Understanding and Addressing Structural Determinants of Cardiovascular Health Inequities

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Definitions

- **Structural racism:** A system in which public policies, institutional practices, cultural representations, and other norms work in various, often reinforcing ways to perpetuate racial group inequity

- **Racial and ethnic equity**: Racial or ethnic identity no longer predicts life outcomes.

- **Racial and ethnic equity perspective**: Application of tools and practices needed to recognize people of color's experiences with unequal power differentials and access to resources and opportunity, while considering historical and current lived realities, including structural racism.

Child Trends 2019

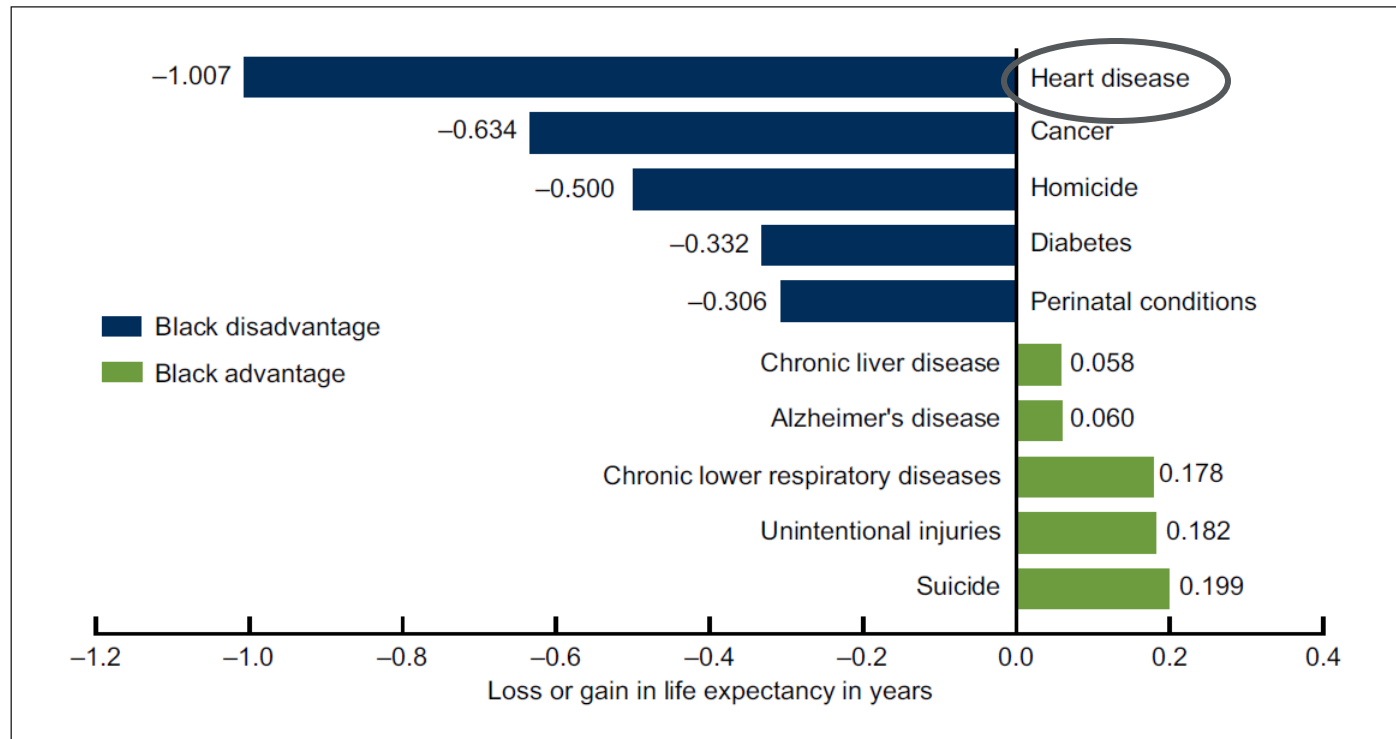# Racial disparities in health are large and persistent

Figure 1. Life expectancy, by race: United States, 1970–2010
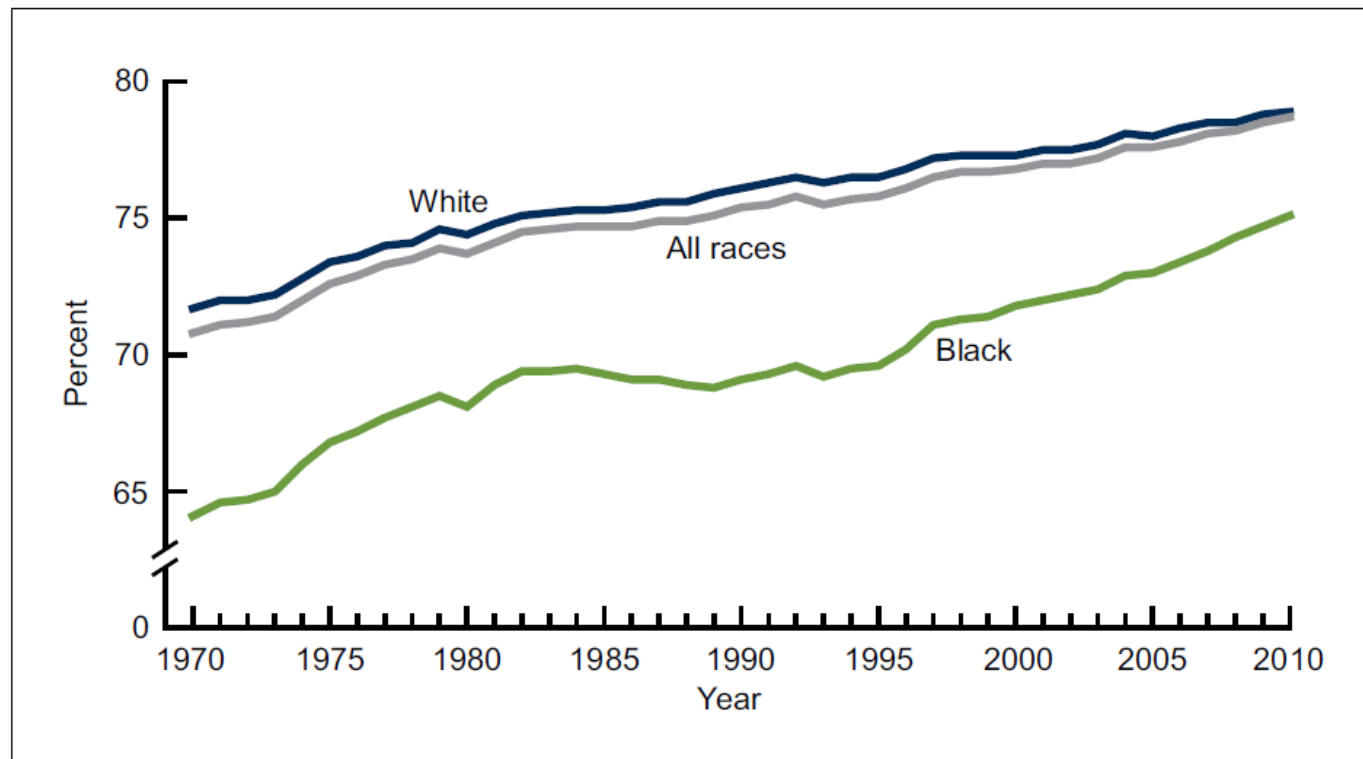
Disparities exist for many major causes of death

Figure 3. Contribution of the leading causes of death to the difference in life expectancy between black and white persons: United States, 2010

Residential environment and racial disparities in cardiovascular disease risk factors

- Neighborhood social and physical environments contribute to Black-White disparities in adverse cardiovascular outcomes
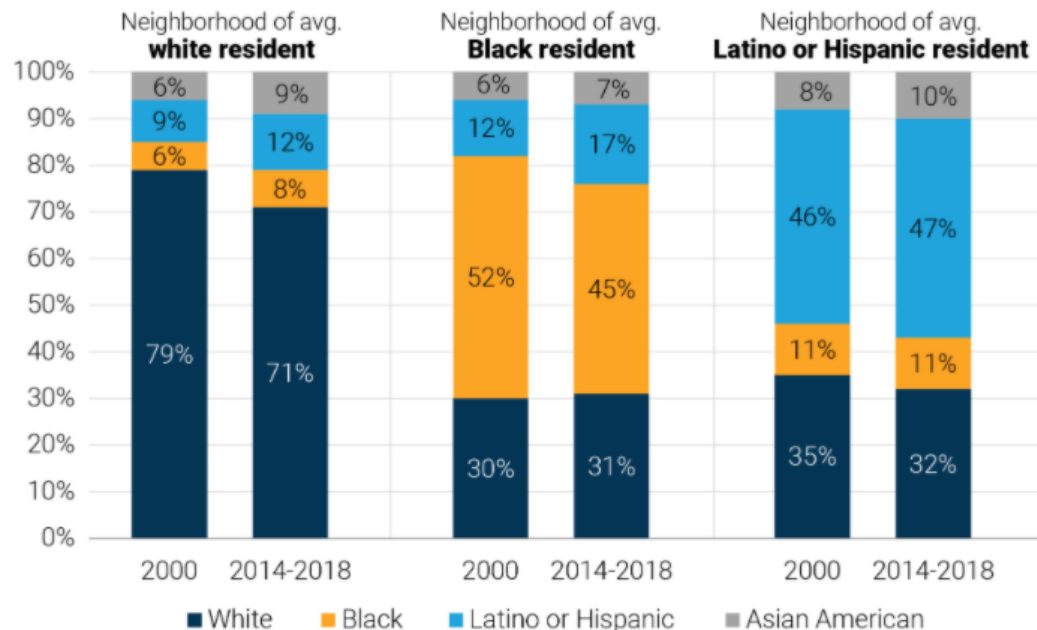
Black and White individuals living in similar environments have more similar health outcomes

Adapted from Thorpe et al 2008; LaVeist et al 2009; Bleich et al 2010

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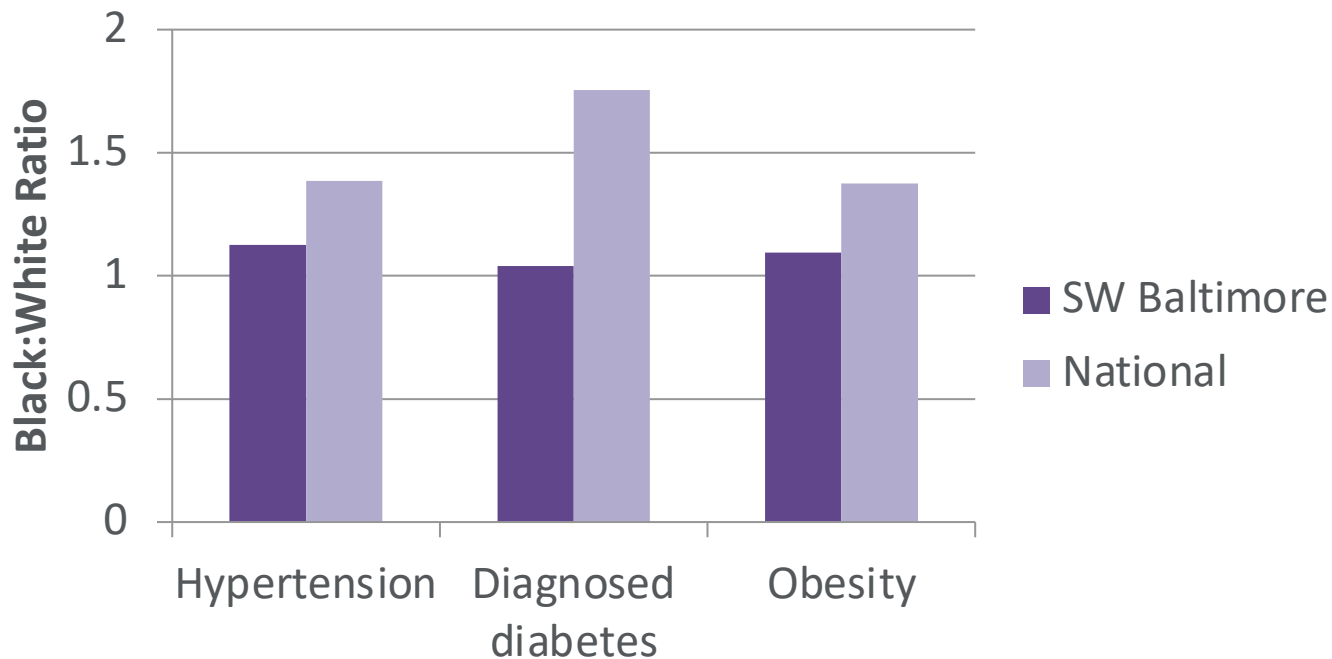
Black and White people are not living in the same neighborhoods

Understanding the reasons why Black and White individuals live in different neighborhoods may provide further insight into the best policies to effectively address health disparities

Figure 2. Race-ethnic makeups of average neighborhoods of different groups in metro areas
2000 and 2014-2018

Neighborhood of avg. **white resident**

	2000	2014-2018
Asian American	6%	9%
Latino or Hispanic	9%	12%
Black	6%	8%
White	79%	71%

Neighborhood of avg. **Black resident**

	2000	2014-2018
Asian American	6%	7%
Latino or Hispanic	12%	17%
Black	52%	45%
White	30%	31%

Neighborhood of avg. **Latino or Hispanic resident**

	2000	2014-2018
Asian American	8%	10%
Latino or Hispanic	46%	47%
Black	11%	11%
White	35%	32%

■ White ■ Black ■ Latino or Hispanic ■ Asian American

Source: William H. Frey analysis of 2000 Census and 2014-2018 multiyear American Community Survey.

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Racial residential segregation

- Systematic sorting of individuals into different neighborhoods by race

- Typically measured at the metropolitan area level or the neighborhood level
  - Metropolitan areas represent labor and housing markets which shape residential segregation
  - Neighborhoods allow for examination of heterogeneity within cities

Racial residential segregation among African-Americans

- Great Migration of African-Americans out of the rural South

- Discriminatory practices led to persistent segregation throughout much of the 20th century and it still remains high

http://i.imgur.com/xZoKnTa.gif
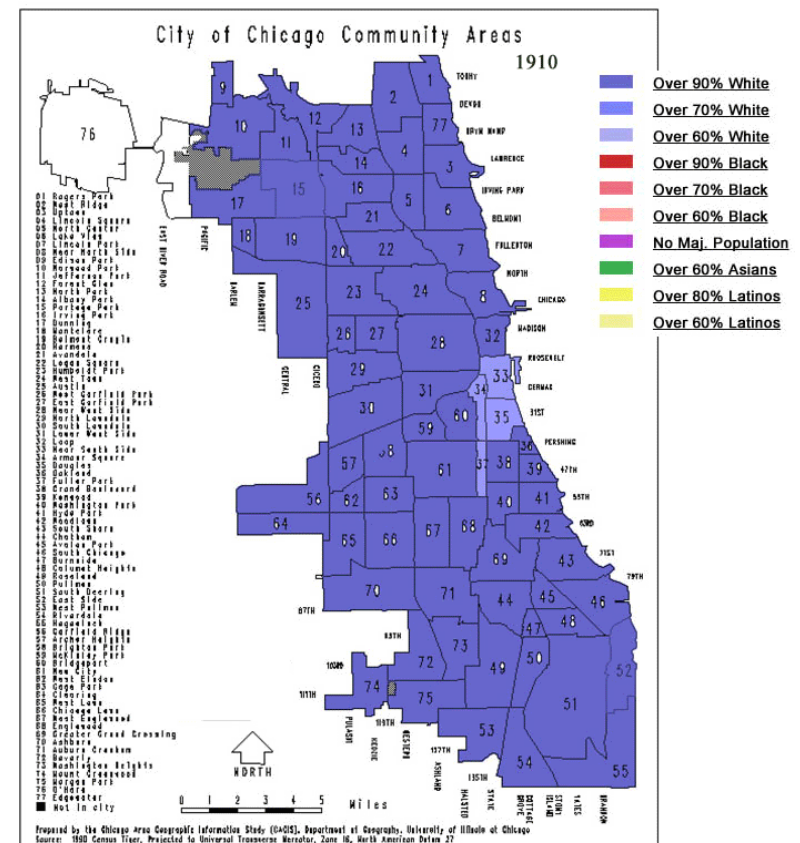
Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health

DAVID R. WILLIAMS, PhD, MPH[a]
CHIQUITA COLLINS, PhD[b]

SYNOPSIS

Racial residential segregation is a fundamental cause of racial disparities in health. The physical separation of the races by enforced residence in certain areas is an institutional mechanism of racism that was designed to protect whites from social interaction with blacks. Despite the absence of supportive legal statutes, the degree of residential segregation remains extremely high for most African Americans in the United States. The authors review evidence that suggests that segregation is a primary cause of racial differences in socioeconomic status (SES) by determining access to education and employment opportunities. SES in turn remains a fundamental cause of racial differences in health. Segregation also creates conditions inimical to health in the social and physical environment. The authors conclude that effective efforts to eliminate racial disparities in health must seriously confront segregation and its pervasive consequences.

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Fundamental cause theory

- Influences multiple disease outcomes
- Affects these disease outcomes through multiple risk factors
- Involves access to resources that can be used to avoid risks or to minimize the consequences of disease once it occurs
- Association between a fundamental cause and health is reproduced over time via the replacement of intervening mechanisms

Link and Phelan 1995

Segregation influences multiple disease outcomes

Is it who you are or where you live? Residential segregation and racial gaps in childhood asthma.

Alexander D[1], Currie J[2].

Racial/ethnic residential segregation and cardiovascular disease risk.

Kershaw KN[1], Albrecht SS[2].

Racial residential segregation and adverse birth outcomes: A systematic review and meta-analysis.

Racial Residential Segregation and STI Diagnosis Among Non-Hispanic Blacks, 2006-2010.

Lutfi K[1], Trepka MJ[2], Fennie KP[3], Ibañez G[4], Gladwin H[5].

Residential Segregation and Racial Cancer Disparities: A Systematic Review.

Landrine H[1], Corral I[2], Lee JGL[3], Efird JT[4], Hall MB[5], Bess JJ[6].

Racial residential segregation and risky sexual behavior among non-Hispanic blacks, 2006-2010.

Lutfi K[1], Trepka MJ[2], Fennie KP[3], Ibanez G[4], Gladwin H[5].

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THE AVENUE

# COVID-19 is turning the Midwest's long legacy of segregation deadly

John C. Austin · Friday, April 17, 2020

https://www.brookings.edu/blog/the-avenue/2020/04/17/covid-19-is-turning-the-midwests-long-legacy-of-segregation-deadly/

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- In Milwaukee County, Black residents account for 27% of the local population, but 51% of confirmed COVID-19 cases (where race/ethnicity was recorded) and 57% of COVID-19 deaths.

- In the ⧉ city of Chicago and suburban ⧉ Cook County, Ill., the rate of COVID-19 cases per 100,000 people is nearly 470 for Black residents—more than twice that for white and Latino or Hispanic residents. COVID-19 death rates for Chicago's Black residents are more than four times as high as for other race groups.

- In the ⧉ city of Detroit, Black residents account for 79% of the local population, but 88% of confirmed COVID-19 cases and deaths (where race/ethnicity was recorded).

Segregation affects disease outcomes through multiple risk factors
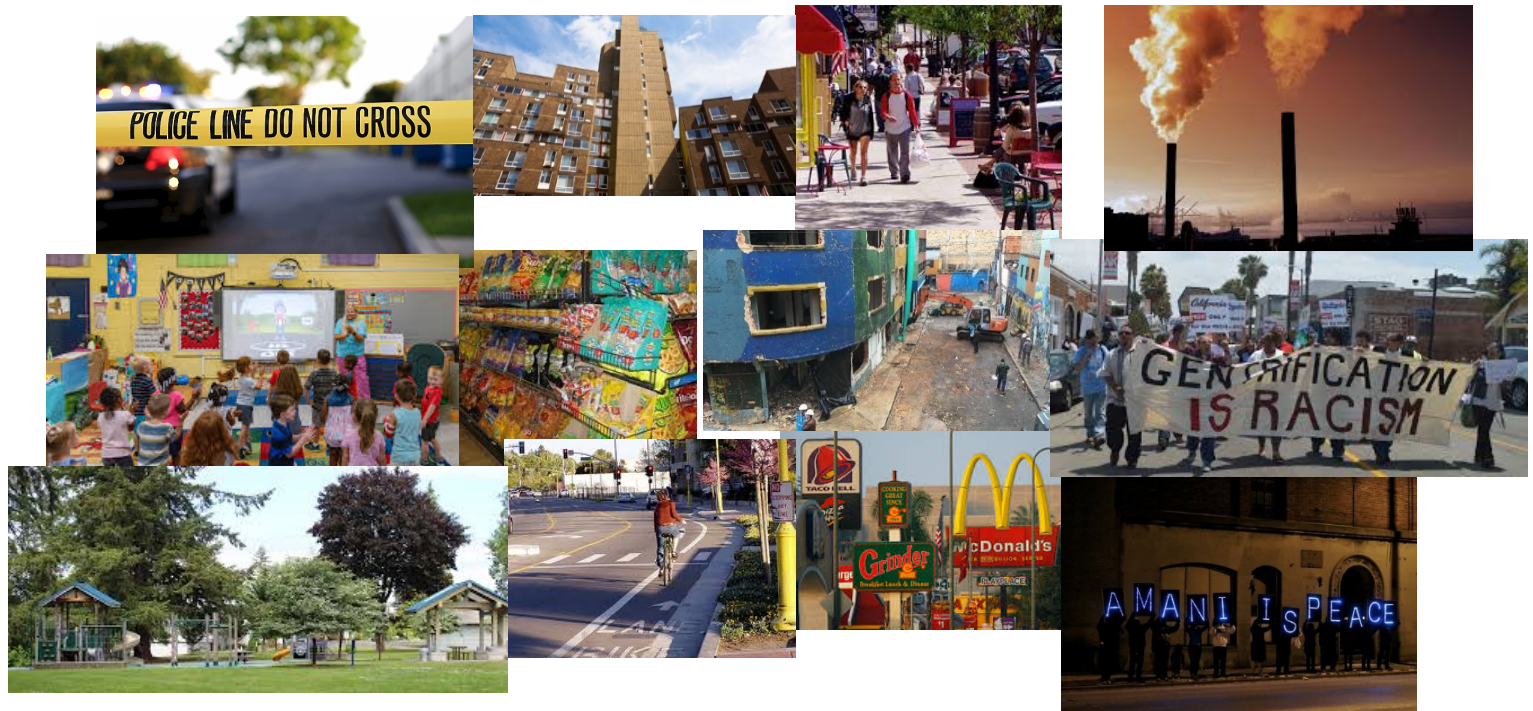
Fundamental cause theory - flexible resources

- Individuals and groups deploy resources to avoid risks and adopt protective strategies

- Key resources: knowledge, money, power, prestige, beneficial social connections

- Resources shape individual health behaviors

- Fundamental causes affect health even when the profile or risk and protective factors change radically

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Neighborhood-Level Racial/Ethnic Residential Segregation and Incident Cardiovascular Disease
The Multi-Ethnic Study of Atherosclerosis

Kiarri N. Kershaw, PhD; Theresa L. Osypuk, PhD; D. Phuong Do, PhD; Peter J. De Chavez, MS;
Ana V. Diez Roux, MD, PhD

Background—Previous research suggests that neighborhood-level racial/ethnic residential segregation is linked to health, but it has not been studied prospectively in relation to cardiovascular disease (CVD).

Methods and Results—Participants were 1595 non-Hispanic black, 2345 non-Hispanic white, and 1289 Hispanic adults from the Multi-Ethnic Study of Atherosclerosis free of CVD at baseline (aged 45–84 years). Own-group racial/ethnic residential segregation was assessed by using the G_i^* statistic, a measure of how the neighborhood racial/ethnic composition deviates from surrounding counties' racial/ethnic composition. Multivariable Cox proportional hazards modeling was used to estimate hazard ratios for incident CVD (first definite angina, probable angina followed by revascularization, myocardial infarction, resuscitated cardiac arrest, coronary heart disease death, stroke, or stroke death) over 10.2 median years of follow-up. Among blacks, each standard deviation increase in black segregation was associated with a 12% higher hazard of developing CVD after adjusting for demographics (95% confidence interval, 1.02–1.22). This association persisted after adjustment for neighborhood-level characteristics, individual socioeconomic position, and CVD risk factors (hazard ratio, 1.12; 95% confidence interval, 1.02–1.23). For whites, higher white segregation was associated with lower CVD risk after adjusting for demographics (hazard ratio, 0.88; 95% confidence interval, 0.81–0.96), but not after further adjustment for neighborhood characteristics. Segregation was not associated with CVD risk among Hispanics. Similar results were obtained after adjusting for time-varying segregation and covariates.

Conclusions—The association of residential segregation with cardiovascular risk varies according to race/ethnicity. Further work is needed to better characterize the individual- and neighborhood-level pathways linking segregation to CVD risk.   (*Circulation*. 2015;131:141-148. DOI: 10.1161/CIRCULATIONAHA.114.011345.)

Key Words: cardiovascular diseases ■ continental population groups ■ epidemiology ■ ethnic groups ■ residence characteristics
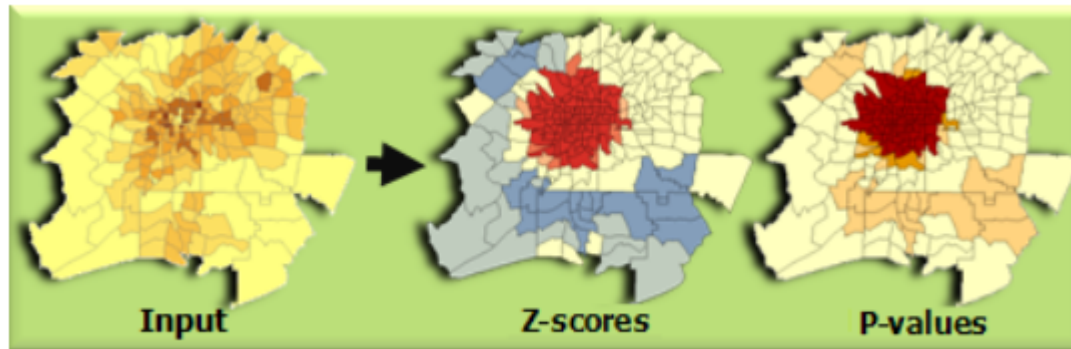
The G_i^* statistic

- A spatially-weighted z-score that represents how much a specific neighborhood characteristic (e.g. income or race) deviates from the larger metropolitan area

- "High" segregation: Z-scores > 1.96

- "Medium" segregation: Z-scores 0 – 1.96

- "Low" segregation: Z-scores < 0 (*ideally < -1.96*)
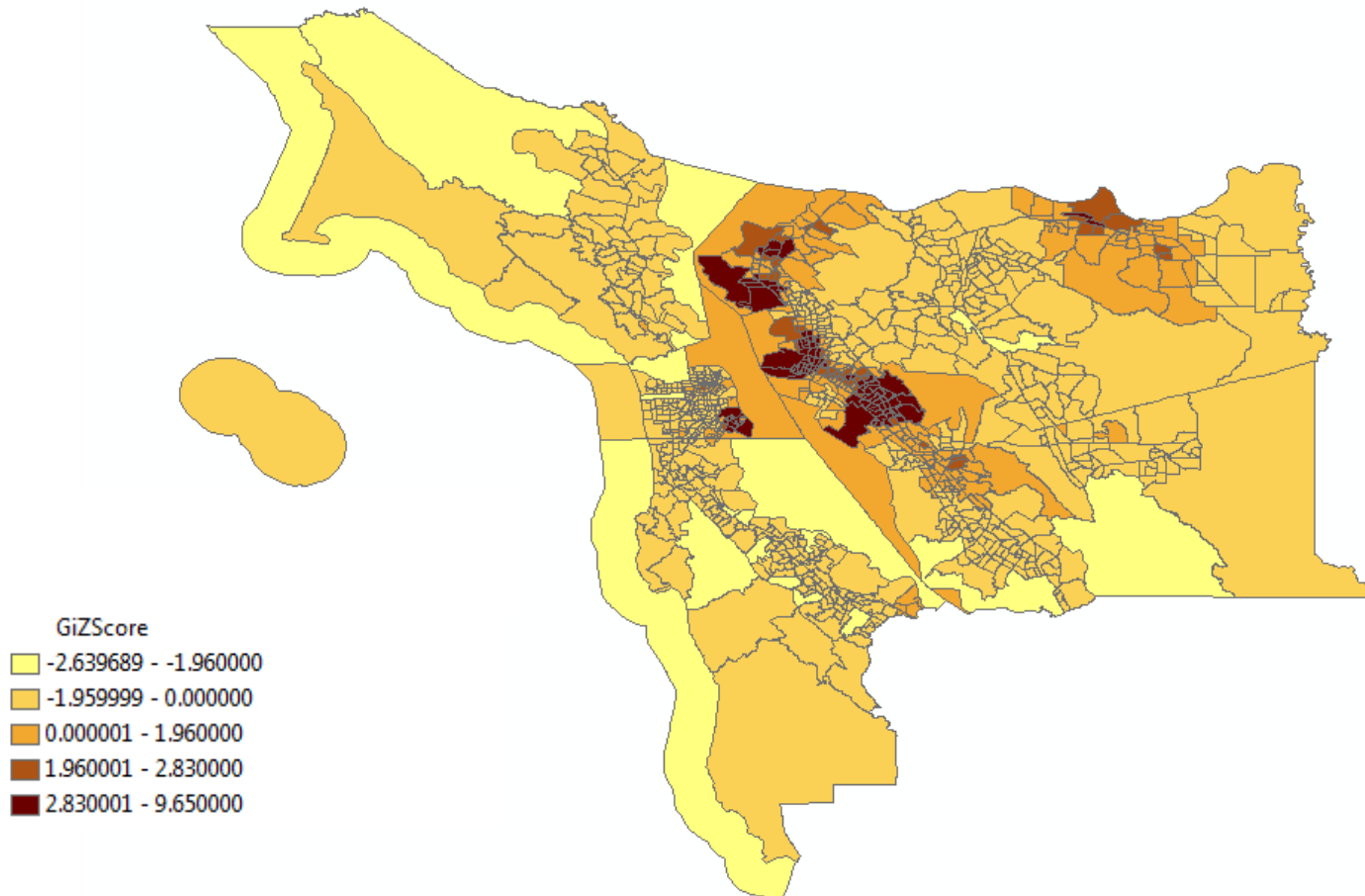
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Benefits of G_i^* statistic as measure of neighborhood-level segregation

- Incorporates information from neighboring tracts
- Takes into account the metropolitan area in which a neighborhood is embedded (ideal for multi-site studies)

Input → Z-scores → P-values
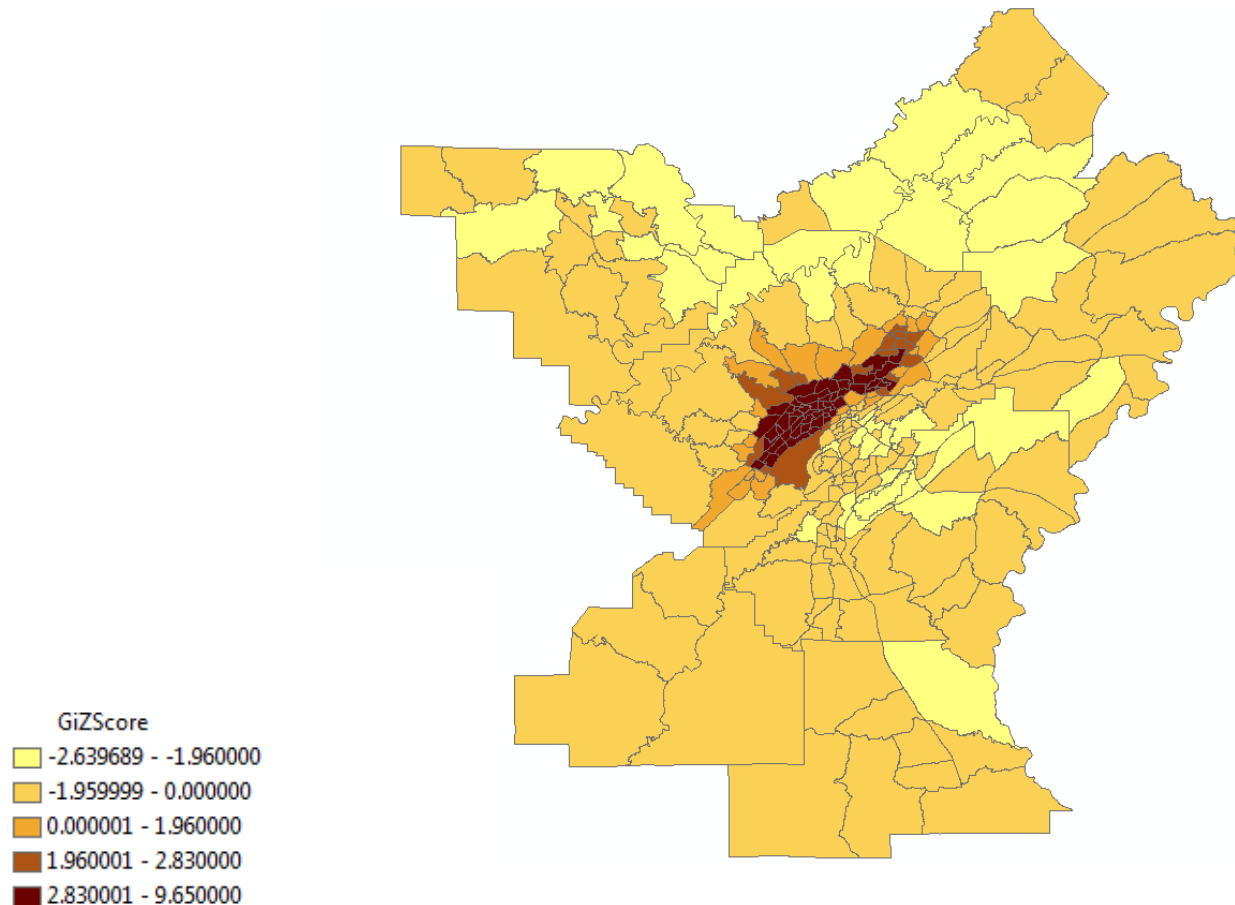
Gi* statistic example: San Francisco-Oakland-Hayward, CA MSA

Z-score of 0 corresponds to a neighborhood that is 7% Black

GiZScore
- ☐ -2.639689 - -1.960000
- ☐ -1.959999 - 0.000000
- ☐ 0.000001 - 1.960000
- ☐ 1.960001 - 2.830000
- ☐ 2.830001 - 9.650000

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Gi* statistic example: Birmingham-Hoover, AL MSA

Z-score of 0 corresponds to a neighborhood that is 28% Black

GiZScore
- -2.639689 - -1.960000
- -1.959999 - 0.000000
- 0.000001 - 1.960000
- 1.960001 - 2.830000
- 2.830001 - 9.650000

Table 3. Adjusted Hazard Ratios of Cardiovascular Disease and Coronary Heart Disease (and 95% Confidence Intervals) Associated With Each Standard Deviation Increase in Baseline Racial/Ethnic Residential Segregation

	No. of Events	Model 1*	Model 2†	Model 3‡	Model 4§
Incident cardiovascular disease					
Blacks	136	1.12 (1.02–1.22)	1.12 (1.02–1.23)	1.11 (1.02–1.22)	1.12 (1.02–1.23)
Hispanics	120	1.00 (0.95–1.05)	1.00 (0.94–1.08)	1.00 (0.93–1.08)	1.01 (0.94–1.08)
Whites	241	0.88 (0.81–0.96)	0.91 (0.81–1.02)	0.91 (0.81–1.01)	0.92 (0.82–1.02)
Incident coronary heart disease					
Blacks	55	1.18 (1.05–1.33)	1.16 (1.02–1.31)	1.15 (1.02–1.30)	1.17 (1.03–1.32)
Hispanics	60	1.03 (0.95–1.12)	1.03 (0.91–1.16)	1.03 (0.92–1.15)	1.03 (0.91–1.16)
Whites	103	0.88 (0.79–0.99)	0.94 (0.80–1.10)	0.94 (0.81–1.09)	0.96 (0.82–1.13)

BMI indicates body mass index; CVD, cardiovascular disease; and HDL, high-density lipoprotein.

*Adjusted for demographics (age, sex, study site, and, for Hispanics, nativity).

†Adjusted for all covariates in model 1 plus neighborhood covariates (neighborhood poverty, neighborhood social environment, and neighborhood physical environment).

‡Adjusted for all covariates in model 2, plus socioeconomic position (education, income, and health insurance status).

§Adjusted for all covariates in model 3, plus baseline CVD risk factors (systolic blood pressure, total cholesterol, HDL cholesterol, diabetes mellitus, BMI, cigarette smoking, current alcohol use, and physical activity).

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Longitudinal Associations of Neighborhood-level Racial Residential Segregation with Obesity Among Blacks

Lindsay R. Pool,[a] *Mercedes R. Carnethon,*[a] *David C. Goff, Jr.,*[b] *Penny Gordon-Larsen,*[c] *Whitney R. Robinson,*[d] *and Kiarri N. Kershaw*[a]

Background: Despite 50 years since the passage of the Fair Housing Act of 1968, the majority of black Americans continue to live in highly segregated communities. Differing exposure to obesogenic environments in segregated neighborhoods may contribute to racial disparities in obesity prevalence.

Methods: We used prospective data from the Coronary Artery Risk Development in Young Adults (CARDIA) study to examine associations between levels of neighborhood-level racial residential segregation and incident obesity in black men and women. Obesity, determined by measured anthropometry, and residential segregation, measured using the local G_i^* statistic, were recorded at baseline and follow-up at years 7, 10, 15, 20, and 25. We used marginal structural hazard of obesity (hazard ratio = 1.5 [95% confidence interval = 1.0, 2.3]) among women. We observed few differences in obesity incidence among men by segregation levels.

Conclusions: Fewer health-promoting resources, stressful neighborhood context, and social norms that are less stigmatizing of obesity may contribute to these findings, but more research on specific pathways leading from segregation to obesity is needed to understand differing patterns between men and women.

TABLE 3. Hazard of Incident Obesity by Racial Residential Segregation[a] Among Black Women and Men in the CARDIA Study, 1985–2011

	Women (n = 1,032)		Men (n = 888)	
	Discrete Time Hazard Model HR (95% CI)	Marginal Structural Model HR (95% CI)	Discrete Time Hazard Model HR (95% CI)	Marginal Structural Model HR (95% CI)
Baseline segregation[b]				
High	1.4 (0.93, 2.1)	—	0.94 (0.62, 1.4)	—
Medium	1.4 (0.87, 2.2)	—	0.86 (0.52, 1.4)	—
Low	1.0	—	1.0	—
Time-varying segregation[c]				
High	1.2 (0.94, 1.6)	1.3 (1.0, 1.7)	0.93 (0.66, 1.3)	0.86 (0.61, 1.2)
Medium	1.2 (0.85, 1.6)	1.2 (0.86, 1.6)	1.0 (0.85, 1.6)	0.96 (0.64, 1.4)
Low	1.0	1.0	1.0	1.0
Cumulative segregation[d]				
High	1.5 (0.93, 2.2)	1.5 (1.0, 2.3)	1.0 (0.64, 1.6)	0.94 (0.59, 1.5)
Medium	1.3 (0.82, 2.2)	1.4 (0.92, 2.3)	0.99 (0.60, 1.6)	0.95 (0.58, 1.6)
Low	1.0	1.0	1.0	1.0

[a]Levels of racial residential segregation categorized into high, medium, and low based on the value of the local G_i^* statistic, which measures the deviation of the racial composition of the census tract from the larger area. Segregation levels based on a G_i^* statistic z score of less than 0, 0–1.96, and greater than 1.96, represent low, medium, and high categories, respectively.

[b]Hazard of incident obesity by neighborhood segregation level as recorded at baseline, simultaneously adjusted for all covariates as recorded at baseline: age, field center, marital status, education, physical activity, current smoking, and income.

[c]Hazard of incident obesity by neighborhood segregation level as recorded at each exam, simultaneously adjusted for the following covariates as recorded at each exam: marital status, education, physical activity, current smoking, income, and age at baseline and field center at baseline.

[d]Hazard of incident obesity by neighborhood segregation level recorded as an average up to each exam, simultaneously adjusted for the following covariates as recorded at each exam: marital status, education, physical activity, current smoking, income, and age at baseline and field center at baseline.

Summary

- There is evidence supporting racial segregation as a fundamental cause of Black-White cardiovascular health inequities

- Knowledge gaps
  - Prospective studies examining individual- and neighborhood-level mechanisms
  - Sources of heterogeneity in associations of segregation with CVD risk
  - Critical periods in which segregation is more harmful or beneficial

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Addressing Structural
Determinants

How can researchers empower communities and guide policy makers in their efforts to address structural determinants of health inequities?

How to Embed a Racial and Ethnic Equity Perspective in Research

Practical Guidance for the Research Process

Kristine Andrews, Jenita Parekh, and Shantai Peckoo

(All authors contributed equally to this work)

A Child Trends Working Paper

URBAN INSTITUTE

Confronting Structural Racism in Research and Policy Analysis

Charting a Course for Policy Research Institutions

K. Steven Brown, Kilolo Kijakazi, Charmaine Runes, and Margery Austin Turner

February 2019

Five guiding principles for researchers to consider

1. Examine their own backgrounds and biases.

2. Make a commitment to dig deeper into the data.

3. Recognize that the research process itself has an impact on communities, and researchers have a role in ensuring research benefits communities.

4. Engage communities as partners in research.

5. Guard against the implied or explicit assumption that white is the normative, standard, or default position.

These principles apply to each stage of the research process

- Landscape assessment (environmental scan)

- Design and data collection

- Data analysis

- Dissemination

Landscape assessment

- Understand the historical and political context in which the research study will operate.

- Provide opportunities for stakeholders to share their perceptions of the apparent issue or topic.

- Be reflective to ensure that you confront any biases you hold about the population, community, or other factors that affect your study.

Design and data collection

- Are the community's values represented in the research questions?

- Have the researchers identified how the answers to the research questions will benefit the community?

- Do the research questions account for the cultural and historical context of the community?

- Do you have a diverse research team that can bring their perspectives into the entire construction of the entire research process?

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Data analysis

- Go beyond racial and/or ethnic group classification to look at structural and social determinants that might explain the observed findings

- Data disaggregation – allows us to uncover heterogeneity in lived experiences across race and ethnic groups
  - How to handle small groups (the "other" category)
  - Implications of including race as a dummy variable

Dissemination

- Devise a comprehensive dissemination strategy that considers the language used, stakeholders as the key audience, and actionable results

- Establish communication guidelines
- Diversify dissemination products
- Host data walks

Association of Changes in Neighborhood-Level Racial Residential Segregation With Changes in Blood Pressure Among Black Adults
The CARDIA Study

Kiarri N. Kershaw, PhD; Whitney R. Robinson, PhD; Penny Gordon-Larsen, PhD; Margaret T. Hicken, PhD; David C. Goff Jr, MD, PhD; Mercedes R. Carnethon, PhD; Catarina I. Kiefe, MD, PhD; Stephen Sidney, MD, MPH; Ana V. Diez Roux, MD, PhD

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Study population

- 2,281 Black participants of the CARDIA study

- Adults aged 18-30 years at baseline

- Recruited from four sites (Birmingham, AL; Chicago, IL; Minneapolis, MN; and Oakland, CA) between 1985 and 1986

- Participants were re-examined 2, 5, **7**, **10**, **15**, **20**, and **25** years later

Fair Housing Acts

- Fair Housing Act of 1968: Prohibits discrimination in the sale, rental and financing of dwellings based on race, color, religion, sex or national origin

- Fair Housing Amendments Act of 1988:
  - Expanded coverage to prohibit discrimination based on disability or on family status
  - Established new administrative enforcement mechanisms with HUD attorneys bringing actions before administrative law judges on behalf of victims of housing discrimination
  - Revised and expanded Justice Department jurisdiction to bring suit on behalf of victims in Federal district courts

CARDIA participants moved a lot over follow-up
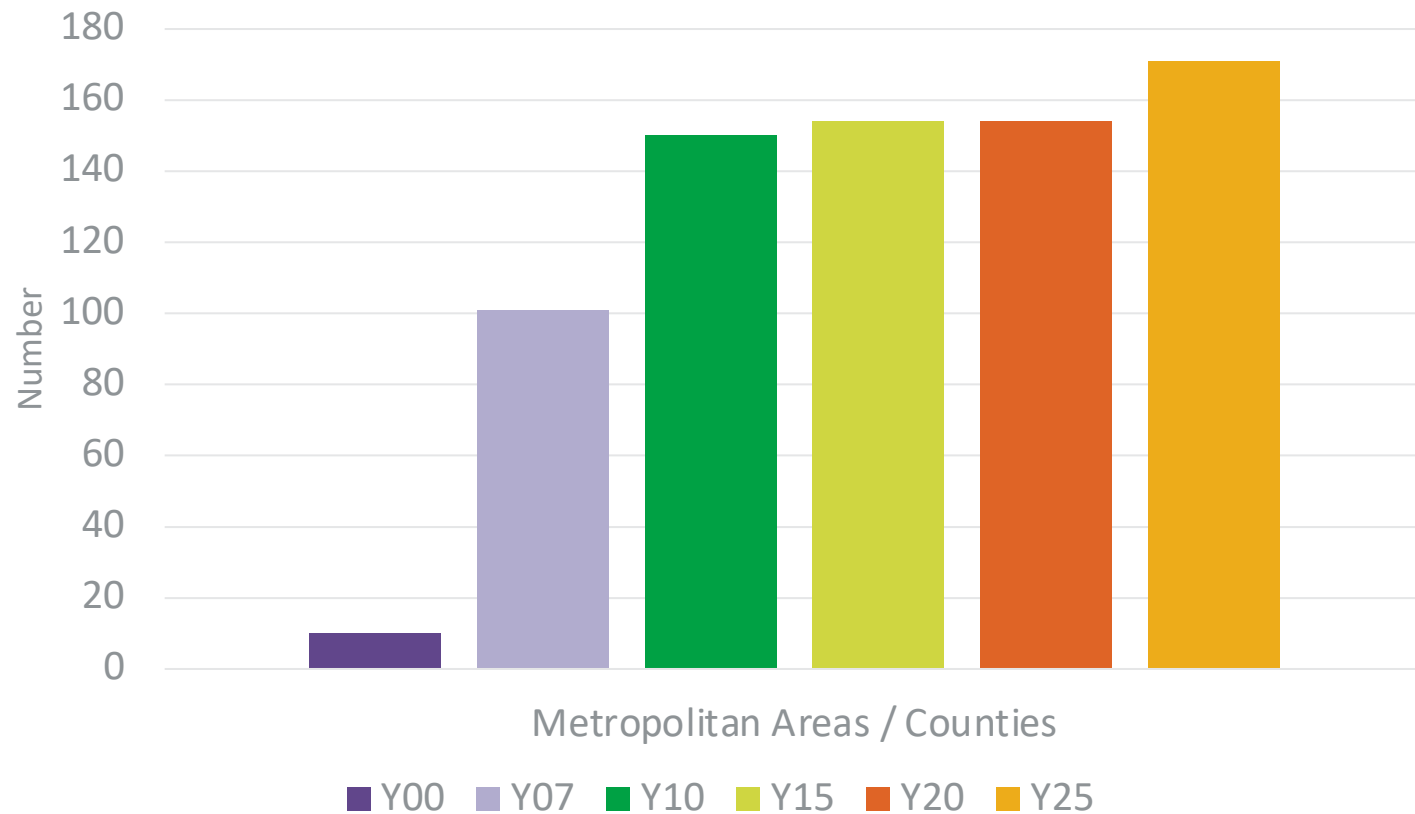
Movers were the ones experiencing reductions in exposure to segregation

Table 2. Mean Unadjusted Within-Person Change in G_i^* Statistic Between Successive Examinations Among "Movers" and "Stayers"[a]

Successive Examination Years	Stayers		Movers	
	No.	Within-Person Change in G_i^* Statistic, Mean (SD)[b]	No.	Within-Person Change in G_i^* Statistic, Mean (SD)[b]
Year 0 to year 7	862	0.28 (0.84)	991	−1.98 (3.98)
Year 7 to year 10	493	0	1067	−1.27 (3.79)
Year 10 to year 15	848	0.18 (1.09)	622	−0.34 (3.52)
Year 15 to year 20	640	0	703	−0.74 (3.26)
Year 20 to year 25	791	0.06 (0.85)	509	−0.20 (2.96)

Moves to less segregated neighborhoods associated with reductions in systolic blood pressure

Table 4. Mean Within-Person Change in Systolic and Diastolic Blood Pressure (95% CI) Associated With a Change in Segregation Category Among Study Participants in the High-Segregation Category at Baseline

Characteristic	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
Systolic BP, mean (SD), mm Hg				
High segregation	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Medium segregation	−1.19 (−2.08 to −0.31)	−1.29 (−2.21 to −0.37)	−1.22 (−2.14 to −0.30)	−1.31 (−2.23 to −0.39)
Low segregation	−1.33 (−2.26 to −0.40)	−1.49 (−2.51 to −0.47)	−1.38 (−2.40 to −0.37)	−1.48 (−2.50 to −0.47)
Diastolic BP, mean (SD), mm Hg				
High segregation	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Medium segregation	0.42 (−0.27 to 1.12)	0.33 (−0.39 to 1.06)	0.33 (−0.39 to 1.06)	0.20 (−0.51 to 0.92)
Low segregation	0.67 (−0.06 to 1.41)	0.53 (−0.28 to 1.33)	0.54 (−0.27 to 1.34)	0.42 (−0.38 to 1.21)

Abbreviation: BP, blood pressure.

[a] Model 1 adjusted for time since baseline, baseline age × time, sex × time, and field center × time.

[b] Model 2 adjusted for Model 1, neighborhood poverty, and neighborhood population density.

[c] Model 3 adjusted for Model 2, education, and marital status.

[d] Model 4 adjusted for Model 3, body mass index, current smoking, and physical activity.

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Conclusions

- Racial residential segregation is associated with a broad range of adverse health outcomes among Black people in the U.S.

- Developing policies that address the structures that produce inequalities in opportunity may have the greatest impact on health inequities

- All of us can play a role in addressing the structural factors data drive health inequities

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Questions?

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