



RESEARCH REPORT

Measuring Structural Racism

Approaches from the Health Literature

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Measuring Structural Racism: Approaches from the Health Literature

Introduction

In recent years, the number of studies examining how structural racism (see box 1 for definition) drives outcomes has skyrocketed across domains such as education, housing, urban planning, and environmental justice (Merolla and Jackson 2019; McGee 2020; Strand 2019; Stacy et al. 2022; Brand and Miller 2020; Alvarez 2022; Hammer 2019; Rice, Long, and Levenda 2022). The health field has also produced a broad range of research exploring the deleterious impacts of structural racism, as evidenced by the nearly 50-fold increase in citations on the topic between 2016 and 2021, with many scholars and organizations naming structural racism as a fundamental driver of health inequities (Dean and Thorpe 2022; Bailey et al. 2017; Churchwell et al. 2020; Yearby 2020; Ford and Airhihenbuwa 2010b).¹ Researchers have an important role in helping identify, reimagine, and redesign social structures that sustain structural racism. The insights from high-quality research are needed to meaningfully address structural racism and its effects on health.

However, research—even research that seeks to advance equity—can also do harm. With the increased interest in racism-related health equity research, prompted by the racial reckoning following the police murders of George Floyd and Breonna Taylor and media attention about the toll the COVID-19 pandemic took on people of color in 2020, came a wave of “health equity tourists,” defined by Lett and colleagues as “investigators—without prior experience or commitment to health equity research—[who parachute] into the field in response to timely and often temporary increases in public interest and resources” (Lett et al. 2022). In response, scholars called out such research as lacking conceptual frameworks that include structural racism, defaulting to problematic theory and methods (e.g., treating race as a biological fact by offering genetic differences as explanation for racial and ethnic inequities caused by structural racism), and ignoring the foundational and current work of Black scholars (Nweke, Isom, and Fashaw-Walters 2022; Azar et al. 2020; Anyane-Yeboah, Sato, and Sakuraba 2020). They also proposed new standards for publications focused on health equity in peer-reviewed journals.²

Researchers who want to advance equity and justice need varied methodological skills; strong conceptual foundations; and a willingness to question the cultural norms and values embedded in their fields, the research profession, and society more generally (Venkateswaran et al. 2023). This report focuses on one set of research skills needed to study racial inequality with a structural lens:³ quantitative measurement approaches, emphasizing structural racism as an independent or right-hand-side variable. It is intended to grow the skills of researchers who are familiar with the *concept* of structural racism and would like to quantitatively study its associations, causes, effects, and/or, ultimately, solutions but need grounding in how to measure it as a *construct and estimate its impact*. While this report alone is not sufficient to launch a researcher into empirical investigation of structural racism (see box 2 for some starting points for researchers new to the topic), it will be a useful tool for researchers as they craft their equity- and systems-oriented research questions and approaches, and, more importantly, as they grow their capacity and will to be more justice-oriented scholars.

BOX 1

Definition of Structural Racism

Structural racism is a complex topic that has made its way into mainstream societal discourse. As a result, the term is often used in slightly different ways and with slightly different meanings. To facilitate shared understanding and language, below are the definitions we use for the purpose of this report. We highlight the thinking of contemporary scholars whose efforts represent the latest in an ongoing attempt to hone collective understanding. These definitions build on those established by earlier scholars, including Fred Pincus, Camara Jones, and Eduardo Bonilla-Silva (Pincus 1996; Jones 2000; Bonilla-Silva 1997). As the concept of racism beyond the interpersonal has taken root, we can witness how it has shifted—growing more concrete, textured, and applied—as scholarship on the topic has become more empirical. The measurement we discuss in this report is in many ways a product of this development.

First, structural racism refers to the “totality of ways in which societies foster racial discrimination through mutually reinforcing systems of housing, education, employment, earnings, benefits, credit, media, health care, and criminal justice. These patterns and practices, in turn, reinforce discriminatory beliefs, values, and the distribution of resources” (Bailey et al. 2017).

We find the following definitions and distinctions from Braveman and colleagues also useful:

Systemic and structural racism are forms of racism that are pervasively and deeply embedded in and throughout systems, laws, written or unwritten policies, entrenched practices, and established beliefs and attitudes that produce, condone, and perpetuate widespread unfair treatment of people of color. They reflect both ongoing and historical injustices. Although systemic racism and structural racism are often used interchangeably, they have somewhat different emphases. Systemic racism emphasizes the involvement of whole systems, and often all systems—for example, political, legal, economic, health care, school, and criminal justice

systems—including the structures that uphold the systems. Structural racism emphasizes the role of the structures (laws, policies, institutional practices, and entrenched norms) that are the systems’ scaffolding ... Institutional racism is sometimes used as a synonym for systemic or structural racism, as it captures the involvement of institutional systems and structures in race-based discrimination and oppression; it may also refer specifically to racism within a particular institution. (Braveman et al. 2022)

A structure or a system is characterized as racist because of its effect—not necessarily because of its intent. Braveman and colleagues go on to say that: “Systemic racism systematically and pervasively puts Black people, Indigenous people, and other people of color at compounded disadvantage within society. It often can be traced to deliberate acts of discrimination in the past, such as laws mandating residential segregation by race. Once in place, however, systemic racism is often self-perpetuating, with persistently damaging effects on health even after the explicitly discriminatory measures are no longer in effect.” In other words, structural racism can and does exist within contemporary systems and institutions, even in the relative absence of explicit, intentional racism.

We largely use “structural” throughout this report and refer to system-specific and institutional examples of structural racism as appropriate. In searching for papers on the topic of structural racism and health, we included papers on systemic and institutional racism because the terms are commonly used interchangeably.

Road Map and Key Findings

In the following sections, we first summarize common approaches to measuring structural racism based on a literature search and provide a profile of each. We then discuss the analytic challenges of empirically measuring structural racism and assessing its impact. Finally, we explore how the continued growth in quantitative literature on structural racism can be an opportunity to examine the values embedded in research and how those values may need to shift to encourage more authentic and impactful scholarly activity in the service of racial justice.

We find:

- There are three general approaches to operationalizing structural racism, each with its own use cases driven by its strengths and weaknesses. Each is essential in its own right, which leads researchers to sometimes use combinations of them:
 - a. *Geographic or area approach* (i.e., analyzing racial segregation, racialized economic segregation, index of disproportionality or multiple proportions), which assembles a composite—generally indirect estimate of structural racism through the presence of place-

based racial disparity. This strategy is especially useful for measuring the big picture of structural racism, its magnitude, and its associations. It is less equipped for identifying solutions or for designing interventions.

- b. *Self-reported approach*, which measures individual-level experiences of structural forms of racism. This method is most useful when the goal is to understand people's experiences and how they may differ based on individual and environmental factors. While it can be challenging to discern the origins of people's experiences (e.g., interpersonal versus structural racism), thoroughly defining the structures being studied can help mitigate it. This approach can also be used to assess the impacts of policy changes or interventions on people's experiences.
 - c. *Specific policy approach*, which evaluates the effect of specific racist or anti-racist policies, both contemporary and historical, as structures. This approach is the obvious choice when the goal is to draw claims of causality and illuminate mechanisms.
- Structural racism is challenging to measure, regardless of the approach, because it simultaneously operates directly and indirectly, as a dependent and independent variable, at all geographical and social levels, and in complex and nuanced combinations with other forms of identity-based oppression.
 - Mitigating these challenges (since eliminating them is impossible) will require quantitative researchers to be theory-driven, historically rooted, and policy specific when implementing any approach.
 - As quantitative researchers continue to grow their work on structural racism, as with the study of other complex social phenomena, it will be important to work with people with lived experience of systemic inequity as well as with scholars of other disciplines and methodologies. Doing so will help situate models in the context needed to improve the credibility, accuracy, resonance, and, ultimately, impact of findings.

BOX 2

Additional Resources for Researchers Seeking to Conduct Racial Equity Research

This report focuses largely on measuring structural racism as an exposure and the challenges of doing so when the goal is ultimately to examine its impact. There are many steps of the research process that this report does not meaningfully engage with (e.g., problem definition, approach formulation, research design selection, analysis planning, etc.). Researchers looking for resources that discuss how to operationalize a structural racism lens across the research process should explore Urban's forthcoming

framework for structural racism research, RTI’s “Equity-Centered Framework to Research,” and Urban’s “Guide for Racial Equity in the Research Process” (Venkateswaran et al. 2023; DEI Council Working Group on Content and Communications 2020).

Similarly, this report assumes a baseline understanding of fundamental concepts like the social construction of race, race versus racism, and the differences and connections between interpersonal racism and structural racism.⁴

Finally, there is a large body of conceptual and theoretical literature on the topic of structural racism, its causes, and its effects within which empirical researchers should situate their work. Some leading theoretical work on structural racism’s impact on health and other outcomes include the Fundamental Causes of Disease, Critical Race Theory, Public Health Critical Race Praxis, the Social Determinants of Health, Intersectional Theory, and Political Economy Theory (Phelan and Link 2015; Delgado and Stefancic 2001; Ford and Airhihenbuwa 2010a; 2010b; Braveman and Gottlieb 2014; Williams and Mohammed 2013; Yearby 2020; Homan, Brown, and King 2021; Harvey 2021; Krieger 2012).

Literature Scan Methods

This report is informed by a scan of the quantitative empirical literature examining the relationship between structural racism and health. We used a snowball sampling strategy to identify peer-reviewed papers from the past 10 years that focused on structural, systemic, and/or institutional racism and health (i.e., we used papers with any of those terms in their title, abstract, or keywords). The 2018 systematic review by Groos and colleagues and the 2022 follow up by Needham and colleagues were particularly helpful in collecting the literature for this report (Groos et al. 2018; Needham et al. 2022). Groos and colleagues focused on the domains or contexts in which structural racism was measured in the 20 articles they found on the topic published from 2007 to 2017 as well as the measures and data sources used in those articles. Needham and colleagues identified additional 36 papers published between 2018 and 2022 and put forth a framework for advancing empirical research on institutional racism and health.

In total, we evaluated 70 papers (see literature table in appendix). We focused on research in the health sector both because of the authors’ backgrounds and, as noted above, because the field seems to be further along in its acknowledgment and study of structural racism thanks, in large part, to work in the public health and social epidemiology spaces. We intentionally used the words “scan” and “snowball sampling strategy” to describe our search: our examination of the literature was not exhaustive. New work on this topic is coming out weekly, and the literature on some aspects of structural racism is well-

established and therefore very large (e.g., segregation as a form of structural racism). Consequently, there are papers that we missed or did not include for capacity-related reasons. As a result, there may be other approaches to measuring structural racism that we have not captured. The ongoing work on the topic all but ensures that our catalog of approaches will need to be updated over time. Growing and refining the list of approaches, including by incorporating methods used and developed outside of the health and public health literature, will be an important charge for the field of equity-oriented research.

Three Approaches to Measuring Structural Racism

As described by Needham et al. (2022), structural racism measurement can be categorized according to several characteristics. Measures can be direct by evaluating the effect of a specific structure (e.g., policy, process, etc.) that is racist, and they can be indirect. An indirect or proxy measure captures the secondary effect of a racist structure. Or, as we suggest below, measures can demonstrate both indirect and direct characteristics. They can also document structural racism across single or multiple domains. Finally, measures can produce estimates of structural racism at various area levels (from the census tract to the state level and, theoretically, even higher) or at the individual level.

We identify three general approaches to quantifying structural racism in the articles we studied (summarized in table 1). The first approach measures structural racism at a geographic level to characterize the extent of it in a place. The second approach uses survey questions to identify experiences of structural racism, discrimination, and bias at the individual level. The third approach uses specific policies and laws enacted in the past or the present to understand the extent to which they contribute to structural racism or are anti-racist at the population level.

In the profiles of each approach that follow, we first present the background and describe how each measure is operationalized. Then, borrowing from Needham and colleagues, we describe the approach as direct, indirect, or both; multiple or single domain; and area-level or individual-level (collectively, “Needham properties”). Finally, we present our evaluation of the approach’s strengths and limitations.

Approach #1: Geographic Measures of Structural Racism

We find three strategies that use the geographic approach to measuring structural racism: measures of residential segregation, racialized economic segregation, and indices of disproportionality. These measures are indirect or proxy measures of structural racism and, when used in regression analysis, their impact will include unmeasured aspects of structural racism that are correlated with the measured

aspects. As a result, they are especially useful at quantifying the magnitude of the impact of structural racism but less useful at identifying its drivers or developing solutions. All three strategies have largely been used to study structural racism in terms of Black-white differentials, but they could be extended to other minoritized and marginalized groups or used in an intersectional analysis.

RACIAL SEGREGATION

Background: By far, the most established way of operationalizing structural racism is in the form of racial segregation measures, usually residential (i.e., geographic separation of housing by race). This is understandable, as residential segregation is one of the most well-known examples of racism built into law. The body of literature on segregation and health is robust enough to fuel multiple reviews on the topic (Kramer and Hogue 2009; Williams and Collins 2001). Racial residential segregation is most directly the result of historical and contemporary housing policy (e.g., redlining, restrictive covenants, exclusionary zoning). It has been deemed a fundamental and structural cause of racial health inequities because segregation drives the inequitable distribution of health-promoting resources (e.g., economic opportunity, education, clean air, healthy food availability) related to multiple health outcomes (Williams and Collins 2001). Residential segregation has been found to be associated with a host of health outcomes, including multiple kinds of mortality (e.g., all-cause, all-cause premature, chronic disease, nonchronic disease, and smoking), maternal health, and infant health (Kramer and Hogue 2009).

Segregation measures tend to quantify racism indirectly as opposed to directly measuring exposure to structurally racist policies and practices. This is understandable given the long and complex history of de jure and de facto racist housing (and other) policies at the local, state, and federal levels. Such measures are unidimensional, focused on the geographic distribution of people in a given sector (e.g., housing, education, etc.). They do not consider structural racism in multiple sectors or domains simultaneously; they generally focus on the dispersion of individuals within a geographic area and require data for a larger area, say a metropolitan region or city, and for a smaller area, say a neighborhood or census tract. However, these measures can be deployed at an array of area levels, from census tract to ZIP code, county, state, or region.

Notes on operationalization: Researchers have measured racial residential segregation in myriad ways in the extant literature. Following an extensive literature search, Massey and Denton identified 20 different indexes of segregation, which they classified into five key dimensions of segregation: evenness, exposure, clustering, concentration, and centralization (Massey and Denton 1988). The dissimilarity index (commonly applied to housing) and the Gini coefficient (applied to income), perhaps

the most widely used measures of segregation, are both measures of evenness.⁵ The Census guide provides a useful rundown of these five dimensions, measures in each dimension, and their formulas. Newer approaches also have been developed, including an index of contemporary mortgage discrimination and an index of historical redlining (Mendez, Hogan, and Culhane 2011; Beyer et al. 2016).

Strengths and limitations: Residential segregation is one of the most well-documented measures of structural racism. It is undergirded by a wide conceptual literature base, which makes it valuable to apply to novel outcomes. However, its unidimensional nature is limiting given the pervasiveness of structural racism. Such a focus can be appropriate if the goal is to understand the mechanisms surrounding one or a small set of policies, but it can be challenging when measuring segregation, given the long and complex history of segregationist policies at multiple levels of government and community. When used in the context of regression analysis, the coefficients will represent the impact of all the attributes of structural racism correlated with residential segregation. Additionally, some of the most commonly used measures of segregation are not very useful at the neighborhood or census tract levels (Kramer and Hogue 2009); for example, entirely white or Black neighborhoods would have the same dissimilarity index scores.

RACIALIZED ECONOMIC SEGREGATION

Background: Increasingly, efforts to empirically study and measure the intersecting and compounding nature of structural racism have taken more of a multidimensional approach. Massey developed the index of concentration at the extremes (ICE), which, unlike well-established measures of segregation like the dissimilarity index, simultaneously evaluates concentration of deprivation and privilege, and thereby provides a fuller picture of spatial social polarizations (Massey 2001). Krieger and colleagues then created a version that measures spatial polarizations of race and income, ICE_{Race-Income} (Krieger et al. 2017; Sonderlund et al. 2022). ICE_{Race-Income} has been used to examine and partially explain racial disparities in various types of mortality and birth outcomes (Chambers et al. 2019; Dyer et al. 2022; Krieger et al. 2018).

Racialized economic segregation measures tend to measure structural racism indirectly for reasons similar to those discussed above for residential segregation. However, unlike unidimensional segregation measures, racialized economic segregation measures are multidimensional in that they measure the intersection of racial concentration and economic concentration in place. They are area-level measures that have been applied at a host of levels, including census tract, ZIP code, and city.

Notes on operationalization: $ICE_{\text{Race-Income}}$ can be calculated using data from the publicly available American Community Survey and other sources according to the following formula: $ICE_i = (A_i - P_i) / T_i$, where, for a defined geographical area, A_i is the number of people in the most privileged extreme (i.e., white residents above the 80th income percentile), P_i is the number of people in the most deprived extreme (i.e., Black residents below the 20th income percentile), and T_i is the total Black and white population in the area (Krieger et al. 2018). $ICE_{\text{Race-Income}}$ is, therefore, scaled from -1 to $+1$, where -1 denotes that 100 percent of the population in the given area is in the most deprived group, and $+1$ denotes that 100 percent of the population is in the most privileged group.

Strengths and limitations: $ICE_{\text{Race-Income}}$ has several strengths over traditional measures of segregation, as identified by Sonderlund et al. (2022). First, its multidimensional and intersectional nature is more theoretically aligned with the concept of structural racism. Second, by combining geographic and social concentration into one measure, it also avoids multicollinearity issues that can arise when using separate measures as predictors in a single regression model. Third, it provides information about the direction of concentration as opposed to simply whether unequal distributions are present. Finally, it is informative and more valid than common measures of segregation at smaller geographic levels (e.g., census tract). However, it has some limitations: it should be adjusted to consider heterogeneity in cost of living, but data to do so at small geographic areas are limited; it only considers two racial categories in each analysis; and it can be a less intuitive construct to grasp.

INDEX OF DISPROPORTIONALITY

Background: The index of disproportionality (also called the “multiple proportions”) approach uses racial disparities in indicators within an array of domains to measure the “systematic exclusion of non-White groups from resources and mobility in society” (Lukachko et al. 2014). Developed by Lukachko and colleagues, this approach includes the domains of political participation, employment and job status, educational attainment, and judicial treatment at the state level to study individual risk of myocardial infarction. Since then, researchers have steadily continued to develop the approach across geographic levels (e.g., state, county, and PUMA levels), domains (e.g., adding housing, income, and health care), and measurement structures (e.g., developing single- or lower-dimension measures based on confirmatory factor analysis or latent class modeling (Chantarat, Van Riper, and Hardeman 2021; Wallace et al. 2017; Liu et al. 2019). Studies using this approach have found associations with myocardial infarction, body mass index, birth and maternal outcomes, and COVID-19 case and vaccination rates (Dougherty et al. 2020; Wallace et al. 2015; Tan, deSouza, and Raifman 2022).

The intent of the index of disproportionality approach (as reflected in the quote from Lukachko et al. above) is to measure the presence of differences that reflect structural racism—that is, it aims to measure structural racism indirectly through its effects. As discussed in the crosscutting challenges section below, those differences could be analyzed and interpreted as drivers of structural racism as well. This approach is multidimensional, with the dimensions included differing according to researchers' theory, research question, and data.

Notes on operationalization: The original and fundamental version of this approach was not an index. The name “multiple proportions” is more appropriate for the approach Lukachko and colleagues developed. They identified one to four indicators in each of the four domains mentioned above (political participation, employment and job status, educational attainment, and judicial treatment) and calculated Black versus white rate or prevalence ratios for each indicator ($P_b = 1 / P_w = 1$, where $P_b = 1$ is the proportion of Black people in a state experiencing an event and $P_w = 1$ is the proportion of white people experiencing an event). For example, in the employment and job status domain, the authors calculated the state-level ratio of Black to white employment rates. The indicators were then entered individually into generalized estimating equation models overall and stratified by race. As noted above, researchers have continued to develop the approach, adding more domains, applying it at more area levels, supplementing the rate ratios with other domain-specific measures of structural racism (e.g., dissimilarity index to measure segregation), and using various techniques to combine the indicators into one measure of structural racism. For example, Chantarat and colleagues calculated measures of Black-white residential segregation and inequities in education, employment, income, and homeownership at the Public Use Microdata Areas (PUMAs) level and then used latent class modeling to consolidate them into a single multidimensional measure of structural racism (Chantarat, Van Riper, and Hardeman 2021). Dougherty and colleagues used confirmatory factor analysis to identify one construct of structural racism at the county level that combined measures—including the H (entropy) index of income inequality, school-based dissimilarity index, and prevalence ratios—across five domains (Dougherty et al. 2020).

Strengths and limitations: The index of the disproportionality approach's obvious strength is its multidimensionality, which makes it better able to capture the systemic nature of structural racism. Moreover, the ability to use latent variable methods (e.g., factor analysis, cluster analysis, latent class analysis) makes it particularly appropriate for studying the directly unobservable nature of structural racism. For both reasons, it is a strong tool for studying structural racism at the macro level. However, that advantage also makes the approach less appropriate for understanding the mechanisms by which structural racism impacts health and other outcomes. Additionally, there is work to be done to

strengthen its historical and theoretical underpinnings. Past authors working to develop the approach were rooted in conceptual definitions of structural racism (i.e., “systematic exclusion of non-White groups from resources and mobility in society”), but those roots are less clearly present in the selection of domains and indicators within them. For example, Lukachko and colleagues used political participation, employment, educational attainment, and judicial treatment as their domains, but they did not explain why those domains were selected or how they selected specific indicators within those domains. Presumably, and understandably, the authors made these decisions based on data availability, which is a significant challenge, especially in studies in smaller geographic areas. The field of researchers studying structural racism as an independent variable would benefit from broader discussion about the gap between construct and concept; as an area of particularly active growth and development, researchers working on the multiple proportions approach can help model this and lead the way.

Approach #2: Self-Reported Experiences of Structural Racism

The second category of approaches uses surveys to operationalize the extent of structural racism at the individual level. This approach is especially useful for quantifying the depth and breadth of how individuals experience racism and how they might differ based on various individual- and higher-level characteristics. The self-reported approach could help identify the mechanisms through which structural racism operates, propose areas in need of intervention, and evaluate the impact and efficacy of those interventions, especially at the institutional and organizational levels. These more confined contexts allow for greater specificity in terms of the structures being evaluated (e.g., a company’s promotion process), which in turn could make the approach more effective. We could also imagine using this approach to gauge population-level attitudes and perceptions in the wake of significant policy changes or sociocultural events.

Background: Surveys are a tried-and-tested tool for measuring experiences of interpersonal racism, discrimination, and bias (Bastos et al. 2010). Instruments have also been developed to try to measure experiences of structural racism in various systems and institutions. The self-report approach aims to be a direct way of measuring structural racism, across one or multiple domains, at the individual level.

Notes on operationalization: Several self-report survey instruments have been developed to capture the experience of different age groups (e.g., adolescents and youth as well as adults) and in different settings (e.g., workplaces, schools). Some ask about discrimination because of one’s race and ethnicity more generally, while others were developed for a specific racial/ethnic group. Examples include the Index of Race-Related Stress (IRRS), the Workplace Racial Bias Measure, the Asian American Racism-

Related Stress Inventory, and the Adolescent Discrimination Distress Index (Utsey and Ponterotto 1996; Hughes and Dodge 1997; Liang, Li, and Kim 2004; Fisher, Wallace, and Fenton 2000). For instance, the IRRS is composed of four subscales of racism (cultural, institutional, individual, and collective) along with a global racism measure. Items in the institutional subscale of the IRRS ask about agreement with statements such as, “You have noticed that the public services are inadequate or nonexistent in Black communities (e.g., police, sanitation, street repairs, etc.)” and “You did not receive a promotion you deserved; you suspect it was because you are Black” (Utsey and Ponterotto 1996). Adolescent and brief versions of the IRRS also exist, both of which include the institutional subscale (Seaton 2003; Utsey 1999). The Adolescent Discrimination Distress Index contains three subscales: institutional discrimination, educational discrimination, and peer discrimination. Examples of items in the institutional subscale include statements such as “People expected less of you than they expected of others your age,” “You were hassled by police,” and “You were hassled by a store clerk or store guard” (Fisher, Wallace, and Fenton 2000). Adolescent scales exist for measuring perceptions of structural discrimination in schools (Cogburn, Chavous, and Griffin 2011; Butler-Barnes et al. 2019).⁶

Strengths and limitations: The desire to identify a self-reported method of describing structural racism is compelling but challenging. Other approaches that measure structural racism at the aggregate or geographic level essentially leave no space for capturing people’s lived realities of oppression. A self-reported measure is a way to document how individuals witness and experience structural racism in the systems and institutions with which they interact. Developing self-report instruments also forces specificity with respect to structures and therefore can be useful for formulating interventions and reforming structures. It is not clear that any of the geographic measures can disentangle the institutional from the structural. The self-report method gets closest to measuring the production of structural racism—or structural racism as an outcome—which is what makes it a useful tool for formulating interventions. This is a substantial advantage. However, a fundamental challenge is that it can be difficult for an individual to distinguish between the experience of institutional/systemic racism and interpersonal racism. For example, a candidate for a promotion may not know whether they were unsuccessful because of individual bias on the part of their supervisor or because of institutional bias propagated by a structurally inequitable selection process. This is true of the other approaches as well, of course. But the area-level and indirect nature of those approaches builds in an expectation of this measurement complexity and, ultimately, error. Additionally, as the examples of instrument items shared above convey, there is a lot of variability in how “institutional racism” is conceptualized in the development of survey instruments. The self-report approach arguably makes the most sense when the researcher has clear definitions of structural/institutional/systemic racism and wants to study it in the form of the experienced effects of a specific, well-defined, potentially racist or anti-racist policy or

process within a specific setting. In the absence of this nuance, the self-report approach may be useful as a more rudimentary “pulse-check” of attitudes and experiences, especially in the context of noteworthy sociopolitical events.

Approach #3: Historical and Contemporary Policy as Specific Structures

The third approach to operationalizing structural racism involves examining a specific structure that is purported to be either racist or anti-racist and its connection to outcomes of interest. This approach is most commonly used with federal policy, both historical and contemporary, but it could be used with state and local policies as well as other structures, including statutes, processes, rules, regulations, and protocols. Because of the tight focus on a defined structure, when paired with the right analytical design and data, this approach could be used to make causal claims.

Background: The most common racist structure that has been studied is probably historical redlining (i.e., the practice of systematically denying mortgage loan applications in certain areas based on race) and contemporary health outcomes. For example, Collin et al. (2021) found redlining to be associated with breast cancer, and Wing et al. (2022) found an association with stroke prevalence. (See the appendix for more examples.) Jim Crow polity (i.e., laws that enforced racial segregation in the South after Reconstruction and before the civil rights era) has also been used as a measure of structural racism in the health literature. A study by Krieger and colleagues found that being born in a Jim Crow region (i.e., 21 states and the District of Columbia) was associated with higher odds of estrogen-receptor-negative breast cancer for Black women. (Krieger, Jahn, and Waterman 2017; Krieger et al. 2014). Investigations of contemporary policy as vehicles of structural racism or anti-racism have also been done. For example, a recent study examined the association between state-level voter restrictions and access to health insurance.⁷ Other studies could examine Medicaid expansion and nonexpansion as examples of structural anti-racism and racism, respectively.

The policy-specific approach can study structural racism both directly and indirectly. It is possible to directly examine the effects of a contemporary policy, whereas historical policy involves a more indirect examination of effects and consequences over time. Policies tend to be focused on one domain, so this approach to defining exposure to structural racism is generally unidimensional. Assuming the correct data availability, the policy-specific approach can be applied at any area level and, if a policy directly affects individuals (e.g., immigration policy), it can be studied at the individual level.

Notes on operationalization: Studies using this approach must begin with a well-defined policy that the researchers assert is either an intentional or unintentional vehicle of structural racism or

counterweight to structural racism. Historical policies examined, as noted above, have included Jim Crow polity, civil rights policies, and redlining (Almond and Chay 2006; Hahn, Truman, and Williams 2018; Krieger et al. 2013). Some of the contemporary policies studied include local spending, immigration policy, police and court-related fees and fines, and voter restrictions (Ronzio, Pamuk, and Squires 2004; Sabo et al. 2014; Davis et al. 2023; Pabayo et al. 2021). Agénor and colleagues recently published a database of structurally racist and anti-racist policies that will be a great asset for researchers using the policy-specific approach (Agénor et al. 2021). Analyses that look at a raft of policies at a general population level are well suited to depict macro-level, potentially causal effects, whereas analyses of more specific policies, especially when studied within a defined institutional setting, allow for a more detailed examination of causal effects that isolate the chain of events between structure and outcome. For example, both Krieger et al. and Almond et al. studied the effects of the Civil Rights Act. Krieger and colleagues took a public health angle and looked broadly at how the end of Jim Crow was associated with patterns in Black and white premature mortality rates from 1960 to 2009. They found evidence that the ending of Jim Crow enduringly helped reduce the racial disparity in premature mortality (Krieger et al. 2014). Almond and colleagues looked more specifically at the passage of Title VI of the Civil Rights Act and its effect on racial disparities in infant mortality through the desegregation of hospitals in the South. They concluded, among other things, that Title VI enabled at least 25,000 infants from 1965 to 2002 to survive infancy (Almond, Chay, and Greenstone 2006).

Strengths and limitations: A primary strength of using a specific policy as a measure of structural racism is the ability to more thoroughly examine the mechanisms by which it might be related to health outcomes. As a result, this approach lends itself to telling the story of structural racism and demonstrating how it plays out in systems and institutions and, ultimately, what can be done to dismantle it. But the approach's focus on a single policy can be a shortcoming in that it leaves little space for the multitude of simultaneous forms of structural racism that act on a given outcome and that likely confound, mediate, and moderate any analysis of the policy's effect. It is not the best approach if the goal is to develop a composite or an aggregate sense of the structural racism at play. Using contemporary policies as measures of structural racism may be particularly challenging when the policies are not explicitly racist or race-based in the same way they were in the past. In these instances, researchers will need to take extra steps to explicate their reasoning for why the policy in question is structurally racist or anti-racist, such as its de facto disproportionate impact on other outcomes.⁸ For example, voter suppression laws are not de jure racist, but one can make the case that their disparate impact by race is de facto racism.

TABLE 1

Three General Approaches to Measuring Structural Racism as an Exposure and a Sample of How They Have Been Used

Approach and Example Papers	Direct or Indirect?	Multi- or Single Domain?	Individual or Area-Level?	Potential Approach Inputs	Selection of Health Outcomes Studied	Selection of Analytical Approaches Used
Approach #1: Geographic Area						
Racial segregation						
Zhou et al. 2017 Mendez et al. 2014 Kramer 2009	Usually indirect	Single	Area, including: <ul style="list-style-type: none"> ▪ Census tract ▪ County ▪ ZIP code ▪ Region 	<ul style="list-style-type: none"> ▪ Place (e.g., housing, employment, education) 	<ul style="list-style-type: none"> ▪ Survival time after cancer diagnosis ▪ Preterm birth ▪ Stress among pregnant people 	<ul style="list-style-type: none"> ▪ Cox proportional hazards regression ▪ Log binomial regression ▪ Multilevel logistic regression
Racialized economic segregation						
Janevic et al. 2020 Dyer et al. 2022	Usually indirect	Multi	Area, including: <ul style="list-style-type: none"> ▪ ZIP code ▪ Census tract ▪ City 	<ul style="list-style-type: none"> ▪ Place (e.g., housing, employment, education) ▪ Income 	<ul style="list-style-type: none"> ▪ Preterm birth ▪ Birth weight ▪ Mortality, various types ▪ Severe maternal morbidity 	<ul style="list-style-type: none"> ▪ Generalized linear mixed models ▪ Logistic regression ▪ Fairlie nonlinear decomposition
Multiple proportions						
Lukachko et al. 2014 Dougherty et al. 2020 Chantarat et al. 2021	Indirect	Multi	Area, including: <ul style="list-style-type: none"> ▪ State ▪ County ▪ PUMA 	<ul style="list-style-type: none"> ▪ Political ▪ Employment ▪ Education ▪ Criminal-legal ▪ Housing ▪ Economic stability ▪ Health care 	<ul style="list-style-type: none"> ▪ Myocardial infarction ▪ Body mass index ▪ COVID-19 vaccination rates ▪ Mortality, various types ▪ Severe maternal morbidity ▪ Preterm birth ▪ Low birth weight ▪ Police shooting rates 	<ul style="list-style-type: none"> ▪ Logistic regression ▪ Mixed effects models ▪ Poisson regression ▪ Latent class models ▪ Ordinary least squares regression ▪ Generalized estimating equation models ▪ Random effects models

Approach and Example Papers	Direct or Indirect?	Multi- or Single Domain?	Individual or Area-Level?	Potential Approach Inputs	Selection of Health Outcomes Studied	Selection of Analytical Approaches Used
Approach #2: Individual/self-report						
Atkins 2014 Greer 2014 Seaton 2010	Direct	Single or multi	Individual	<ul style="list-style-type: none"> ▪ Employment ▪ Education 	<ul style="list-style-type: none"> ▪ Psychological well-being ▪ Treatment adherence ▪ Mistrust of providers ▪ Stress 	<ul style="list-style-type: none"> ▪ Ordinary least squares regression with interaction ▪ Bivariate analyses ▪ Descriptive statistics
Approach #3: Historical and Contemporary Policy as Specific Structures						
Krieger et al. 2017 Kaplan, Ranjit, and Burgard 2008 Almond and Chay 2006	Usually indirect	Usually single	Area, including: <ul style="list-style-type: none"> ▪ Census tract ▪ County ▪ State ▪ Region 	<ul style="list-style-type: none"> ▪ Civil rights era policies overall and in specific institutions/systems ▪ Jim Crow polity ▪ Redlining policies ▪ Migration ▪ Local spending ▪ Voting ▪ Justice system 	<ul style="list-style-type: none"> ▪ Mortality, various types ▪ Estrogen-receptor-negative breast tumors ▪ Birth weight ▪ Gestational length ▪ APGAR score ▪ Life expectancy at 35 ▪ Distress ▪ Negative emotions 	<ul style="list-style-type: none"> ▪ Hierarchical age-period cohort models ▪ Poisson regression ▪ Logistic regression ▪ Generalized linear mixed models ▪ Differences-in-differences regression ▪ Ordinary least squares regression

Source: See literature table in appendix.

Thoughts on Selecting an Approach

Each of the three approaches described above has its own strengths and limitations and, therefore, its own use case. The “right” approach will be the one that aligns with the researcher’s conceptualization and definition of structural racism, empirical questions, data, and analytical tools. The area or geographic approach (e.g., segregation, racialized segregation, and the index of disproportionality) is well matched to the latent nature of structural racism and is best suited for measuring structural racism’s aggregate and multidimensional impact. It has less to offer if the goal is to understand mechanisms and drivers, and data availability can be limiting, especially at smaller geographic units. The self-reported approach uses surveys to operationalize structural racism through individuals’ experiences with it, generally at the institutional or organizational level. This approach may be worth considering for researchers who are interested in understanding people’s lived experiences of structural racism, especially when that structure is (or can be) well-defined. When structural definition is available, it can also be useful for identifying potential interventions. The challenge of asking an individual to parse their experience of structural versus interpersonal forms of racism compromises its ability to isolate causal effects. The policy-specific approach operationalizes structural racism through the identification of a specific historical or contemporary racist or anti-racist structure. This approach has the greatest potential to help researchers illuminate mechanisms and test solutions. Each strategy allows researchers to analyze different aspects of structural racism, and each is important in helping to measure impact and, along with advocates, policymakers, and community members, develop solutions. We also observe examples of combining approaches to leverage the strengths of each (see the [literature table](#) for several examples).

Crosscutting Challenges of Measuring Structural Racism as an Exposure

The pervasive nature of structural racism across levels of society and government, sector, and time makes it challenging to measure as an exposure. This complexity merits discussion as it is a challenge that the field will have to contend with to advance the value that quantitative methods can add to structural examinations of racial inequality.

Structural Racism as an Outcome and a Cause

Structural racism is socially constructed through (or caused by) a complex series of historical and contemporary processes occurring and reinforced at multiple levels (e.g., cross-system, systemic, institutional, organizational, interpersonal). It is also a contributor to racial disparities in many outcomes through a multidimensional array of pathways. Most studies in our scan have used some measure of structural racism as a predictor variable; all the literature referenced in table 1 does so, for example. The focus on structural racism as an independent variable makes sense given the interest in understanding the effects of structural racism to make a sharper case for addressing it and improving health disparities.

While this report focuses on measuring the impact of structural racism, it is important to note that other researchers are using empirical methods to understand the production of structural racism. One vein of this is work that documents the effects of policies that structurally create inequality; for example, work by Scott et al. (2020) on how segregation and local policy created an overconcentration of alcohol outlets in majority Black neighborhoods in Louisiana and Alabama. Another vein studies the production of structural racism to better incorporate it as a predictor. See, for example, the construct development work by Dougherty et al. (2020); Chantarat, Van Riper, and Hardeman (2021); and Hardeman et al. (2022). The work by Agénor and colleagues to build a database of state-level structural racism-related policies also delves further into how structural racism is created (Agénor et al. 2021), as do more policy-focused measurement approaches (Almond, Chay, and Greenstone 2006; Ronzio, Pamuk, and Squires 2004; Krieger, Jahn, and Waterman 2017). Moving forward, additional study of the policy and social processes that result in structural racism will be important for making evidence-based recommendations on how to eliminate it. Moreover, the “endogenous” nature of some of the measures of structural racism described above makes empirical estimates of its impact more complicated.

Calibrating Geographic and Temporal Scale

There is no one geographic scale at which structural racism should be studied because it exists at all geographic levels. When it comes to making choices about a geographic level, the general advice is to follow the lead of the research question and the policies at its heart and, absent a clear read on that, to use theory, existing literature, and hypothesis as guides (Needham et al. 2022). For instance, if exposure to structural racism is measured in the form of racially inequitable education funding, a researcher would be justified in measuring that exposure at the local level because education funding in most states comes from local property tax. However, state and federal policies undoubtedly play a large

role—and, in some states, they are the primary sources of education funding—so researchers should also think about analytical approaches that capture multilevel and cross-level exposures (discussed more below). To add even more complexity, individuals occupy different places across the varying aspects of their lives (e.g., where they live, work, play, etc.), and they, of course, sometimes relocate their lives altogether. Researchers are just beginning to develop methods for measuring structural racism as a dynamic exposure that changes over time and place (Graetz, Boen, and Esposito 2022). Both geographic and temporal scale are dimensions of operationalizing exposure to structural racism that will require thoughtful decisionmaking, explanation, and innovation on the part of researchers.

Indirect Measurement of Structural Racism and Simultaneity

In many cases, structural racism is simultaneously a left- and right-hand variable, which poses substantial measurement and downstream analytical challenges. This is most obviously true when considering the indirect aspects of different approaches. Take, for example, the multiple proportions approach, which measures structural racism as the racial disparity at a given geographic level in indicators within and across various domains (e.g., education, housing, employment). Stemming from the conceptualization of structural racism as “the systematic exclusion of non-White racial groups from resources and mobility in society as a means to secure or maintain power,” we can imagine how measuring the racial disparity in bachelor’s degree attainment is, in a sense, a direct measurement of systematic exclusion from education as a resource (Lukachko, Hatzenbuehler, and Keyes 2014). But the disparity in bachelor’s degrees is also an effect of structural racism in education and other systems, thereby making it an indirect measure. Put another way, education inequity is both an effect and a cause of inequities. This is likely true for any indirect measure that captures the effect of structural racism more distally from its exposure. In a regression context, all the approaches yield variables that do a lot of work: each measure takes on all the aspects of structural racism that are correlated with it. For example, when estimating the effects of residential segregation on outcomes, the segregation measure captures not only the impact of where people live but all the other factors that come with racially and economically segregated areas.

The challenge of simultaneity lessens when longitudinal data that allow researchers to tease apart the $A \rightarrow B$ and $B \rightarrow A$ dynamics are available. But when studying structural racism, even this relatively rare data richness is likely to be inadequate given the mosaic nature of structures within systems (i.e., laws, policies, and institutional practices) and the manifold ways in which they inequitably affect marginalized individuals. Dissecting all these paths stretches the bounds of what we can even imagine,

much less study using existing data and analytical tools. So, some degree of simultaneity bias will be an issue when indirectly studying structural racism and its effect.

However, generally, this challenge was not acknowledged or discussed in the papers we reviewed. One exception was a paper by Graetz and colleagues, “Structural Racism and Quantitative Causal Inference: A Life Course Mediation Framework for Decomposing Racial Health Disparities,” which features an excellent critical discussion of the shortcomings of conventional quantitative approaches for examining structural racism and demonstrates a set of alternatives that, among other things, uses longitudinal data to evaluate the process of structural racism (Graetz, Boen, and Esposito 2022).

Measurement Error and Analytical Approaches for Modeling Structural Racism as an Exposure

How structural racism enters a model brings up questions related to measurement error and how well the effect of structural racism is estimated. This is particularly important when operationalizing structural racism as a causal or descriptive predictor variable, rather than an outcome. As a starting point, we might think of structural racism as a policy that (mis)delivers a “treatment” (e.g., schooling). If this is the theory of change, then we want to avoid using the *individual* characteristic of racial group membership to represent *structural* racism in that policy. Race may be an individual moderator and/or a mediator of the treatment effect, but it is not the variable that captures structural effects.

What we want to measure is how that treatment is structured in ways that deliver different opportunities to different groups. To get at the how, some scholars use index variables (as described above) to capture the contribution of multiple systems. That may work if we are conceptualizing structural racism as operating only on one level, as in a typical ordinary least squares regression model. Indeed, many of the papers we found used single-level analyses, including ordinary least squares regression, logistic regression, Poisson regression, negative binomial regression, difference-in-difference, and Cox proportional hazards/survival analysis.

However, we know that structural racism operates on multiple levels of society simultaneously (i.e., individual decisionmakers are nested within institutions that belong to systems), which requires that we model it differently (Evans et al. 2018). In addition, structural racism operates as a cross-classified phenomenon wherein lower-level units belong to combinations of higher-level units. For example, in education research, students are often nested together within schools and separately within neighborhoods. Schools are generally nested within neighborhoods, but not all students who attend a given school live in the same neighborhood, nor do all students in a given neighborhood attend the same

school. Each level or classification contributes to the total “quantity” of structural racism that contributes to or causes a particular outcome. Failing to incorporate cross-classified structures into modeling and instead using a simpler hierarchical or a nonhierarchical approach on cross-classified data can lead to overestimating the importance of some levels while underestimating the importance of others (Raudenbush et al. 2001). Several of the papers we captured in our scan used multilevel methods, but none developed cross-classified models as far as we could tell.

Another way that measurement error manifests is the misalignment between the theoretical effect measured (i.e., the estimand) and the chosen estimate of it. As a field, researchers engaging in descriptive or causal structural racism analysis largely have not yet pinpointed the effects they seek to measure. In some cases, they care about average effects of a policy on a total population (e.g., rates of experiencing homelessness) or differences in average effects between sub-populations (e.g., racial disparities in rates of experiencing homelessness). In other cases, they care about the degree of dispersion or concentration that a policy creates. In the housing example, looking for dispersion effects could be useful if one hypothesizes that the policy in question pushes unstably housed people into ongoing homelessness. In general, we have not aligned how we think structural racism shows up as an effect (estimand) and the actual measurement of that effect (estimator and estimate). Additionally, oftentimes estimates of structural racism involve comparing the outcomes of Black individuals to those of white individuals. Essentially, all the approaches we present in this report do so, at least to a degree. Quantitative Critical Race Thinking (QuantCrit) encourages examining how comparing racial groups this way may reinforce privilege and whiteness as the norm by which all others are measured (Garcia, López, and Vélez 2018; Arellano 2022).

Reflections on the Values Embedded in Quantitative Research

Underlying many of the crosscutting challenges described above are the foundations of the knowledge-generating process. Embedded in those foundations are mental models, paradigms, and norms of traditional academic scholarship in keeping with Western European standards that may not be aligned with the pursuit of social justice (Garcia, López, and Vélez 2018). We feel it is important to anchor the more tactical bulk of this report in a set of values-oriented considerations. In the broadest sense, the following four recommendations apply to any researchers seeking to study and eliminate structural oppression of any form.

Acknowledge the Bounds of Quantitative Approaches to Understanding Structural Racism

Developing a measurable construct of structural racism for research purposes that simultaneously (1) resolves the multitude of definitions of the concept, (2) intersects multiple domains of society, (3) reflects historical and contemporary influences, (4) can be used at different geographical levels, and (5) is cyclical, such that it can be viewed as both an exposure and outcome depending on the context, is a feat that likely extends beyond any extant methodological or statistical approaches. This report documents several approaches to operationalizing structural racism as well as their substantial limitations.

Quantitative researchers can add to the collective understanding of the impact of structural racism, how it is experienced, and how it can be eliminated. Measuring structural racism is an essential prerequisite for pushing beyond disparities studies that reinforce our cultural fixation on the individual (e.g., in terms of risk, responsibility, and intervention) and using quantitative methods to interrogate the root causes of those inequities and investigate structural reforms (Hardeman et al. 2022). More pragmatically, because of the pervasiveness of structural racism across nearly all domains of American society, measurements are likely to be statistical underestimates (i.e., bias toward the null) of its true effect. Therefore, the methodological limitations should not deter researchers from intervening when there is a documented effect, as such interventions can still have substantial societal impact. Remaining clear-eyed about the shortfalls of the approaches can encourage quantitative researchers to innovate and to think more inclusively about the partnerships and the ways to build knowledge that are necessary.

Acknowledge the Importance of Other Forms of Knowing

In attempting to measure something as complex and omnipresent as structural racism, researchers will continue to run up against the bounds of what quantitative methods can do. Quantitative methods will not be able to provide perfect answers—they never can. But this may be especially so when trying to understand and address a phenomenon as massively complex, interconnected, and embedded as structural racism. Acknowledging this limitation invites other ways of learning and knowing into the fold. Qualitative, community-engaged, and emancipatory methods, among others—and those who know how to use them—must have a place at the table when illuminating the nature of structural racism, its effects, and its solutions. The work of W. E. B. Du Bois and Ida B. Wells are historical examples of the powerful combination of quantitative and qualitative methods for capturing both the population-level

magnitude and lived experience of structural racism (Du Bois 1904; Battle-Baptiste and Rusert 2018; Wells 1895). More recently, we can look to the work of the Ferguson Commission and the Healing ARC for examples of the use of community-embedded, qualitative, and emancipatory methods to understand and address structural racism (Ferguson Commission 2015).⁹

Discussing the limitations of quantitative approaches to understanding structural racism and embracing other ways of producing knowledge is also an opportunity to question the norm, within research and beyond, that valorizes quantitative methods and numbers as truth. Quantitative researchers should be vocal participants in the conversation about the limits of quantitative methods—they, after all, know the limitations better than anyone else. Any research purporting to use quantitative approaches to study structural racism should include a healthy and frank discussion of the challenges of doing so and the importance of incorporating other methods.

Ground Quantitative Empirical Work in Theory and History

As indicated above, it is critical that quantitative empirical researchers situate their work in theory. At times, “empirical” work and “theoretical” work are used as complementary and mutually exclusive—that is, they fit together, but oftentimes in the sense that one picks up where the other left off, which can make it easy for the two to drift apart. This tendency, problematic perhaps in all contexts, is especially so when the topic of interest is structural racism and inequity because it may mean propagating inequitable norms through practice as researchers (Hardeman and Karbeah 2020). Failing to root quantitative empirical projects in relevant conceptual foundations of structural racism can mean discounting decades of work done largely by scholars of color and aggrandizing quantitative knowledge and methods (Venkateswaran et al. 2023). As Clemans-Cope, Garrett, and McMorro explain, “a strong conceptual framework can clarify analytic choices, contextualize research findings, incorporate the effects of structural racism and other upstream causal factors, and thereby prevent potential misinterpretation of results. In addition, a strong conceptual framework is necessary for moving beyond documenting disparities to explaining them and identifying solutions. This facilitates a more useful understanding of the specific causes and potential remedies of the disparities” (Clemans-Cope, Garrett, and McMorro 2023). Similarly, researchers should spend time evaluating the history that undergirds the phenomena they are studying. Understanding present-day health disparities and the structural mechanisms that produce them oftentimes requires examining how present-day, race-neutral policies, processes, and laws are influenced by the historical, explicitly racist policies that preceded them (Yearby, Clark, and Figueroa 2022). More pragmatically, considering theory and history can help

researchers propose questions, hypotheses, and mechanisms that, in turn, guide their selection of the appropriate measure of structural racism.

Consider Policy Implications

The hard-won progress and ongoing efforts to advance a more structural etiology of racial disparity by establishing theory, methodological tools, richer data sets, and empirical evidence on the causes and consequences of structural racism allow researchers to ask and begin to answer more nuanced questions. We have shared examples of research that look at the effects of specific policies, studies that examine the macro-level effects of rafts of policies, and efforts to assemble a database of structural racism-related policies (Almond and Chay 2006; Krieger, Jahn, and Waterman 2017; Krieger et al. 2014, 2013; Agénor et al. 2021). These more targeted questions open the door to more specific policy recommendations. For instance, what should policymakers do today with the insights generated by Almond and Chay about the impact of hospital desegregation on maternal and infant health outcomes? What does their research tell about the de facto segregation of access to providers today? How should a researcher interested in studying education inequity at the local/regional level account for the state-level education policies and associated effects captured by Agenor and colleagues? Getting specific about the structures in question is essential to selecting the right operationalization of structural racism. For instance, the area level at which to measure structural racism should be determined by considering the level at which relevant policies are primarily made. The practice of considering policy from the question formulation/design stage of the research process through to the interpretation stage may be somewhat unfamiliar to researchers: Needham and colleagues found that only a small minority of papers on institutional racism and health named the policies implicated in the racism they were describing (Needham et al. 2022). Researchers should continue to develop their ability to weave policy into their scholarship, and the field of equity-oriented research should set an expectation for careful consideration of policy as standard practice.

Conclusion and Next Steps

This report described three approaches to measuring structural racism as an exposure and the strengths and limitations of each, the challenges in estimating impacts that crosscut them, and the foundational questions and is a call to action for quantitative researchers interested in engaging in empirical work on structural racism. There are many topics and questions under the quantitative methods for studying the structural racism umbrella that we touched on either very lightly or not at all,

including analytical approaches, study design, existing and needed data sources, and operationalizing outcomes given structural racism exposure. Far more could be said about research on the production of structural racism or structural racism as an outcome. In short, this report is one tool in the large and growing toolkit available to researchers who want to contribute to this essential work.

While the challenges of measuring structural racism and health are many and run as deep as the norms of Western European scholarship, there is also much to celebrate about how far the field has come. The majority of articles we scanned were published in the last 10 years, suggesting that research has been accelerating, which echoes a broader cultural (though certainly not universal) recognition that structural racism is real and mutable. As noted above, these research efforts have resulted in a larger and more advanced, multidimensional set of measurement tools. This burgeoning interest in understanding the structural nature of racial differences is a welcome progression from the era of disparity studies that documented those differences but provided little explanation or reverted to individual-level explanations.

An even larger body of literature studies structural racism without calling it that for whatever reason—many papers on segregation, for example. Imagine the increase in scholarly horsepower if those researchers were willing and able to claim their work as in the service of ending structural racism.

In the coming years, researchers will have much work to do to add to the toolkit of approaches for measuring and modeling structural racism as a dynamic, life-course exposure. This work is greatly needed. The evidence and insights researchers can produce will help bolster debates, vet policy solutions, and lend legitimacy to the reality of structural racism—not as a vague concept, a relic of the past, or a political and social conspiracy, but as a real set of forces that are very much still at play. Justice-oriented research that seeks to illuminate structural racism in order to eradicate it is a natural extension of the health research field's long-standing commitment to improving the health and well-being of all.

Appendix: Literature Table, Measures of Structural Racism

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Structural Racism and Severe Maternal Morbidity in New York State	Sze Yan Liu, Christina Fiorentini, Zinzi Bailey, Mary Huynh, Katharine McVeigh, and Deborah Kaplan	2019	<i>Clin Med Insights Women's Health</i>	Geography: Multiple proportions/Index of disproportionality		County	Severe maternal morbidity	Multilevel logistic regression
Structural racism and the education gradient for early all-cause mortality	Suzanne Bartle-Haring and Riley Whiting	2022	<i>SSM Popul Health</i>	Geography: Multiple proportions/Index of disproportionality		State	All-cause mortality	Random effects modeling with discrete time survival analysis
Associations between Obesity, Obesogenic Environments, and Structural Racism Vary by County-Level Racial Composition	Caryn N. Bell, Jordan Kerr, and Jessica L. Young	2019	<i>Int J Environ Res Public Health</i>	Geography: Multiple proportions/Index of disproportionality		County	Obesity and obesogenic environments	Random effects linear and Poisson regressions stratified by county racial composition
The Intricacy of Structural Racism Measurement: A Pilot Development of a Latent-Class Multidimensional Measure	Tongtan Chantarat, David C. Van Riper, and Rachel R. Hardeman	2021	<i>E Clinical Medicine</i>	Geography: Multiple proportions/Index of disproportionality		PUMA	COVID-19 vaccination rates	Latent class modeling to develop multidimensional measure; Kruskal-Wallis test to compare median COVID-19 vaccination rate by level of structural racism

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Multidimensional Structural Racism Predicts Birth Outcomes for Black and White Minnesotans	Tongtan Chantarat, David C. Van Riper, and Rachel R. Hardeman	2022	<i>Health Serv Res</i>	Geography: Multiple proportions/Index of disproportionality		PUMA	Preterm birth, low birthweight, small-for-gestational-age birth	Latent class modeling to develop multidimensional measure; stratified logistic regression to look at linkage between structural racism and birth outcomes
Measuring Structural Racism and Its Association with BMI	Geoff B Dougherty, Sherita H Golden, Alden L Gross, Elizabeth Colantuoni, and Lorraine T Dean	2020	<i>Am J Prev Med</i>	Geography: Multiple proportions/Index of disproportionality		County	BMI	Confirmatory factor analysis to develop a multidimensional indicator of structural racism; mixed effects modeling to evaluate the relationship between structural racism and BMI
Structural Racism and Myocardial Infarction in the United States	Alicia Lukachko, Mark L. Hatzenbuehler, and Katherine M. Keyes	2014	<i>Soc Sci Med</i>	Geography: Multiple proportions/Index of disproportionality		State	Past-year myocardial infarction	Logistic regression

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
The Relationship Between Structural Racism and Black-White Disparities in Fatal Police Shootings at the State Level	Aldina Mesic, Lydia Franklin, Alev Cansever, Fiona Potter, Anika Sharma, Anita Knopov, and Michael Siegel	2018	<i>J Natl Med Assoc</i>	Geography: Multiple proportions/Index of disproportionality		State	Black-White disparity in police shooting rates of victims not known to be armed	Poisson regression
Separate and Unequal: Structural racism and Infant Mortality in the US	Maeve Wallace, Joia Crear-Perry, Lisa Richardson, Meshawn Tarver, and Katherine Theall	2017	<i>Health Place</i>	Geography: Multiple proportions/Index of disproportionality		State	Infant mortality	Poisson regression
Access to Social Determinants of Health and Determinant Inequity for the Black Population in US States in the Early Twenty-First Century	Robert A. Hahn	2021	<i>J Racial Ethn Health Disparities</i>	Geography: Multiple proportions/Index of disproportionality		State	NA- equity in social determinants is the outcome	Descriptive statistics

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Structural Racism and Quantitative Causal Inference: A Life Course Mediation Framework for Decomposing Racial Health Disparities	Nick Graetz, Courtney E. Boen, and Michael H. Esposito	2022	<i>J Health Soc Behav</i>	Other		Census tract and household	Continuous measure of cardiometabolic risk, defined as the first principal component of five biomarker variables indicating (1) elevated waist circumference, (2) elevated blood pressure, (3) elevated triglycerides, (4) reduced high-density lipoprotein, and (5) prediabetic value of glycosylated hemoglobin (A1C)	G-formula method for causal mediation decomposition
Structural Racism, Economic Opportunity and Racial Health Disparities: Evidence from US Counties	Rourke O'Brien, Tiffany Neman, Nathan Seltzer, Linnea Evans, and Atheendar Venkataramani	2020	<i>SSM Popul Health</i>	Geography: Multiple proportions/Index of disproportionality		County	County-level racial gap in age-adjusted all-cause mortality rates	Linear regression
Structural Racism and Odds for Infant Mortality among Infants Born in the United States 2010	Roman Pabayo, Amy Ehntholt, Kia Davis, Sze Y. Liu, Peter Muennig, and Daniel M Cook	2019	<i>J Racial Ethn Health Disparities</i>	Geography: Multiple proportions/Index of disproportionality		State	Infant mortality and neonatal mortality	Multilevel logistic regression

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Income Inequality and Racial Disparities in Pregnancy-Related Mortality in the US	Dovile Vilda, Maeve Wallace, Lauren Dyer, Emily Harville, and Katherine Theall	2017	<i>SSM Popul Health</i>	Geography: Racial segregation		State	Pregnancy-related 5-year mortality	Poisson regression and linear regression
Housing Discrimination, Residential Racial Segregation, and Colorectal Cancer Survival in Southeastern Wisconsin	Yuhong Zhou, Amin Bemanian, and Kirsten M. M. Beyer	2017	<i>Cancer Epidemiol Biomarkers Prev</i>	Geography: Racial segregation		ZIP CTA	Survival time after colorectal cancer diagnosis (months)	Cox proportional hazards regression
The Impact of Residential Segregation on Pancreatic Cancer Diagnosis, Treatment, and Mortality	Barbara Aldana Blanco, Michael Poulson, Kelly M. Kenzik, David B. McAneny, Jennifer F. Tseng, and Teviah E. Sachs	2021	<i>Ann Surg Oncol</i>	Geography: Racial segregation		County	Diagnosis, management, and outcomes of pancreatic cancer	Survival analysis using Kaplan-Meier and Poisson regression
Racial Residential Segregation, Socioeconomic Disparities, and the White-Black Survival Gap	Ioana Popescu, Erin Duffy, Joshua Mendelsohn, and José J. Escarce	2018	<i>PLoS One</i>	Geography: Racial segregation		Core-based statistical area (CBSA)	White-Black survival gap	Linear regression

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
The Impact of Racial Residential Segregation on Colorectal Cancer Outcomes and Treatment	Michael Poulson, Ella Cornell, Andrea Madiedo, Kelly Kenzik, Lisa Allee, Tracey Dechert, and Jason Hall	2021	<i>Ann Surg</i>	Geography: Racial segregation		County	Advanced stage at diagnosis, resection of localized disease, and cancer-specific survival	Poisson regression and Cox proportional hazards survival analysis
Residential Racial Segregation and Disparities in Breast Cancer Presentation, Treatment, and Survival	Michael R. Poulson, Brendin R. Beaulieu-Jones, Kelly M. Kenzik, Tracey A. Dechert, Naomi Y. Ko, Teviah E. Sachs, and Michael R. Cassidy	2021	<i>Ann Surg</i>	Geography: Racial segregation		County	Advanced stage at diagnosis, surgery for localized disease, and overall stage-specific survival	Poisson regression and proportional hazards survival analysis
The Impact of Racial Residential Segregation on Prostate Cancer Diagnosis and Treatment	Michael R. Poulson, Samuel A. Helrich, Kelly M. Kenzik, Tracey A. Dechert, Teviah E. Sachs, and Mark H. Katz	2021	<i>BJU Int</i>	Geography: Racial segregation		County	Advanced stage at diagnosis, resection of localized disease, and cancer-specific survival	Poisson regression and competing hazards survival analysis
The Relationship between Racial Residential Segregation and Black-White Disparities in Fatal Police Shootings at the City Level, 2013-2017	Michael Siegel, Rebecca Sherman, Cindy Li, and Anita Knopov	2019	<i>J Natl Med Assoc</i>	Geography: Racial segregation		Census block	Rates of fatal police shootings of Black people compared to White people	Linear regression

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Structural Racism and Its Influence on the Severity of Atopic Dermatitis in African American Children	Kelly Jo Tackett, Frances Jenkins, Dean S. Morrell, Diana B. McShane, and Craig N. Burkhart	2019	<i>Pediatr Dermatol</i>	Geography: Racial segregation		County	Severity of atopic dermatitis	Race-stratified bivariate analyses
Racial Residential Segregation and Racial Disparities in Stillbirth in the United States	Andrew D. Williams, Maeve Wallace, Carrie Nobles, and Pauline Mendola	2018	<i>Health Place</i>	Geography: Racial segregation		Hospital reform region (HRR)	Black-White stillbirth rates	Hierarchical logistic regression
Using Index of Concentration at the Extremes as Indicators of Structural Racism to Evaluate the Association with Preterm Birth and Infant Mortality—California, 2011–2012	Brittany D. Chambers, Rebecca J. Baer, Monica R. McLemore, and Laura L. Jelliffe-Pawlowski	2018	<i>J Urban Health</i>	Geography: Racialized economic segregation		ZIP Code	Preterm birth and infant mortality	Generalized linear mixed models
The Index of Concentration at the Extremes (ICE) and Pregnancy-Associated Mortality in Louisiana, 2016–2017	Lauren Dyer, Brittany D. Chambers, Joia Crear-Perry, Katherine P. Theall, and Maeve Wallace	2020	<i>Health Affairs</i>	Geography: Racialized economic segregation		ZIP Code	Severe maternal morbidity	Logistic regression with interaction by race/ethnicity and Fairlie nonlinear decomposition to test for mediation

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Neighborhood Racial and Economic Polarization, Hospital of Delivery, and Severe Maternal Morbidity	Teresa Janevic, Jennifer Zeitlin, Natalia Egorova, Paul L Hebert, Amy Balbierz, and Elizabeth A. Howell	2018	<i>Int J Epidemiol</i>	Geography: Racialized economic segregation		Census tract and city/town	Child mortality, premature mortality, cause-specific mortality	Mixed effect Poisson regression with stratification by gender and race/ethnicity
Using the Index of Concentration at the Extremes at Multiple Geographical Levels to Monitor Health Inequities in an Era of Growing Spatial Social Polarization: Massachusetts, USA (2010–14)	Nancy Krieger, Rockli Kim, Justin Feldman, and Pamela D. Waterman	2014	<i>Health Psychol</i>	Individual/self-report		Individual	Self-evaluated treatment adherence, mistrust of health care	Moderated linear regression
The Influence of Cognitive Development and Perceived Racial Discrimination on the Psychological Well-Being of African American Youth	Eleanor K. Seaton	2010	<i>J Youth Adolesc</i>	Individual/self-report		Individual	Psychological well-being (self-esteem)	Hierarchical regression with interaction
Stress of Caring for Children: The Role of Perceived Racism	Anissa I. Vines and Donna D. Baird	2009	<i>J Natl Med Assoc</i>	Individual/self-report		Individual	Stress/concern	Descriptive statistics and chi-square tests

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Perceptions of Race/Ethnic Discrimination in Relation to Mortality Among Black Women: Results From the Black Women's Health Study	Michelle A. Albert, Yvette Cozier, Paul M. Ridker, Julie R. Palmer, Robert J. Glynn, Lynda Rose, Nitsan Halevy, and Lynn Rosenberg	2010	<i>Arch Intern. Med</i>	Individual/self-report		Individual	All-cause mortality, cancer mortality, cardiovascular mortality	Cox proportional hazard models
Asthma Disparities During the COVID-19 Pandemic: A Survey of Patients and Physicians	Alan P. Baptist, Desmond Lowe, Nadeen Sarsour, Hannah Jaffee, Sanaz Eftekhari, Laurie M. Carpenter, and Priya Bansal	2020	<i>J Allergy Clin Immunol Pract</i>	Individual/self-report		Individual	Perceived risk of getting COVID-19	Logistic regression and multinomial regression
Experiences of Racism and Subjective Cognitive Function in African American Women	Patricia Coogan, Karin Schon, Shanshan Li, Yvette Cozier, Traci Bethea, and Lynn Rosenberg	2020	<i>Alzheimers Dement (Amst)</i>	Individual/self-report		Individual	Subjective cognitive function	Multinomial logistic regression
Racial/Ethnic Discrimination and Alcohol Use Disorder Severity among United States Adults	Joseph E Glass, Emily C Williams, and Hans Oh	2020	<i>Drug Alcohol Depend</i>	Individual/self-report		Individual	Alcohol use disorder severity	Multinomial logistic regression with interaction by poverty and race/ethnicity

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
The Role of Age in Understanding the Psychological Effects of Racism for African Americans.	Tawanda M. Greer and Abby Spalding	2017	<i>Cultur Divers Ethnic Minor Psychol</i>	Individual/self-report		Individual	Psychological symptoms of somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism	Hierarchical regression with interaction by racism and age
Perceived Racism in Relation to Telomere Length among African American Women in the Black Women's Health Study	Darlene Lu, Julie R. Palmer, Lynn Rosenberg, Alexandra E. Shields, Esther H. Orr, Immaculata DeVivo, and Yvette C. Cozier	2019	<i>Ann Epidemiol</i>	Individual/self-report		Individual	Telomere length	Linear regression with interaction by BMI, smoking, maternal age at participant's birth, age at blood draw, or geographic region and stratification by use of coping mechanisms

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Household Fear of Deportation in Relation to Chronic Stressors and Salivary Proinflammatory Cytokines in Mexican-Origin Families Post-SB 1070	Airín D. Martínez, Lillian Ruelas, and Douglas A. Granger	2018	<i>Social Science and Medicine</i>	Individual/self-report		Individual	Salivary proinflammatory cytokines	Random effects multilevel structural equation models
Peer Social Support is Associated with Recent HIV Testing Among Young Black Men Who Have Sex with Men	Hyman M. Scott, Lance Pollack, Gregory M. Rebchook, David M. Huebner, John Peterson, and Susan M. Kegeles	2014	<i>AIDS Behavior</i>	Individual/self-report		Individual	Delayed HIV testing	Hierarchical logistic regression
Racial Discrimination and Telomere Length in Midlife African American Women: Interactions of Educational Attainment and Employment Status	Marilyn D. Thomas, Saba Sohail, Rebecca M. Mendez, Leticia Márquez-Magaña, and Amani M. Allen	2021	<i>Annals of Behavioral Medicine</i>	Individual/self-report		Individual	Telomere length	Linear regression with interaction by age, poverty, and composite SES

Title	Authors	Year	Journal	Operationalization Category	Multiple/Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Triple Jeopardy: The Joint Impact of Racial Segregation and Neighborhood Poverty on the Mental Health of Black Americans	D. Phuong Do, Lindsay R. B. Locklar, and Paul Florsheim	2019	<i>Soc Psychiatry Psychiatr Epidemiol</i>	Geography: Racialized economic segregation		Metropolitan area and census tract	psychological distress	Logistic regression stratified by race
The Long-Run and Intergenerational Impact of Poor Infant Health: Evidence from Cohorts Born During the Civil Rights Era	Douglas Almond and Kenneth Y. Chay	2003	<i>MIT Working Paper</i>	Specific policy (historical or contemporary)		Individual	Birth weight, gestational length, and APGAR score	Difference-in-differences regression

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Civil Rights, the War on Poverty, and Black-White Convergence in Infant Mortality in the Rural South and Mississippi	Douglas Almond, Kenneth Y. Chay, and Michael Greenstone	2006	<i>MIT Working Paper</i>	Specific policy (historical or contemporary)		Hospital, County	Number of neonatal and post-neonatal fatalities by broad cause of death categories, the number of births in a hospital with a doctor present, total births, the distribution of births by maternal age, and the fraction of “illegitimate” births	Event-study analysis
Lifting Gates, Lengthening Lives: Did Civil Rights Policies Improve the Health of African-American Women in the 1960s and 1970s?	George A. Kaplan, Nalini Ranjit, and Sarah A. Burgard	2008	<i>Book Chapter (in: Making Americans Healthier: Social and Economic Policy as Health Policy)</i>	Specific policy (historical or contemporary)		National and regional (south versus non-south)	Mortality rates and life expectancy at 35	Linear regression with some stratification by race
Jim Crow and Premature Mortality Among the US Black and White Population, 1960–2009	Nancy Krieger, Jarvis T. Chen, Brent A. Coull, Jason Beckfield, Mathew V. Kiang, and Pamela D. Waterman	2014	<i>Epidemiol</i>	Specific policy (historical or contemporary)		State	Age-standardized premature mortality	Hierarchical age-period-cohort models

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
The Unique Impact of Abolition of Jim Crow Laws on Reducing Inequities in Infant Death Rates and Implications for Choice of Comparison Groups in Analyzing Societal Determinants of Health	Nancy Krieger, Jarvis T. Chen, Brent Coull, Pamela D. Waterman, and Jason Beckfield	2013	<i>Am J Public Health</i>	Specific policy (historical or contemporary)		State	Infant death rates	Poisson log-linear regression
Jim Crow and Estrogen-Receptor-Negative Breast Cancer: Us-Born Black and White Non-Hispanic Women, 1992–2012	Nancy Krieger, Jaquelyn L. Jahn, and Pamela D. Waterman	2017	<i>Cancer Causes Control</i>	Specific policy (historical or contemporary)		State	Estrogen-receptor-negative breast tumors	Generalized linear mixed models with random effects
Barriers to Voting and Access to Health Insurance Among US Adults: A Cross-Sectional Study	Roman Pabayo, Sze Yan Liu, Erin Grinshteyn, Daniel M. Cook, and Peter Muennig	2021	<i>The Lancet Regional Health - Americas</i>	Specific policy (historical or contemporary)		State	Health insurance status	Multilevel logistic regression with stratification by racial/ethnic identity, household income, and age group
From Undocumented to Lawfully Present: Do Changes to Legal Status Impact Psychological Wellbeing among Latino Immigrant Young Adults?	Caitlin Patler and Whitney Laster Pirtle	2018	<i>Soc Sci Med</i>	Specific policy (historical or contemporary)		Individual	Distress, negative emotions, and worry	Logistic regression

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Everyday Violence, Structural Racism and Mistreatment at the Us-Mexico Border	Samantha Sabo, Susan Shaw, Maia Ingram, Nicolette Teufel-Shone, Scott Carvajal, Jill Guernsey de Zapien, Cecilia Rosales, Flor Redondo, Gina Garcia, and Raquel Rubio-Goldsmith	2014	<i>Soc Sci Med</i>	Specific policy (historical or contemporary)		Individual	Immigration-related mistreatment episode	Descriptive statistics
Neighborhood-Level Redlining and Lending Bias Are Associated with Breast Cancer Mortality in a Large and Diverse Metropolitan Area	Lindsay J. Collin, Anne H. Gaglioti, Kristen M. Beyer, Yuhong Zhou, Miranda A. Moore, Rebecca Nash, Jeffrey M. Switchenko, Jasmine M. Miller-Kleinhenz, Kevin C. Ward, and Lauren E. McCullough	2020	<i>Cancer Epidemiol Biomarkers Prev.</i>	Specific policy (historical or contemporary)		Census tract	Breast cancer mortality	Cox proportional hazard models with interaction by race

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Historic Redlining in Columbus, Ohio Associated with Stroke Prevalence	Jeffrey J. Wing, Emily E. Lynch, Sarah E. Laurent, Bruce Mitchell, Jason Richardson, and Helen C. S. Meier	2022	<i>J Stroke Cerebrovasc Dis</i>	Specific policy (historical or contemporary)		Census tract	Stroke prevalence quartile	Linear regression
Testing the Association Between Traditional and Novel Indicators of County-Level Structural Racism and Birth Outcomes among Black and White Women	Brittany D. Chambers, Jennifer Toller Earausquin, Amanda E. Tanner, Tracy R. Nichols, and Shelly Brown-Jeffy	2018	<i>J Racial Ethn Health Disparities</i>	Multiple	segregation and multiple proportions	County	Gestational age and birthweight	Random slopes hierarchical linear modeling was used to allow the exploration of cross-level interactions
Structural Racism, Historical Redlining, and Risk of Preterm Birth in New York City, 2013–2017	Nancy Krieger, Gretchen Van Wye, Mary Huynh, Pamela D. Waterman, Gil Maduro, Wenhui Li, R. Charon Gwynn, Oxiris Barbot, and Mary T. Bassett	2020	<i>Am J Public Health</i>	Multiple	Segregation, racialized economic segregation, specific policy	Census tract	Preterm birth	Multilevel generalized estimating equations logistic regression

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Institutional Racism, Neighborhood Factors, Stress, and Preterm Birth	Dara D. Mendez, Vijaya K. Hogan, and Jennifer F. Culhane	2014	<i>Ethn Health</i>	Multiple	specific policy and racial segregation	Census tract	Preterm birth	Multilevel log binomial regression with interaction by race, housing type/tenure, and segregation measures
Stress during Pregnancy: The Role of Institutional Racism	Dara D. Mendez, Vijaya K. Hogan, and Jennifer F. Culhane	2013	<i>Stress Health</i>	Multiple	Specific policy and racial segregation	Census tract	Stress among pregnant people	Multilevel logistic regression
Structural Racism in the Built Environment: Segregation and the Overconcentration of Alcohol Outlets	Jennifer Scott, Denise Danos, Robert Collins, Neal Simonsen, Claudia Leonardi, Richard Scribner, and Denise Herd	2020	<i>Health Place</i>	Multiple	Specific policy and racial segregation	Census tract and county/parish	Alcohol outlet density	Mixed effects negative binomial regression with interaction
Structural Racism and COVID 19 in the USA: a County-Level Empirical Analysis	Shin Bin Tan, Priyanka deSouza, and Matthew Raifman	2022	<i>J Racial Ethn Health Disparities</i>					
Joint Effects of Structural Racism and Income Inequality on Small-for-Gestational-Age Birth	Maeve E. Wallace, Pauline Mendola, Danping Liu, and Katherine L. Grantz	2015	<i>Am J Public Health</i>	Multiple	Racial segregation and proportions	State	Small for gestational age birth	Generalized estimating equations with interactions between structural racism indicators and race

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Self-Rated Health and Structural Racism Indicated by County-Level Racial Inequalities in Socioeconomic Status: The Role of Urban-Rural Classification	Caryn N Bell and Jessica L Owens-Young	2020	<i>J Urban Health</i>	Multiple	Segregation and multiple proportions	County	Self-rated health	Random effects linear regressions stratified by county urban-rural classification
The Impact of Historical Racism on Modern Gun Violence: Redlining in the City of Louisville, KY	Matthew Bennis, Matthew Ruther, Nicholas Nash, Matthew Bozeman, Brian Harbrecht, and Keith Miller	2020	<i>Injury</i>	Multiple	Segregation and specific policy	Census block group built up to approximate neighborhoods	Gunshot victims	Zero-inflated negative binomial regression with a spatial component
A Multilevel Analysis of the Relationship between Institutional and Individual Racial Discrimination and Health Status	Gilbert C. Gee	2008	<i>Am J Public Health</i>	Multiple	Individual/self-report, specific policy, segregation	Individual	Health status and psychological distress	Hierarchical linear modeling with some random effects and cross-level interactions
The Role of Racial Residential Segregation in Black-White Disparities in Firearm Homicide at the State Level in the United States, 1991–2015	Anita Knopov, Emily F. Rothman, Shea W Cronin, Lydia Franklin, Alev Cansever, Fiona Potter, Aldina Mesic, Anika Sharma, Ziming Xuan, Michael Siegel, and David Hemenway	2019	<i>J Natl Med Assoc</i>	Multiple	Segregation and multiple proportions	State	Black-White firearm homicide disparity	Linear regression with generalized estimating equations

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Segregation, Racial Structure, and Neighborhood Violent Crime	Lauren J. Krivo, Ruth D. Peterson, and Danielle C Kuhl	2009	<i>AJS</i>	Multiple	Segregation and multiple proportions	Census tract	Three-year average count of violent crimes (homicides, rapes, and robberies) reported to the police	Multilevel Poisson regression with random slopes
Mortgage Discrimination and Preterm Birth among African American Women: An Exploratory Study	Nana Matoba, Suzanne Suprenant, Kristin Rankin, Hailin Yu, and James W. Collins	2019	<i>Health Place</i>	Multiple	Specific policy and racial segregation	Census tract	Preterm birth rates	Logistic regression
Institutional Racism and Pregnancy Health: Using Home Mortgage Disclosure Act Data to Develop an Index for Mortgage Discrimination at the Community Level	Dara D. Mendez, Vijaya K. Hogan, and Jennifer Culhane	2011	<i>Public Health Rep</i>	Multiple	Specific policy and racial segregation	Census tract	Bacterial vaginosis, general self-perceived health status, and self-perceived stress	Bivariate associations
Structural Racial Inequities in Socioeconomic Status, Urban-Rural Classification, and Infant Mortality in US Counties	Jessica Owens-Young and Caryn N. Bell	2020	<i>Ethn Dis</i>	Multiple	Multiple proportions and racial segregation	County	Race-specific infant mortality rate	Linear regression with stratification by urban-rural categorization

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Differences in Racial Disparities in Firearm Homicide across Cities: The Role of Racial Residential Segregation and Gaps in Structural Disadvantage	Brooke Wong, Serena Bernstein, Jonathan Jay, and Michael Siegel	2020	<i>J Natl Med Assoc</i>	Multiple	Racial segregation and multiple proportions	City	Black and White firearm homicide rates and the ratio of the Black to White firearm homicide rates	Latent trajectory analysis and latent multi-trajectory analysis; hierarchical, random effects, negative linear modeling
Police Killings of Black People and Rates of Sexually Transmitted Infections: A Cross-Sectional Analysis of 75 Large US Metropolitan Areas, 2016	Umedjon Ibragimov, Stephanie Beane, Samuel R Friedman, Justin C. Smith, Barbara Tempalski, Leslie Williams, Adaora A. Adimora, Gina M. Wingood, Sarah McKetta, Ronald D. Stall, and Hannah L. F. Cooper	2020	<i>Sex Transm Infect</i>	Multiple/other	Number of non-Hispanic Black people killed by police and specific policy	MSA	Rates of primary and secondary syphilis, gonorrhea, and chlamydia among Black residents	Unclear ("multivariable models")
The Enduring Impact of Historical and Structural Racism on Urban Violence in Philadelphia	Sara F. Jacoby, Beidi Dong, Jessica H. Beard, Douglas J. Wiebe, and Christopher N. Morrison	2018	<i>Soc Sci Med</i>	Multiple/other	Specific policy, segregation, and concentrated disadvantage	Census block	Firearm assaults and violent crimes	Poisson regression with a conditional autoregressive random effect

Title	Authors	Year	Journal	Operationalization Category	Multiple/ Other: Specify	Level(s) At Which SR Is Measured	Health Outcome(s) Studied	Analytical Approach
Emergency Department Visits for Depression Following Police Killings of Unarmed African Americans	Abhery Das, Parvati Singh, Anju K. Kulkarni, and Tim A. Bruckner	2021	<i>Soc Sci Med</i>	Other	Police killings of unarmed African Americans	County	Depression-related Emergency Department visits	Linear fixed effect regression

Source: Authors' analysis.

Notes: SR = structural racism.

Notes

- ¹ “Structural Racism Is a Public Health Crisis: Impact on the Black Community,” American Public Health Association, October 24, 2020, <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2021/01/13/structural-racism-is-a-public-health-crisis>.
- ² Rhea W. Boyd, Edwin G. Lindo, Lachelle D. Weeks, and Monica R. McLemore, “On Racism: A New Standard for Publishing on Racial Health Inequities,” *Health Affairs Forefront* (blog), July 2, 2020, <https://www.healthaffairs.org/doi/10.1377/forefront.20200630.939347/full/>.
- ³ We generally focus on anti-Black racism, although structural racism certainly affects other racially and ethnically marginalized groups. We do so, in part, because of the embedded nature of this form of oppression today: anti-Black racism was a major organizing principle of our country that animated slavery and colonialism, and its legacy remains potent. More practically, the bulk of the empirical literature on structural racism focuses on anti-Black racism. There are other forms of systematic oppression that extend even further back into our history, namely Native American genocide, but they are less examined in the literature for reasons tied directly to that program of eradication. Ultimately, the methods and reflections shared here translate to the study of other racial and ethnic groups whose experience of systematic minoritization has the same origins: in the prioritization of land-owning and monied White men’s needs, perspectives, and preferences.
- ⁴ See, for example, the Glossary put forth by Racial Equity Tools, <https://www.racialequitytools.org/glossary>.
- ⁵ “Housing Patterns: Appendix B: Measures of Residential Segregation,” US Census Bureau, last revised November 21, 2021, <https://www.census.gov/topics/housing/housing-patterns/guidance/appendix-b.html>.
- ⁶ “Maryland Adolescent Development in Context Study (MADICS),” Gender and Achievement Research Program, accessed July 5, 2023, <http://garp.education.uci.edu/madics.html>.
- ⁷ Sze Yan Liu, Erin Grinshteyn, and Daniel Cook, “Barriers to Voting in Elections Linked to Increased Odds of Being Uninsured,” Columbia University Mailman School of Public Health, August 4, 2021, <https://www.publichealth.columbia.edu/news/barriers-voting-elections-linked-increased-odds-being-uninsured>.
- ⁸ Cornell Law School, Legal Information Institute, s.v. “Disparate Impact,” accessed July 6, 2023, https://www.law.cornell.edu/wex/disparate_impact.
- ⁹ “The Healing ARC: Inspiring Race-Conscious Collaborations That Eliminate Racism in Patient Care,” Healing ARC, 2023, <https://healingarccampaign.com/>.

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