16,334,809		16,325,882		16,265,124		16,111,500
Likelihood Ratio		12.04		11.52		11.44		11.89
Rank correlation index		0.708		0.707		0.712		0.716

***p < 0.001

** p < 0.01

* p < 0.5

1. Models weighted to the Wisconsin population at T2 for any level of stress, anxiety or depression (Any SAD) based on the DASS-42 (Lovibond & Lovibond, 1995).

2. Self-reported perceived housing discrimination exposure vs. non-exposure.

3. Milwaukee metro vs. the rest of the state.

4. Residential quality based on the dichotomous immediate built environment (IBE) index, moderate-high vs. low.

5. Meets at least one residential mobility measure and indicated any level of financial stress

Note: All models adjust for individual SES characteristics including gender, age, education level, race/ethnicity citizenship, marital status, household income, unemployment, general health status and life shock based on a recent death in the family or close friends.

Table 6.4. Summarized logistic regression results for Stress, Anxiety and Depression

		Stress[1]		**Anxiety[1]**		**Depression[1]**	
Model	**Measures of interest**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
1	**Housing discrimination exposure[2]**	**2.28****	**1.29-4.04**	**2.31****	**1.40-3.82**	**2.15****	**1.22-3.78**
2	**Housing discrimination exposure[2]**	**2.29****	**1.29-4.07**	**2.31****	**1.39-3.83**	**2.13****	**1.20-3.77**
	Milwaukee Metro[3]	0.90	0.60-1.35	1.06	0.69-1.63	1.41	0.89-2.22
3	**Housing discrimination exposure[2]**	**2.21****	**1.21-4.04**	**2.09****	**1.24-3.52**	**2.04***	**1.13-3.67**
	Milwaukee Metro[3]	0.89	0.59-1.34	1.01	0.66-1.54	1.39	0.87-2.22
	Low residential quality[4]	1.21	0.79-1.87	1.73**	1.18-2.55	1.30	0.90-1.89
4	**Housing discrimination exposure[2]**	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
	Milwaukee Metro[3]	0.89	0.59-1.34	1.01	0.66-1.54	1.40	0.89-2.20
	Low residential quality[4]	1.23	0.81-1.88	1.75**	1.18-2.58	1.34	0.93-1.93
	At risk of housing instability[5]	1.51[t]	0.99-2.32	1.29	0.80-2.10	1.96***	1.33-2.87

***p < 0.001

** p < 0.01

* p < 0.5

[t] p < 0.1

1. Models weighted to the Wisconsin population at T2. Sample size for models N=2,564.

2. Self-reported perceived housing discrimination exposure vs. non-exposure.

3. Milwaukee metro vs. the rest of the state.

4. Residential quality based on the dichotomous immediate built environment (IBE) index, low vs. moderate-high.

5. Meets at least one residential mobility measure and indicated any level of financial stress

Note: All models adjust for individual SES characteristics including gender, age, education level, race/ethnicity citizenship, marital status, household income, unemployment, general health status and life shock based on a recent death in the family or close friends.

Table 6.5. Summarized fixed effects models for stress, anxiety and depression by gender and racial ethnic construct categories

		Any SAD[1] (N=2,570)		Stress[1] (N=2,570)		Anxiety[1] (N=2,568)		Depression[1] (N=2,570)	
Model	**Measures of interest**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	**1.58***	**1.05-2.39**	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
Gender interaction model	Male*HDE (1|0)	1.37	0.71-2.61	1.99	0.94-4.20	1.22	0.57-2.61	1.58	0.82-3.05
	Female*HDE (1|0)	2.12*	1.18-3.81	2.15*	1.17-3.93	3.15***	1.69-5.86	2.09*	1.09-4.02
	HDE*(female|male)	1.28	0.63-2.58	1.07	0.54-2.09	2.44[t]	0.98-6.08	0.90	0.46-1.77
	Non-HDE*(female|male)	0.82	0.63-1.07	0.99	0.69-1.42	0.95	0.63-1.42	0.68**	0.52-0.90
Race and ethnicity Interaction model	Non-Hispanic White(NHW)*HDE(1|0)	1.46	0.78-2.72	2.40**	1.25-4.63	1.92*	1.06-3.48	1.81[t]	0.95-3.47
	Non-Hispanic Black(NHB)*HDE (1|0)	7.50***	2.60-21.6	2.50	0.74-8.40	5.77**	1.81-18.4	3.54*	1.14-11.0
	Hispanic(H)*HDE (1|0)	0.45	0.07-3.03	0.33	0.04-2.57	0.26	0.02-2.78	0.71	0.08-5.94
	Other(O)*HDE (1|0)	1.02	0.20-5.14	1.00	0.18-5.56	0.68	0.08-5.47	1.05	0.17-6.42
	HDE*(NHB|NHW)	1.79	0.72-4.46	0.68	0.23-1.97	2.03	0.73-5.70	0.54	0.21-1.44
	HDE*(H|NHW)	0.18	0.03-1.03	0.08**	0.02-0.47	0.09*	0.01-0.62	0.20	0.03-1.34
	HDE*(O|NHW)	0.50	0.11-2.32	0.17*	0.03-0.83	0.11*	0.02-0.76	0.35	0.07-1.76
	HDE (1|0)*(NHB|NHW)	2.61*	1.15-5.92	1.62	0.61-4.33	3.91**	1.51-10.15	0.99	0.39-2.50
	Non-HDE*(NHB|NHW)	0.35**	0.18-0.69	0.65	0.29-1.47	0.68	0.34-1.34	0.28**	0.13-0.60
	Non-HDE*(H|NHW)	0.58	0.20-1.68	0.61	0.17-2.21	0.66	0.14-3.05	0.52	0.16-1.76
	Non-HDE*(O|NHW)	0.71	0.31-1.65	0.40	0.14-1.12	0.31*	0.10-0.92	0.61	0.22-1.66

***p < 0.001

** p < 0.01

* p < 0.05

[t] p < 0.1

[1.] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state. Any SAD indicates the presence of any stress, anxiety or depression above normal.

[2.] Perceived housing discrimination exposure (HDE, self-reported).

Table 6.6. Summarized fixed effects models for stress, anxiety and depression by household income and education level

		Any SAD (N=2,570)[1]		Stress (N=2,570)[1]		Anxiety (N=2,568)[1]		Depression (N=2,570)[1]	
Model	**Measures of interest**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)	**1.58***	**1.05-2.39**	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
Household Income interaction model	(<$25K)*HDE (1|0)	1.58	0.80-3.12	1.85[t]	0.98-3.52	2.45*	1.14-5.24	1.49	0.79-2.82
	($25K-$44.9K)*HDE (1|0)	2.72	0.86-8.57	5.42**	1.58-18.6	1.95	0.59-6.37	4.03*	1.23-13.2
	($45K-$74.9K)*HDE (1|0)	1.03	0.33-3.19	1.62	0.51-5.13	0.99	0.27-3.65	1.08	0.32-3.60
	($75K-$100K)*HDE (1|0)	1.40	0.13-14.9	-	-	-	-	2.11	0.22-20.6
	(>100k)*HDE (1|0)	4.99*	1.33-18.8	1.15	0.12-10.8	6.24[t]	0.96-40.7	3.99*	1.03-15.5
	HDE*(<$25K|>$100K)	0.72	0.17-3.06	4.49	0.46-43.5	1.50	0.21-10.5	1.02	0.24-4.29
	HDE*($25K-$44.9K|>$100K)	0.92	0.18-4.62	5.87	0.47-73.4	0.52	0.06-4.68	1.89	0.39-9.18
	HDE*($45K-$74.9K|>$100K)	0.41	0.07-2.39	3.42	0.28-41.3	0.37	0.04-3.26	0.61	0.10-3.57
	HDE*($75K-$100K|>$100k)	0.35	0.02-5.09	-	-	-	-	0.76	0.06-10.5
	Non-HDE*(<$25K|>$100K)	2.29**	1.34-3.91	2.78*	1.25-6.19	3.82**	1.54-9.51	2.72**	1.48-4.99
	Non-HDE*($25K-$44.9K|>$100K)	1.68*	1.02-2.78	1.24	0.65-2.36	1.66	0.74-3.72	1.87*	1.06-3.32
	Non-HDE*($45K-$74.9K|>$100K)	2.00**	1.31-3.05	2.42***	1.48-3.97	2.31*	1.11-4.78	2.26**	1.26-4.03
	Non-HDE*($75K-$100K|>$100k)	1.25	0.77-2.02	1.51	0.86-2.67	1.14	0.40-3.30	1.44	0.80-2.57
Employment status interaction model	Employed*HDE(1|0)	1.68	0.88-3.20	1.97	0.88-4.44	1.86	0.92-3.77	2.05*	1.02-4.11
	Unemployed*HDE (1|0)	1.71	0.85-3.45	2.22**	1.23-4.03	2.26*	1.11-4.60	1.47	0.76-2.84
	HDE*(Unemployed|Employed)	1.66	0.71-3.88	1.36	0.56-3.29	1.71	0.70-4.17	1.54	0.67-3.54
	Non-HDE*(Unemployed|Employed)	1.63**	1.13-2.36	1.21	0.72-2.02	1.40	0.90-2.18	2.15***	1.41-3.28
Education level interaction model	< HighSchool*HDE (1|0)	1.56	0.54-4.49	0.75	0.25-2.30	1.69	0.55-5.20	1.22	0.47-3.18
	HighSchool/GED*HDE (1|0)	1.22	0.43-3.42	1.64	0.60-4.47	0.87	0.33-2.33	1.39	0.47-4.07
	SomeCol/Assoc.deg*HDE (1|0)	1.57	0.80-3.05	2.91**	1.39-6.10	2.77**	1.35-5.68	1.82	0.89-3.70
	Bachelors' deg*HDE (1|0)	1.80	0.49-6.54	2.21	0.48-10.1	3.76	0.69-20.5	2.56	0.68-9.55
	Graduate deg*HDE(1|0)	10.2***	2.88-36.3	3.08	0.69-13.8	1.13	0.10-13.2	7.24*	1.37-38.4
	HDE*(<HighSchool|Graduate deg)	0.22	0.04-1.21	0.33	0.06-1.86	2.34	0.17-32.3	0.23	0.04-1.55
	HDE*(HighSchool|Graduate deg)	0.16*	0.03-0.81	0.47	0.08-2.71	1.20	0.09-15.3	0.24	0.03-1.73
	HDE*(SomeColAssocDeg|Graduate d)	0.25	0.06-1.05	0.87	0.17-4.45	2.77	0.24-31.9	0.41	0.07-2.35
	HDE*(Bachelors deg|Graguate deg)	0.33	0.05-2.03	0.78	0.11-5.58	4.05	0.25-66.0	0.61	0.07-5.37
	Non-HDE*(<HighSchool|Graduate deg)	1.45	0.73-2.88	1.36	0.59-3.13	1.57	0.57-4.37	1.38	0.65-2.93
	Non-HDE*(HighSchool|Graduate deg)	1.31	0.74-2.31	0.88	0.44-1.77	1.56	0.56-2.30	1.27	0.66-2.45
	Non-HDE*(SomeCol/AssocDeg|Grad d)	1.64*	1.08-2.51	0.92	0.50-1.71	1.13	0.47-2.74	1.63*	1.04-2.57
	Non-HDE*(Bachelors deg|Graduate d)	1.86*	1.16-2.98	1.08	0.55-2.11	1.22	0.45-3.34	1.72[t]	0.99-2.97

***p < 0.001

** $p < 0.01$
* $p < 0.05$
t $p<0.1$
[1.] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state. Any SAD indicates the presence of any stress, anxiety or depression above normal.
[2.] Perceived housing discrimination exposure (HDE, self-reported)

Table 6.7. Summarized fixed effects models for stress, anxiety and depression by age group and marital status categories

		Any SAD (N=2,570)[1]		Stress (N=2,570)[1]		Anxiety (N=2,568)[1]		Depression (N=2,570)[1]	
Model	**Measures of interest**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	**1.58***	**1.05-2.39**	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
Age interaction model	<35 years old*HDE (1|0)	0.93	0.40-2.13	1.45	0.63-3.31	1.10	0.42-2.88	0.87	0.37-2.04
	35-44 years old*HDE (1|0)	3.10*	1.29-7.42	3.65**	1.42-9.35	5.44***	2.52-11.8	3.42*	1.29-9.03
	45-54 years old*HDE (1|0)	1.97	0.79-4.91	1.32	0.47-3.77	1.51	0.55-4.12	1.78	0.71-4.51
	55-64 years old*HDE(1|0)	3.01	0.87-10.4	5.33*	1.48-19.2	3.05	0.77-12.1	4.29*	1.09-16.8
	>64 years old*HDE(1|0)	1.88	0.34-10.4	-	-	4.08	0.39-42.8	2.48	0.47-13.0
	HDE*(<35|>64years old)	1.20	0.17-8.49	-	-	0.66	0.06-7.14	0.54	0.09-3.40
	HDE*(35-44|>64 years old)	4.87	0.75-31.5	-	-	2.28	0.22-23.7	3.43	0.53-22.1
	HDE*(45-54|>64 years old)	2.65	0.42-16.8	-	-	0.88	0.08-10.2	1.80	0.30-10.8
	HDE*(55-64|>64 years old)	2.45	0.33-18.0	-	-	1.36	0.11-17.3	2.29	0.34-15.7
	Non-HDE*(<35|>64years old)	2.45***	1.57-3.81	5.42** *	2.20-13.3	2.44*	1.14-5.25	1.55	0.95-2.53
	Non-HDE*(35-44|>64 years old)	2.96***	1.85-4.74	7.14** *	3.00-17.0	1.71	0.79-3.72	2.50***	1.50-4.14
	Non-HDE*(45-54|>64 years old)	2.53***	1.61-4.00	4.06** *	1.79-9.23	2.37*	1.18-4.77	2.50***	1.56-4.03
	Non-HDE*(55-64|>64 years old)	1.53*	1.01-2.34	2.51*	1.13-5.59	1.82	0.96-3.44	1.33	0.82-2.14
Marital status interaction mode	Married*HDE(1|0)	2.25[t]	0.98-5.16	2.36	0.93-5.97	2.07	0.90-4.76	2.64*	1.09-6.40
	Widowed*HDE (1|0)	5.00	0.55-45.2	0.16	0.01-3.72	1.54	0.05-49.2	8.12*	1.06-61.9
	Divorced/separated*HDE (1|0)	1.34	0.49-3.67	2.10	0.91-4.82	1.86	0.73-4.75	1.50	0.54-4.18
	Single Never Married*HDE (1|0)	1.24	0.53-2.92	1.33	0.47-3.80	2.07	0.78-5.48	1.28	0.56-2.94
	Living w/ Partner*HDE (1|0)	1.85	0.36-9.49	4.04*	1.16-14.1	2.53	0.48-13.4	0.77	0.13-4.61
	HDE*(Widowed | Married)	2.15	0.25-18.7	0.02*	<0.1-0.47	0.36	0.01-11.8	3.26	0.43-24.5
	HDE*(Divorced/separated | Married)	0.87	0.26-2.91	0.85	0.27-2.69	0.86	0.28-2.69	0.85	0.25-2.92
	HDE*(Single Never Married | Married)	0.53	0.17-1.65	0.30	0.09-1.07	0.72	0.24-2.18	0.56	0.18-1.73
	HDE*(Living w/ Partner | Married)	0.55	0.08-3.55	1.61	0.38-6.77	0.56	0.14-2.19	0.19	0.03-1.16
	Non-HDE*(Widowed | Married)	0.96	0.43-2.15	0.29*	0.09-0.93	0.48	0.18-1.28	1.06	0.45-2.49
	Non-HDE*(Divorced/separated | Married)	1.46[t]	0.99-2.15	0.95	0.59-1.54	0.96	0.60-1.54	1.49[t]	0.99-2.25
	Non-HDE*(SingleNeverMarried | Married)	0.96	0.60-1.55	0.54*	0.30-0.96	0.72	0.40-1.28	1.15	0.70-1.90
	Non-HDE*(Living w/ Partner | Married)	0.66	0.32-1.38	0.94	0.42-2.09	0.46	0.16-1.35	0.66	0.27-1.60

***p < 0.001

** $p < 0.01$

* $p < 0.05$

^{t} $p<0.1$

[1.] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state. Any SAD indicates the presence of any stress, anxiety or depression above normal.

[2.] Perceived housing discrimination exposure (HDE, self-reported)

Table 6.8. Summarized fixed-effect models for stress, anxiety and depression by residential categories

		Any SAD (N=2,570)[1]		Stress (N=2,570)[1]		Anxiety (N=2,568)[1]		Depression (N=2,570)[1]	
Model	**Measures of interest**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Base model	Housing discrimination exposure (HDE)[2]	**1.58***	**1.05-2.39**	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
Residential quality interaction model	Medium-high IBE*HDE(1|0)	1.85[t]	0.96-3.55	2.63**	1.37-5.04	2.21*	1.10-4.46	1.95[t]	0.94-4.06
	Low IBE*HDE (1|0)	1.44	0.68-3.06	1.30	0.61-2.80	1.79	0.83-3.84	1.55	0.72-3.32
	HDE*(Low IBE|medium-high IBE)	1.24	0.50-3.09	0.69	0.30-1.57	1.46	0.58-3.71	1.08	0.43-2.72
	Non-HDE*(Low IBE|medium-high IBE)	1.58**	1.12-2.23	1.39	0.89-2.16	1.81**	1.16-2.82	1.37	0.91-2.07
	HDE(1|0)*(Low IBE|MH-IBE)	2.29*	1.16-4.49	1.81	0.91-3.58	3.23**	1.62-6.46	2.12*	1.08-4.17
Housing instability interaction model	No Risk*HDE (1|0)	1.48	0.87-2.49	1.68	0.904	1.91*	1.03-3.52	1.42	0.78-2.56
	At Risk*HDE (1|0)	2.06	0.83-5.10	2.69*	1.08-6.75	2.23[t]	0.96-5.14	2.46[t]	0.96-6.28
	HDE*(risk|no risk)	2.57[t]	1.00-6.62	2.2	0.80-6.02	1.47	0.57-3.78	3.09*	1.20-7.95
	Non-HDE*(risk|no risk)	1.85***	1.30-2.63	1.37	0.88-2.12	1.26	0.74-2.12	1.78*	1.15-2.74
	HDE(1|0)*(risk|no risk)	3.80**	1.60-8.99	3.69**	1.46-9.28	2.80*	1.19-6.54	4.37**	1.84-10.4
Location interaction model	Outside Milwaukee Metro*HDE(1|0)	1.86*	1.04-3.33	2.47**	1.29-4.73	2.42**	1.35-4.33	2.08*	1.11-3.90
	Milwaukee Metro*HDE (1|0)	1.38	0.53-3.62	1.31	0.54-3.18	1.39	0.54-3.58	1.29	0.47-3.55
	HDE*(Milwaukee Metro|Outside MM)	0.88	0.31-2.54	0.51	0.20-1.31	0.63	0.24-1.69	0.92	0.31-2.68
	Non-HDE*(MilwaukeeMetro|OutMM)	1.19	0.78-1.82	0.97	0.62-1.51	1.09	0.68-1.75	1.48	0.92-2.38
	HDE(1|0)*(MilwaukeeMetro|OutMM)	1.63	0.66-4.07	1.27	0.58-2.80	1.52	0.66-3.52	1.91	0.74-4.94

***p < 0.001

** p < 0.01

* p < 0.05

[t] p <0.1

[1.] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state. Any SAD indicates the presence of any stress, anxiety or depression above normal.

[2.] Perceived housing discrimination exposure (HDE, self-reported)

Table 6.9. Multivariate linear regression results for stress, anxiety, depression and combined psychological disorder

Parameter of interest	DASS Sum Score[1]		Stress[1]		Anxiety[1]		Depression[1]	
	Standardized regression coefficient	*Pr* > |*t*|	Standardized regression coefficient	*Pr* > |*t*|	Standardized regression coefficient	*Pr* > |*t*|	Standardized regression coefficient	*Pr* > |*t*|
Housing discrimination exposure	0.132	<0.001	0.130	<0.001	0.121	<0.001	0.108	0.017
N		2,570		2,570		2,568		2,570
R-squared		0.138		0.138		0.206		0.177
Root mean squared error		0.789		0.769		0.768		0.888

Note: DASS Sum Score is based on the sum of individual Depression, Stress, Anxiety Score (DASS) per Lovibond & Lovibond (1995). Stress, anxiety and depression are based on the DASS-z-scores.

[1.] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state.

Table 6.10. Logistic regression results for stress, anxiety, depression and combined psychological disorder, 2009-2011

	Cohort 1: 2009-2011 (N = 1,961)[1]							
	Any SAD		Stress		Anxiety		Depression	
Parameter of interest	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure	1.93*	1.12-3.33	2.27*	1.20-4.30	2.36**	1.31-4.28	2.35**	1.26-4.38
AIC		10,430,306		7,464,718		6,460,247		8,713,877
Likelihood Ratio		7.35		6.07		6.55		10.55
Rank correlation index		0.699		0.733		0.740		0.718

*p <0.05

** p <0.001

[1] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state.

Table 6.11. Logistic regression results for stress, anxiety, depression and combined psychological disorder, 2011-2013

	Cohort 2: 2011-2013 (N =1,615)[1]							
	Any SAD		Stress		Anxiety		Depression	
Parameter of interest	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Housing discrimination exposure	1.57	0.81-3.04	1.94[t]	1.00-3.80	1.51	0.82-2.81	1.59	0.75-3.39
AIC		9,139,142		5,825,787		5,253,419		7,629,136
Likelihood Ratio		8.25		5.84		7.69		8.04
Rank correlation index		0.732		0.757		0.805		0.745

[t] p<0.1

*p <0.05

** p <0.001

[1] Models weighted to the Wisconsin population at T2. All models are adjusted for SES, general health status, life shock, housing instability risk and location. SES include gender, age, education, marital status, citizenship, race/ethnicity, unemployment, income. Life shocks are based on a recent death in the family or close friends. Housing instability risk on a recent move or short residence duration and any perceived financial stress. Residence location is the contrast between the Milwaukee metro and the rest of the state.

6.8. Appendix

Table A.6.1. Diagnostic results for models 1-4, outcomes of stress, anxiety, depression

Model	Diagnostics	Stress	Anxiety	Depression
1	AIC	11,148,193	9,872,032	13,758,183
	Likelihood Ratio	8.71	10.68	12.41
	Rank correlation index	0.729	0.754	0.724
2	AIC	11,145,291	9,871,271	13,717,095
	Likelihood Ratio	8.43	10.31	12.08
	Rank correlation index	0.73	0.754	0.722
3	AIC	11,136,100	9,797,984	13,694,862
	Likelihood Ratio	8.17	10.36	11.78
	Rank correlation index	0.733	0.758	0.726
4	AIC	11,097,734	9,784,994	13,567,501
	Likelihood Ratio	8.11	10.06	12.00
	Rank correlation index	0.735	0.76	0.725

Table A.6.2. Logistic regression results for stress, anxiety and depression with all covariates

	Stress		Anxiety		Depression	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Explanatory variable (Ref. = No exposure)						
Housing discrimination exposure	**2.04***	**1.16-3.59**	**2.00****	**1.20-3.33**	**1.79***	**1.02-3.14**
Gender (ref. = Male)						
Female	1.00	0.72-1.38	1.08	0.73-1.61	0.71	0.54-0.93
Age group (Ref. = 64+ year old)						
<35 years old	5.21***	2.16-12.6	2.11[t]	1.00-4.44	1.35	0.85-2.14
35-44 years old	7.95***	3.33-19.0	2.04*	1.03-4.03	2.66***	1.58-4.49
45-54 years old	4.01**	1.76-9.16	2.27*	1.15-4.51	2.50***	1.56-3.99
55-64 years old	2.82*	1.28-6.24	1.85*	1.01-3.40	1.38	0.87-2.21
Education attainment (Ref. = Graduate degree)						
< High school	0.99	0.47-2.11	1.57	0.59-4.21	1.11	0.54-2.26
High school or GED	0.82	0.43-1.60	1.45	0.54-3.91	1.09	0.57-2.09
Some college or AD	0.94	0.53-1.67	1.24	0.52-2.93	1.44	0.92-2.27
Bachelor's degree	1.05	0.57-1.93	1.33	0.51-3.49	1.54	0.90-2.63
Marital status (Ref. = Married)						
Widowed	0.23*	0.07-0.80	0.47	0.18-1.25	1.13	0.52-2.44
Divorced/separated	0.94	0.58-1.52	0.93	0.60-1.46	1.38	0.90-2.12
Single/never married	0.49**	0.29-0.84	0.72	0.44-1.20	1.05	0.67-1.63
Living with partner	1.11	0.55-2.24	0.49	0.21-1.14	0.51	0.21-1.23
Race and ethnicity (Ref. = Non-Hispanic White)						
Non-Hispanic Black	0.68	0.36-1.30	0.98	0.59-1.63	0.35***	0.20-0.63
Hispanic	0.37	0.11-1.19	0.39	0.10-1.57	0.39	0.13-1.15
Other Race or Ethnicity	0.30*	0.11-0.79	0.20**	0.07-0.64	0.53	0.22-1.27
Citizenship status (Ref. = US Citizen)						
Non-US citizen	0.41	0.04-3.93	0.97	0.16-5.77	1.52	0.40-5.81
Household Income (Ref. = > $100,000)						
<$25,000	2.74**	1.29-5.84	3.86**	1.63-9.14	2.55**	1.39-4.66
$25,000-$44,999	1.47	0.78-2.80	1.58	0.72-3.49	2.02*	1.17-3.49
$45,000-$74,999	2.40***	1.49-3.89	2.05*	1.02-4.11	2.09**	1.20-3.63
$75,000-$100,000	1.46	0.83-2.57	1.02	0.36-2.91	1.40	0.79-2.48
Employment status (Ref. = Employed)						
Unemployed	1.23	0.76-1.98	1.44	0.96-2.15	2.07***	1.38-3.11
General health status (Ref. = Excellent-good)						
Fair-Poor Health	3.51***	2.23-5.54	3.69***	2.33-5.82	3.63***	2.26-5.83
Life shock (Ref. = No)						
Recent life shock	1.45	0.95-2.23	1.53*	1.02-2.31	1.49*	1.07-2.09
Residence location (Ref. = Wisconsin, excluding Milwaukee Metro)						
Milwaukee Metro	0.89	0.59-1.34	1.01	0.66-1.54	1.40	0.89-2.20
Residential quality (Ref. = moderate-high IBE quality)						
low IBE quality	1.23	0.81-1.88	1.75**	1.18-2.58	1.34	0.93-1.93
Housing insecurity risk (Ref = No risk)						
housing insecurity risk[5]	1.51[t]	0.99-2.32	1.29	0.80-2.10	1.96***	1.33-2.89
Model diagnostics						
N		2,564		2,564		2,564
AIC		11,097,734		9,784,994		13,567,501
Likelihood Ratio		8.11		10.06		12.00
Rank correlation index		0.735		0.76		0.725

***p < 0.001
** p < 0.01
* P < 0.5

1. Models weighted to the Wisconsin population at T2.
2. Self-reported perceived housing discrimination exposure vs. non-exposure.
3. Milwaukee metro vs. the rest of the state.
4. Residential quality based on binary immediate built environment (IBE) index, moderate-high vs. low.
5. Meets at least one residential mobility measure and indicated any level of financial stress.

CHAPTER 7: CONCLUSIONS

This research is centered around a major barrier to adequate housing: discrimination. Through extensive literature reviews, the recurring theme of *housing discrimination* came up as a predominant yet understudied issue in Wisconsin. This offered me an opportunity to analyze perceived housing discrimination in the state using data from the Survey of the Health of Wisconsin (SHOW) and housing discrimination complaints filed state-wide from 2009 to 2013. This timeframe is relevant because research suggests that housing discrimination contributed to the 2008 Great Recession with enduring consequences thereafter (Foster & Kleit, 2014; Massey et al., 2016; Rothstein, 2017). Wisconsin is an important site because the state houses the most racially segregated metro in the nation (Landis, 2019) and lacks statutory equivalency with the Federal Fair Housing Act (Wisconsin, 2015). The Fair Housing Act enacted roughly 50 years ago, prohibits discrimination in housing market transactions such as denying renting or purchasing a home due to specific social characteristics (e.g., race, sex, national origin). The Act also requires the government to affirmatively further fair housing (i.e., provide equal housing opportunities) as means to address the legacy of housing discrimination. Wisconsin's gaps in statutory equivalency with the Fair Housing Act hinder necessary protections for individuals and families to access equal housing opportunities. In turn, the lack of protections to access equal housing opportunities translates to experiences of discrimination and associates with impacts in residential conditions and health indicators (Williams & Mohammed, 2009; Braveman et al., 2011; Williams et al., 2019). Despite this, no known prior research examined the potential interrelationship between reported housing discrimination experiences and outcomes of residential conditions and mental health in a representative state-wide sample population.

To close gaps in our understanding of housing discrimination experience in Wisconsin, I provided detailed theoretical context and background information to advance our understanding of the complex phenomena of housing discrimination (Chapter 2-3). Then, I dedicated my core research (Chapters 4-6) to examine the extent perceived housing discrimination exposure associates with the likelihood for low residential quality such as living in lower-quality housing and neighborhoods (Aim 1), housing instability risk (Aim 2), and mental health outcomes of stress, anxiety and depression (Aim 3) in a representative sample population that participated in the SHOW from 2009 to 2013. In each core study, I also examined whether the association between perceived housing discrimination exposure and each outcome outlined in Aims 1-3 varies by subpopulation groups (Aim 4) and by location within Wisconsin, specifically the Milwaukee metropolitan area versus the rest of the state (Aim 5).

This dissertation is built upon Krieger's eco-social theory which posits housing discrimination as a multi-leveled phenomenon that interrelates among socio-environmental settings and acknowledges historical and recent discriminatory events, all of which can ultimately impact people's health (Krieger, 2012). Throughout the dissertation, I assumed that the experience of housing discrimination is cumulative over lifetime (Gayman & Barragan, 2013; Grollman, 2014) and that perceptions serve as a proxy for truthful recent experiences (Taylor et al., 2004; Gayman & Barragan, 2013). Mindful of these assumptions and limitations typical of cross-sectional studies and self-reported measures, my research reveals important findings relevant to the Wisconsin population and implications for housing policies and core disciplines including but not limited to urban planning and public health.

7.1. Main findings

My dissertation documents perceived housing discrimination in Wisconsin reported from 2009 to 2013. Findings from my research suggest that roughly 1 in 15 Wisconsin residents experienced housing discrimination. When adjusting for socioeconomic status and residential factors, my research suggests that housing discrimination exposure influences residential disadvantages and unfavorable mental health conditions. For instance, individuals that perceived housing discrimination are more than twice likely to live in lower residential quality and be at risk of housing instability compared to their non-discriminated counterparts. Also, individuals that perceived housing discrimination are roughly twice likely to have stress and anxiety and close to 80% more likely to have depression compared to their non-discriminated counterparts.

My analysis also shows important results for social groups in Wisconsin by demographic characteristics including gender, age, race/ethnicity, education level, marital status, household income and employment status. Because results are extensive, I summarize here the most relevant findings by gender, race/ethnicity and household income. Further details about other demographic categories are available in each core research paper (Chapters 4-6).

Among 28 individual demographic categories, stratified analyses indicated that for women, perceived housing discrimination significantly associates with all outcomes in this study. Women that experienced housing discrimination are more than three times likely to live in low residential quality and have anxiety, and roughly twice more likely to experience housing instability risk, stress and depression, compared to non-discriminated women. While differences among discriminated women and men in this study appear negligible in residential outcomes, discriminated women show roughly twice higher odds for anxiety compared to discriminated

men. Therefore, these findings suggest that perceived housing discrimination disparately impact women's mental health in Wisconsin.

I also outline three notable findings for racial and ethnic groups, especially Non-Hispanic Blacks and Whites. First, the ratio of perceived housing discrimination among Non-Hispanic Blacks and Whites is disproportional among the surveyed sample population in Wisconsin. Roughly 1 in 3 Non-Hispanic Blacks reported housing discrimination - the highest ratio among the social categories in my study. In comparison, approximately 1 in 22 Non-Hispanic Whites reported housing discrimination.

Second, Non-Hispanic Blacks perceived three to five times more housing discrimination than Non-Hispanic Whites in good residential quality conditions. However, no statistical differences were observed between discriminated Non-Hispanic Blacks and Whites in low residential quality conditions. These findings echo recent research (Eligon & Gebeloff, 2016; Yang et al., 2016; Yang & Sun, 2019) suggesting that Non-Hispanic Blacks are more likely to perceive housing discrimination and feel socially oppressed in predominately affluent neighborhoods where they have fewer social ties. Contrarily, in less affluent neighborhoods, racial differences on perceived discrimination may appear negligible.

Third, perceived housing discrimination exposure associates with more detrimental mental health outcomes for Non-Hispanic Blacks than Non-Hispanic Whites. For instance, Non-Hispanic Blacks that experienced housing discrimination are more than five times likely to have anxiety and more than three times likely to have depression compared to their non-discriminated counterparts. In comparison, Non-Hispanic Whites that experienced housing discrimination are more than twice likely to have stress and roughly 92% more likely to have anxiety as opposed to non-discriminated individuals in the same racial category. The effect of housing discrimination

on anxiety appears most significant for Non-Hispanic Blacks while the effect of discrimination on stress appears most significant for Non-Hispanic Whites. However, when leveling the plain field to examine only individuals that perceived housing discrimination, the differences between Non-Hispanic Blacks and Whites appear negligible on their likelihood of stress, anxiety and depression. This suggests that among the discriminated, racial differences appear insignificant on the probability of stress, anxiety and depression. Two recent studies (Yang & Chen, 2018) and (Yang & Sun, 2019) also show similar findings suggesting that racial differences are negligible on self-reported health among individuals that experienced discrimination. In sum, these findings underscore the influence of perceived housing discrimination on the mental health for both Non-Hispanic Blacks and Whites and suggest the effects of discrimination might be broad across racial groups.

Findings from my research also outline a wide-ranging effect of perceived housing discrimination for Wisconsin residents among household income groups. While perceived housing discrimination exposure impact low-income people by increasing their likelihood to live in low residential quality and have housing instability risk, stress and anxiety, my analysis also shows that housing discrimination significantly associates with depressive symptoms for middle-class and affluent individuals, specifically those earning annual household incomes between 25,000 and $44,999 and over $100,000. Therefore, findings suggest housing discrimination is potentially a universal issue that can impact a broader population within the state and that is linked with serious outcomes of mental health regardless of income status.

Lastly, this research shows that the impact of housing discrimination on residential conditions and outcomes of mental health might be widespread in the state of Wisconsin. Results from my analyses indicate that the association between perceived housing discrimination

exposure and each outcome outlined in this study is significant for the overall Wisconsin sample population and does not significantly vary between the Milwaukee metro and the rest of the state. Therefore, people in Wisconsin that experienced housing discrimination and reside outside the Milwaukee metro have similar odds for disadvantages in residential conditions mental health outcomes compared to Milwaukee metro residents. These findings provoke important implications for future research and interventions relevant to housing policies and core disciplines including but not limited to urban planning and public health.

7.2. Directions for future research

This study provides demographic and regional perspectives on the links between perceived housing discrimination exposure and outcomes of residential quality, stability and mental in Wisconsin. Because the legacy of housing discrimination is better understood through geospatial contexts and is most visible through residential segregation patterns (Rothstein, 2017; McClure et al., 2019), my next research will use a geospatial approach to examine the potential effects of perceived housing discrimination exposure on residential quality, housing instability risk and mental health in smaller geographical units (e.g., county, census tract) within the state. Additional analyses will examine the extent neighborhood (or census tract) racial and ethnic composition, housing status and other housing market indicators (e.g., home values, foreclosure rates, housing cost burden) influence the relationship between perceived housing discrimination and the outcomes outlined in this study. A recent study from Philadelphia (Yang et al., 2016) suggests that the racial income composition of neighborhoods may influence the relationship between perceived housing discrimination and self-reported health. Yet, no known study has utilized a geospatial approach to examine perceived housing discrimination, residential

conditions and mental health outcomes in Wisconsin. Therefore, this poses an opportunity to advance research on housing discrimination from a socio-spatial perspective.

Because discrimination goes beyond Black and White, additional research should assess further the potential effects of perceived housing discrimination on residential conditions and mental health in other racial and ethnic groups, particularly Hispanics or Latinx, Native Americans and Asian Americans because these groups have also been historically marginalized in housing markets and policies (Finch et al., 2000; Gee et al., 2007; Rothstein, 2017). In this dissertation, I examined responses from Hispanics and individuals that are neither Hispanic, Non-Hispanic White or Non-Hispanic Black and were identified as "other". Among the sample population in Wisconsin, the rate of perceived housing discrimination was roughly 1 in 5 for both Hispanics and "others". For individuals in the "other" category, a perceived exposure to housing discrimination is significantly associated with low residential quality and housing instability risk but not for outcomes of mental health. For Hispanics, housing discrimination is not associated with any of the outcomes outlined in this study. It is likely that the small sample size for Hispanics may have hindered the ability to make statistical inferences. Therefore, additional research should oversample this group and other racial and ethnic groups.

Due to outstanding research findings for women in Wisconsin, additional research should further assess the implications of housing discrimination on women's health. Future studies should also include other gender identities because recent studies show individuals from non-conforming gender groups are highly discriminated in housing markets (Levy et al., 2017). Also, research should examine combined social identities (e.g., income, race, gender) to understand whether the effect of housing discrimination on residential conditions and mental health

outcomes vary among combined social groups. Larger sample size may facilitate the analysis of combined social identities for the Wisconsin population using data from the SHOW.

Also, research should assess the extent social capital influences the relationship between perceived housing discrimination and outcomes of residential conditions and mental health. Previous research suggests that social capital, such as the networks of relationships among people and individual's sense of community, may moderate the relationship between perceived discrimination and housing instability risk (Priester et al., 2017). Other studies found that social capital may hamper the effects of perceived discrimination on self-reported stress (Yang et al., 2018). However, no known study has assessed perceived housing discrimination and social capital on residential and mental health outcomes in Wisconsin. This may provide context on social capital as a potential mechanism to alleviate the detrimental effects of housing discrimination on the mental health of Wisconsin residents, in addition to policy interventions. Likewise, future research should also assess whether interventions targeted at mitigating housing discrimination are associated with reducing the rate of perceived discrimination and the likelihood of poor outcomes in residential conditions and mental health.

Lastly, this study finds that the associations between perceived housing discrimination and mental health outcomes are sensitive to the timing of the sample collected and potentially influenced by the Great Recession. For instance, findings reveal that the association between perceived housing discrimination exposure and individual outcomes of stress, anxiety and depression are statistically significant between 2009 and 2011 but not between 2011 and 2013, with the exception of the outcome of stress. Based on the potential temporality of the effects of perceived housing discrimination on anxiety and depression among a broader state population, future research should expand on this study using more recent data. Also, due to changes in

politics and housing policies, it is important to consider whether recent changes in policy or politics may influence the outcomes. For example, substantial changes in politics and polices could associate with hostility against certain social groups (Williams & Medlock, 2017; Leventhal et al., 2018; Williams et al., 2019). With recent changes in the political environment, understanding further housing discrimination and potential mitigation mechanisms are important to help advance equitable housing interventions and health policies.

7.3. Policy implications

As we ponder on the 50th anniversary of the Fair Housing Act and Wisconsin's outstanding challenges to enforce the Act, important policy implications can be drawn from this dissertation. First and foremost, the fact that people in Wisconsin experience housing discrimination, as documented throughout my analysis, suggests that housing discrimination occurs despite long-standing anti-discrimination laws at the federal and state levels. Also, the significant associations between perceived housing discrimination and the outcomes of low residential quality, housing instability risk and poor mental health presented throughout this research suggest that housing discrimination is an extensive equity problem in the state. This means that in Wisconsin not everyone has equal opportunities to be adequately housed and healthy because housing discrimination can contribute to differential outcomes of residential quality, stability and mental health. Therefore, public and private entities in the state, including but not limited to fair housing agencies, local and regional planning commissions, public health officials and policymakers, should collaborate to address housing discrimination and its associated impacts through the equity planning and health equity lenses by 1) increasing funding and capacity for interventions and 2) championing interventions such as meaningfully raising awareness of housing discrimination, implementing fair housing laws and improving fair housing

practices. Utilizing the health equity lenses involves focusing efforts to address avoidable social inequalities by emphasizing conditions for improving everyone's health, especially those who have experienced disadvantage or historical injustices (Braveman & Gruskin, 2003; Corburn, 2017). Likewise, equity planning involves actively seeking an egalitarian redistribution of resources and advocating for decision-making processes that promote equal opportunities especially for those who have few, if any, choices. (Davidoff, 1965; Frieden, 1967; Krumholz, 1982; Thomas, 1994; Zapata & Bates, 2015).

Fundamentally, funding is crucial because most entities working on fair housing issues in the state are under-resourced (Wisconsin, 2015). One option to increase funding and capacity is through interdisciplinary collaboration among housing agencies, local and regional planning commissions, public health entities and policymakers. Boosting cross-sector collaborations can benefit the development and sustainability of interventions to address the impacts of housing discrimination while allowing these to be inclusive and accessible to a broader population. Also, as suggested by Sarmiento and Sims (2015), housing interventions must ensure resident participation, particularly affected populations. In the context of this study, affected populations may include individuals that have experienced housing discrimination. Another benefit of cross-sector collaborations, in addition to funding and capacity building, is that these can increase social capital which has been found associated to mitigate the detrimental effects of discrimination experiences on residential conditions (Priester et al., 2017) and stress (Yang et al., 2018).

Following what we know about the findings presented in this study and research evidence from prior studies, I describe three interventions that should be championed in the state. First, public and private entities should engage in advancing education and outreach efforts to raise

awareness on discrimination experiences in housing and their links with disparities in residential quality, stability and mental health could show promising results. A recent study provides some evidence suggesting that mass-media campaigns and interventions geared on increasing understanding of prejudicial biases moderately reduce discrimination and stigma associated with perceived discrimination (Gronholm et al., 2017). Developing a similar approach in the state of Wisconsin can educate residents, property owners and the general public so they understand what housing discrimination is and their implications to the quality of life and health of residents across a broad social spectrum. This approach should also emphasize information about fair housing laws and individuals' rights and obligations under the law.

Second, public and private entities should urge the state of Wisconsin legislative branch to update their Open Housing Law and secure substantial equivalency with the Fair Housing Act. Currently, Wisconsin's lack of equivalency with the Fair Housing Act constitutes a barrier for funding and resources from the federal government to advance fair housing training and, more importantly, ensure adequate enforcement of the law. The lack of substantial equivalency not only hinders enforcement capacity to address housing discrimination but may also impede residents' education on knowing their rights, report violations, and ultimately access equal housing opportunities (Wisconsin, 2015; p. 91). Therefore, it is crucial for the state to take long-overdue steps to secure statutory equivalency and allow a meaningful implementation of the Fair Housing Act.

Third, the state and their local jurisdictions should comprehensively implement the Affirmatively Furthering Fair Housing (AFFH) rule which outlines the standards for complying with the disparate impact liability mandate under the Fair Housing Act. The AFFH rule is essentially a long-delayed policy to enforce the Fair Housing Act's mandate to address housing

discrimination in the contexts of disparate impact (O'Regan and Zimmerman (2019); Jargowsky et al. (2019)). Findings from this dissertation add to the research evidence and suggest that the experience of housing discrimination contributes to disparate outcomes of residential quality, stability and mental health among Wisconsin residents from a variety of sub-populations. Also, as Greenberg et al. (2016) note, the disparate impact the experience of discrimination can be argued as a violation of the Fair Housing Act. However, even under this broad argument, the state faces substantial challenges to implement the Fair Housing Act because of their lack of statutory equivalency limiting resources for education and enforcement. Additionally, the federal government recently proposed changes to the AFFH rule attempting to roll-back requirements to comprehensively assess the impact of housing discrimination and reduce disparities in housing-related outcomes (O'Regan, 2019). Despite these challenges, state and local jurisdictions should act proactively and responsibly to implement the Fair Housing Act because implementation of the law is not only critical to improving fair housing practices in the state but is also key to mitigate discrimination and address related impacts on the quality of life and health of residents.

7.4. References

Braveman, P., & Gruskin, S. (2003). Defining equity in health. *J Epidemiol Community Health, 57*(4), 254-258.

Braveman, P. A., Egerter, S. A., Woolf, S. H., & Marks, J. S. (2011). When do we know enough to recommend action on the social determinants of health? *American Journal of Preventive Medicine, 40*(1), S58-S66.

Corburn, J. (2017). Urban place and health equity: Critical issues and practices. *Int J Environ Res Public Health, 14*(2).

Davidoff, P. (1965). Advocacy and pluralism in planning. *Journal of the American Institute of Planners, 31*(4), 331-337.

Eligon, J., & Gebeloff, R. (2016). Affluent and black, and still trapped by segregation: Why well-off black families end up living in poorer areas than white families with similar or even lower incomes. *New York Times*. 8/20/2016

Finch, B. K., Kolody, B., & Vega, W. A. (2000). Perceived discrimination and depression among Mexican-origin adults in California. *Journal of Health and Social Behavior, 41*(3), 295-313.

Foster, T. B., & Kleit, R. G. (2014). The changing relationship between housing and inequality, 1980–2010. *Housing Policy Debate, 25*(1), 16-40.

Frieden, B. (1967). The changing prospects for social planning. *Journal of the American Institute of Planners*(33), 311-323.

Gayman, M. D., & Barragan, J. (2013). Multiple perceived reasons for major discrimination and depression. *Society and Mental Health, 3*(3), 203-220.

Gee, G. C., Spencer, M. S., Chen, J., & Takeuchi, D. (2007). A nationwide study of discrimination and chronic health conditions among Asian Americans. *American Journal of Public Health, 97*(7), 1275-1282.

Greenberg, D., Gershenson, C., & Desmond, M. (2016). The disparate impact of eviction. *Harvard Civil Rights-Civil Liberties Law Review, 53*, 601-645.

Grollman, E. A. (2014). Multiple disadvantaged statuses and health: The role of multiple forms of discrimination. *Journal of Health and Social Behavior, 55*(1), 3.

Gronholm, P. C., Henderson, C., Deb, T., & Thornicroft, G. (2017). Interventions to reduce discrimination and stigma: The state of the art. *Social Psychiatry and Psychiatric Epidemiology, 52*(3), 249-258.

Jargowsky, P. A., Ding, L., & Fletcher, N. (2019). The fair housing act at 50: Successes, failures, and future directions. *Housing Policy Debate, 29*(5), 694-703.

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health, 102*(5), 936-944.

Krumholz, N. (1982). A retrospective view of equity in planning: Cleveland 1969-1979. *Journal of the American Planning Association, 48*(2), 163-183.

Landis, J. D. (2019). Black-white and Hispanic segregation magnitudes and trends from the 2016 American community survey. *Cityscape, 21*(1), 63-85.

Leventhal, A., Cho, J., Andrabi, N., & Barrington-Trimis, J. (2018). Association of reported concern over increasing societal discrimination and adverse behavioral health outcomes in late adolescence, 2016–2017. *Jama, 172*, 924-933.

Levy, D., Wissoker, D., Aranda, C., Howell, B., Pitingolo, R., Sewell, S., & Santos, R. (2017). *A paired-testing pilot study of housing discrimination against same-sex couples and transgender individuals*. Retrieved from https://www.urban.org/research/publication/paired-testing-pilot-study-housing-discrimination-against-same-sex-couples-and-transgender-individuals

Massey, D. S., Rugh, J. S., Steil, J. P., & Albright, L. (2016). Riding the stagecoach to hell: A qualitative analysis of racial discrimination in mortgage lending. *City & Community, 15*(2), 118-136.

McClure, E., Feinstein, L., Cordoba, E., Douglas, C., Emch, M., Robinson, W., Galea, S., & Aiello, A. E. (2019). The legacy of redlining in the effect of foreclosures on Detroit residents' self-rated health. *Health & Place, 55*, 9-19.

O'Regan, K. M., & Zimmerman, K. (2019). The potential of the Fair Housing Act's affirmative mandate and HUD's AFFH rule. *Cityscape, 21*(1), 87-98.

O'Regan, K. M. (2019). The fair housing act today: Current context and challenges at 50. *Housing Policy Debate, 29*(5), 704-713.

Priester, M. A., Foster, K. A., & Shaw, T. C. (2017). Are discrimination and social capital related to housing instability? *Housing Policy Debate, 27*(1), 120-136.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America* (First Edition ed.). New York: Liveright Publishing Corporation.

Sarmiento, C. S., & Sims, J. R. (2015). Facades of equitable development: Santa ana and the affordable housing complex. *Journal of Planning Education and Research, 35*(3), 323-336.

Taylor, T. R., Kamarck, T. W., & Shiffman, S. (2004). Validation of the Detroit area study discrimination scale in a community sample of older African American adults: The Pittsburgh healthy heart project. *International Journal of Behavioral Medicine, 11*(2), 88-94.

Thomas, J. M. (1994). Planning history and the black urban experience: Linkages and contemporary implications. *Journal of Planning Education and Research, 14*(1), 1-11.

Williams, D. R., Lawrence, J. A., & Davis, B. A. (2019). Racism and health: Evidence and needed research. In J. E. Fielding (Ed.), *Annual review of public health, vol 40* (Vol. 40, pp. 105-125).

Williams, D. R., & Medlock, M. M. (2017). Health effects of dramatic societal events - ramifications of the recent presidential election. *New England Journal of Medicine, 376*(23), 2295-2299.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Wisconsin. (2015). *Fair housing plan: Analysis of impediments to fair housing and actions to overcome them*. Retrieved from http://www.doa.state.wi.us/Documents/DOH/fairhousing.pdf.

Yang, T. C., Chen, D., & Park, K. (2016). Perceived housing discrimination and self-reported health: How do neighborhood features matter? *Annals of behavioral medicine: A publication of the Society of Behavioral Medicine, 50*(6), 789-801.

Yang, T. C., & Chen, D. H. (2018). A multi-group path analysis of the relationship between perceived racial discrimination and self-rated stress: How does it vary across racial/ethnic groups? *Ethnicity & Health, 23*(3), 249-275.

Yang, T. C., Chen, I. C., Kim, S., & Choi, S. W. (2018). Differential investments and opportunities: How do neighborhood conditions moderate the relationship between perceived housing discrimination and social capital? *Social Science Research, 72*, 69-83.

Yang, T. C., & Sun, F. N. (2019). A longitudinal analysis of how perceived discrimination gets under the skin: Investigating gender and racial/ethnic differences. *Euramerica, 49*(2), 243-285.

Zapata, M. A., & Bates, L. K. (2015). Equity planning revisited. *Journal of Planning Education and Research, 35*(3), 245-248.