

Perspective

The Future of Social Determinants of Health: Looking Upstream to Structural Drivers

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Policy Points:

- Policies that redress oppressive social, economic, and political conditions are essential for improving population health and achieving health equity. Efforts to remedy structural oppression and its deleterious effects should account for its multilevel, multifaceted, interconnected, systemic, and intersectional nature.
- The U.S. Department of Health and Human Services should facilitate
 the creation and maintenance of a national publicly available, userfriendly data infrastructure on contextual measures of structural oppression
- Publicly funded research on social determinants of health should be mandated to (a) analyze health inequities in relation to relevant data on structural conditions and (b) deposit the data in the publicly available data repository.

Keywords: social determinants of health, structural oppression, racism, sexism, LGBT+ stigma, population health, health equity.

HE PAST THREE DECADES OF RESEARCH ON SOCIAL determinants of health have produced a wealth of evidence demonstrating how the conditions of daily life shape population health. Social factors, including access to healthy food, education, income, working conditions, health behaviors, interpersonal discrimination, neighborhood conditions, social relationships, and stress have all been shown to play an important role in health and well-being. The majority of research on social determinants of health has focused on proximate or intermediate determinants of health that are

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conceptualized and measured as individual-level resources and exposures; however, scholars have increasingly called for research that looks farther upstream to assess how structural factors operate as fundamental drivers of population health.^{4,9–12}

The World Health Organization (WHO) provides a useful conceptual framework on social determinants of health for understanding how large-scale institutions that structure a society shape the distribution of downstream social determinants, as well as their necessity and utility for achieving good health. 13 Notably, the distribution and value of the social determinants of health are not neutral or uniform across population groups owing to structural oppression. Structural oppression involves interconnected systems of discrimination across societal domains (e.g., educational, economic, social, political, criminal-legal, and health care systems) that create and perpetuate the relational subordination of socially disadvantaged groups (and superordination of advantaged groups). These conditions are reflected in inequalities within institutions, and both reinforce—and are reinforced by—discriminatory beliefs, values, and the distribution of resources. 14-21 For example, in the United States, there are drastic inequities imbedded in our institutional arrangements that constitute structural oppression for Black people¹⁴ and women. ^{22,23} Structural racism and structural sexism refer to the systematic race and genderbased exclusion from resources, power, and opportunity across an array of societal domains. 15,24,22 New lines of research have emerged that are beginning to measure structural racism, structural sexism, structural lesbian, gay, bisexual, transgender plus (LGBT+) stigma, structural xenophobia, and other forms of structural oppression, and examine their links to health^{3,19,20,22,25–30} but this research is still in its infancy. Many additional forms of structural oppression such as cissexism, structural ageism, structural classism, and structural ableism have yet to be conceptualized, measured, or thoroughly examined as structural drivers of health.

Going forward, a central part of the agenda for population health research should focus on advancing our understanding of the roles of structural drivers generally, and in particular, structural oppression. Examining more upstream structural drivers of social conditions can help inform efficacious policies and leverage points that go beyond individual-level solutions to create systemic changes that will reduce

health inequities and improve overall population health. This approach is consistent with the WHO's new expanded definition of "social determinants of health" that includes not only "the conditions in which people are born, grow, live, work, and age," but also the "wider set of forces and systems shaping the conditions of daily life." In this article, we highlight several promising avenues for research related to the health consequences of structural forms of oppression. Specifically, we make several recommendations that include using theory to guide measurement strategies, developing theory-driven empirical measures of structural drivers of health, investigating the geography of structural oppression, examining social pathways and biological mechanisms connecting structural oppression to health, and building a publicly available data infrastructure to catalyze research on its health effects.

Recommendation 1: Use Theory to Guide Measurement Approaches

We recommend using interdisciplinary structural theories as a roadmap for measuring how structural forms of oppression affect population health. Studies on relationships between structural aspects of oppression and health have often been limited by the disconnect between the conceptualization and measurement of structural oppression. In order to develop valid measures of structural oppression, population health studies should draw on tenets of structural theories. Based on a review of the literature, we identify several core tenets of structural theories that are particularly relevant for creating robust, valid measures of structural oppression.

First, structural theories underscore how structural oppression is a *multilevel phenomenon*. ^{15,18,22,31,32} This is illustrated in Homan's 2019 study that conceptualized gender as a multilevel social system, spanning macro-level, meso-level, and micro-level contexts. ²² For example, cultural norms and the gendered distribution of power and resources at the United States state-level reflect macro-level structural sexism. Meso-level manifestations of structural sexism include gender inequality in power and resources within organizational practices and interactional settings. Finally, examples of micro-level forms of structural sexism include gendered selves and internalized sexist ideologies that reproduce

gendered power and resource inequalities.²² Parallel research has shown that structural racism and economic inequality also operate at various levels of society.^{20,33,34}

Second, structural oppression is *multifaceted*. Theories point to how structural oppression is distributed across many institutions and domains of society. For example, structural racism and structural sexism are conceptualized as being embedded within ideologies as well as economic, educational, social, political, residential, medical, and legal institutions. ^{15,23,35–37} *Interconnectedness* among various domains of structural oppression is a third key tenet of structural theories. ^{20,37,38} For example, racial residential segregation creates, maintains, and reproduces racial inequalities in education, employment, wealth accumulation, health care, and contact with the criminal–legal system. ^{39–41} The multifaceted and interconnected nature of structural oppression illustrates the importance of studying how oppression across numerous societal domains are related, and jointly shape population health.

A fourth tenet of structural theories is that structural oppression is systemic. Structural theories, for example, emphasize the racialized and gendered nature of social systems. 15,32,43,44 Structural racism and structural sexism involve systems of relational subordination (for minoritized groups and for women) and superordination (for groups racialized as White and for men). 38,42,44 Importantly, from a systems perspective, the unit of analysis "is not individual subsystems but rather the entire system—the forestrather than the trees." Fifth, structural theories underscore how forms of oppression are *intersectional*. A robust literature on intersectionality theories highlights how structural forms of oppression overlap. For example, pioneering research by Patricia Hill Collins and Kimberly Crenshaw and other scholars has demonstrated how racism, sexism, ableism, heteropatriarchy, and other axes of injustice combine to affect life chances, often advantaging and disadvantaging various subgroups based on their social locations. 45-50 These core tenets of structural theories that have utility for guiding measurement of the impact of structural forms of oppression on population health. Researchers and policymakers should ensure that their efforts to measure and address structural oppression account for its multilevel, multifaceted, interconnected, systemic, and intersectional nature.

Recommendation 2: Develop Novel, Theory-Driven Empirically Based Measures of Structural Drivers of Health

Use Latent Measures

In order to understand the structural drivers of population health, future studies on the topic should operationalize structural forms of oppression in ways that accurately reflect these multisectoral, complex, and largely unobserved phenomena. To date, there has been a disconnect between the conceptualization and measurement of structural oppression. For instance, most prior studies on the health consequences of structural oppression have examined a single, observed proxy variable for structural oppression—e.g., residential segregation or areal subgroup inequalities in education, unemployment, or incarceration rates; a handful of studies have explored the roles of several such proxy variables *separately*. ^{14,17,51–53} Importantly, neither of these approaches reflect the multifaceted, interconnected, and systemic nature of structural racism. Several notable studies, however, have contributed to our understanding of the broad structural forces shaping population health. For example, Homan measured the health effects of structural sexism using a composite index of gendered oppression in economic, political, cultural, and reproductive domains.²² Similarly, a few studies on health inequities have attempted to measure structural racism using summative indices of statelevel racial inequalities across an array of societal spheres. 54,55 Notwithstanding these advances, there remain opportunities to use innovative data and methods to more accurately capture upstream drivers of health.

To better align measurement strategies with core tenets of structural theories, a growing chorus of scholars recommend that quantitative research on the health consequences of structural oppression use *latent variable approaches*, which are well-suited for minimizing measurement error and capturing unobserved, complex systems such as structural racism and structural sexism. 9,20,55 Indeed, several recent population health studies have demonstrated the utility of confirmatory factor analysis to estimate latent measures of state-level and county-level structural racism (using observed, reflective indicators in housing, educational, economic, political, and criminal—legal domains). 30,37,57 Consistent with the idea that structural racism involves a multifaceted, interconnected system,

these studies used latent measurement approaches to explicitly model relationships among the multisectoral reflective indicators of structural racism. Findings from a study by Brown, Kamis, and Homan showed that a multisectoral latent measure of state-level structural racism provided a better model fit and accounted for more variation in Black—White inequities in COVID-19 mortality than individual indicators as well as a summative index of structural racism.³⁰ In addition, Chantarat and colleagues have contributed to the literature by using latent class analysis to identify distinct typologies of multisectoral structural racism and linking them to racialized birth outcomes.^{58,59} Collectively, these studies point to promise of latent measurement approaches for advancing the scientific literature on the impact of structural oppression on health.

Incorporate Legal, Cultural, and Ideological Measures of Structural Oppression

In addition to examining the health impact of institutional aspects of structural oppression discussed above, future population health research should also investigate the health effects of legal, cultural, and ideological aspects of injustice and their intersections. There is a growing recognition that all policy is health policy. 60 Both conceptual and empirical research indicates that population health is likely affected by policies spanning more than a dozen domains—e.g., civil rights, gun safety, environment, health and welfare, abortion, private and public labor, immigration, LGBT+ rights, education, tobacco tax, criminal justice, housing, transportation, and taxes. 61–65 These policy contexts are theorized to impact health, in part, by shaping the distribution of the social determinants of health such as access to salubrious resources (e.g., education, income, housing, autonomy, power) and exposures to risks (e.g., inequality, crime, toxins, discrimination). 60 As a result, Bambra and colleagues note that policies are the "causes of the causes" of geographic inequities in health. 66 Although this emerging field has provided valuable insights, important gaps in our knowledge remain. 66 Future research should address these gaps by examining how policy contexts across multiple domains combine to shape health, as well as the specific pathways through which policy contexts become embodied, and how these processes may be shaped by one's social location. 62,65

We also need a better understanding of how cultural and ideological aspects of structural oppression affect population health. Several studies have shown that living in areas with elevated levels of racist actions, sentiments, and ideologies is associated with worse health among minoritized populations. These studies have focused on a handful of measures including racial biases, racial resentment, racist language, and disproportionate police-involved deaths of Black people. Yet, the empirical evidence base for the health effects of cultural and ideological oppression has largely focused on racial oppression and is relatively thin. Going forward, scholars should examine a wider array of measures of cultural and ideological oppression, as well as how they, along with institutional and legal forms of oppression, jointly undergird population health inequities. The

Harness the Data Revolution for Novel Research on Links Between Structural Oppression and Health

As the data ecosystem is rapidly changing, scholars are increasingly calling for wider use of new "big data" sources in social science, demographic, and health research. 73-77 We echo and expand on these calls by recommending the use of these new approaches to address salient, new questions about how structural oppression shapes population health. A great deal has been learned about the social drivers of health from conventional data sources such as censuses, administrative data, and surveys. However, there is a growing recognition of the limitations of these data sources as they are resource-intensive, logistically complex, take a lot of effort and time to produce, and are becoming less representative of target populations due to declining response rates and other selective forces.⁷⁸ As a result, researchers are embracing new data and methods (e.g., computational social science approaches) that accompany the "data revolution." United Nations defines the data revolution as "an explosion in the volume of data, the speed with which data are produced, the number of producers of data, the dissemination of data, and the range of things on which there are data, coming from new technologies such as mobile phones and the 'internet of things,' and from other sources such as qualitative data, citizen-generated data and perceptions of data." 79 The revolutionary digitalization of data includes previously paper-based

records such as historical censuses, books, and journal and newspaper articles, as well as new forms of "digital trace" data including text and images on websites, in search queries and social media platforms, text messages, and emails.⁷⁸

New digital trace data offer several advantages over conventional sources of data used in population health research. These advantages include, but are not limited to (a) being better suited for examining understudied and hard-to-find subgroups, (b) being easier to implement, (c) producing more timely data because they are "always on," enabling dynamic measurement in real time, and (d) being conducive for addressing new research questions. 76,78,80 This new data also pose some challenges including carefully monitoring data for quality, respect for individual privacy, and the computing demands and difficulties of working with very large amounts of data. 76 Several notable examples of research using digital trace data include studies that have examined the links between health inequities and area-level frequency of racist language used in web search engines and social media platforms. 67,69 In sum, this body of research points to the utility of adding innovative big-data approaches to the methodological toolkit for studying the health consequences of structural oppression.

Employ Longitudinal Research Designs to Address Issues of Temporality

Incorporating temporality into studies of structural oppression is critical for understanding dynamic population health equity processes. Although life course perspectives on health underscore the importance of timing, research on the health consequences of structural oppression has largely ignored the role of temporality. Consequently, many key questions about how exposure to structural oppression over the life course affect health remain unanswered, including the following questions: what are the direct and indirect effects of historical oppression on contemporary health? How does structural oppression affect health trajectories across the life course? Is health during certain life stages particularly sensitive to exposure to structural oppression? How does duration of exposure to structural oppression shape health? Are there lagged effects of structural oppression on health? To what extent are there period- or cohort-specific health effects of structural oppression? Thus,

we recommend that future research utilize historical data and prospective research designs to address these (and other) salient questions related to temporality.

Examine an Array of Axes of Structural Oppression and Their Intersections

Population health research would benefit from examining a wider array of axes of structural oppression and their intersections. Despite progress in measuring the health effects of structural sexism and racism, many forms of structural oppression are largely absent from the literature. For example, most studies on structural racism have focused solely on Black and White people. As a result, there is a need for studies to focus on structural oppression among Asian, Hispanic and Native American populations—and salient research questions, domains of study and, thus, measurement strategies will likely differ for different racial/ethnic groups.

A growing body of research has documented negative health consequences of structural LGBT+ stigma. Powever, little to no research has examined the effects of structural oppression of transgender people (i.e., structural cissexism) or how different types of structural oppression related to both gender and sexuality may work in tandem to shape health. A notable exception was a study by Everett and colleagues that developed a novel measure of structural heteropatriarchy (i.e., interlocking systems of oppression that operate jointly to reproduce the dominance of heterosexual men) composed of state-level LGBT+policies, family-planning policies, and indicators of structural sexism, and showed its association with adverse birth outcomes in the United States. In sum, the health impacts of structural oppression based on various dimensions of sex, gender, and sexuality represent key areas for future research to investigate.

Additionally, shifting demographics, including population aging and the growing share of foreign-born older adults, also underscore the need for research on structural ageism and nativism. Several recent studies point to promising directions for future research in terms of novel data and measurement of the health consequences of exclusionary (and inclusionary) immigration policy contexts and structural xenophobia, ^{25,29} but there remains a substantial amount of work to be done in this area.

Moreover, it is critical for health research on the effects of structural conditions to incorporate intersectional measurement and analytic strategies. As noted above, intersectionality is a central tenet of structural theories, 46,47 yet the vast majority of empirical studies on structural factors focus on a single dimension of structural oppression (e.g., structural racism or structural sexism). Consequently, we know very little about how overlapping forms of structural oppression jointly affect the distribution of health. Nonetheless, a recent study by Homan and colleagues (2021) integrates insights from intersectional and structural perspectives to develop a *structural intersectionality approach* and demonstrate its utility for understanding how macro-level structural racism, structural sexism, and economic inequality undergirds health inequalities.⁴⁸ The study also suggests several key areas for future intersectional research, including (a) examining the implications of using equivalent sample sizes of subgroups (e.g., race and gender groups) to achieve parity in statistical power and equitable assessment of health consequences of structural oppression across subgroups, (b) investigating the relative advantages and disadvantages of using statistical interactions versus multichotomous approaches to estimating the joint consequences of various forms of oppression, and (c) assessing the relationship between intersectional structural oppression and health within a life course context. Furthermore, rather than measuring structural racism and structural sexism separately, Pirtle and Wright propose that studies should explicitly measure structural gendered racism—i.e., "the totality of interconnectedness between structural racism and structural sexism in shaping race and gender inequities." ⁵⁰ Collectively, recent studies spotlight structurally intersectional approaches as a promising new direction for population health research. 50,84

Recommendation 3: Investigate the Geography of Structural Drivers of Health

A key priority for future population health research is to map discriminatory environments with the aim of identifying "hot spots" that are characterized by exceptionally high degrees of structural oppression. When it comes to health and discrimination, place matters. ^{22,64,85–88}

Thus, in order to achieve health equity, we need a better understanding of the geography of structural oppression. Relatedly, it is important to map structural oppression across multiple spatial units. Although there is solid and growing empirical evidence that structural oppression operates at multiple levels—e.g., region, state, county, Metropolitan Statistical Area, Public Use Microdata Area, neighborhood, etc.—the vast majority of studies have only examined oppression at a single geographic level. ^{23,36,59} By mapping and assessing the health effects of structural oppression at multiple spatial scales, future research will be well-situated to address key issues, such as the following questions. What are the relative contributions of structural oppression at different levels? Is structural oppression in certain spatial units particularly salient for specific health outcomes? To what extent does macro-level structural oppression impact health indirectly via meso-level structural oppression? Are there cross-level interactive effects of structural oppression on health?

Recommendation 4: Examine Social Pathways and Biological Mechanisms Connecting Structural Oppression to Health

Although emerging research is beginning to document associations between structural oppression and health, the social pathways and biological mechanisms connecting macro-level environments to health have yet to be thoroughly explicated. Ecosocial theory 89,90 and the substantial existing body of research on social determinants of health provide useful explanations, but further empirical work is needed. Moving forward, we recommend using innovative methods for causal inference, such as causal mediation analyses, which are well-suited for addressing "why?" questions. 91 For example, they would be particularly useful for testing the extent to which structural oppression affects health directly and/or indirectly through intermediary social pathways—e.g., unequal access to resources (education, income, health care, power, autonomy, etc) and exposures to risks (e.g., toxins, housing instability, victimization, involvement in the criminal-legal system, and other pathogenic social conditions). 92 Another opportunity to enhance future studies on the health effects of structural oppression concerns adjusting for appropriate covariates. To date, the number and types of control variables included in health studies on the impact of structural oppression have been inconsistent. On the one hand, it is important to adjust for relevant confounders; on the other hand, it is also important to not reflexively "overcontrol" for factors that likely lie along the causal pathway between structural oppression and health. Thus, future research should use thoughtful approaches to adjusting for potential confounding factors that are guided by both research questions and theory.

In addition to studying social pathways, future research should examine biological mechanisms to better understand "how?" questions regarding links between structural oppression and population health. Although biosocial approaches are well-suited for understanding how social conditions "get under the skin" to shape health, 93 little is known about biosocial mechanisms undergirding the relationship between structural oppression and health. Moving forward, research should take a "society to cells" approach by examining, for example, whether and how "epigenetic clocks," which reflect the rate of biological aging and related morbidities, 94,95 might mediate the structural oppression health relationship. Gene-environment interaction (GxE) is another central biosocial process shaping health and health inequities. Although theory and model organism research have long supported the intuition that GxE is a major source of phenotypic variation in health and disease, methods capable of effectively modeling the process have only recently been developed. 96,97 In particular, the advent of "polygenic scores," which aggregate the cumulative effects of variants across the genome to index an individual's genetic liability for a given trait, have been critical in allowing the proliferation of replicable GxE findings. This line of research is still in the very early stages of development, yet it has already demonstrated that genetic propensity for many health conditions and health behaviors is strongly moderated by the social context. 98-100 Despite the promise of genomics to advance our understanding of health, caution is warranted as the field is still grappling with significant limitations. 101 In particular, the lack of portability of polygenic scores across sociodemographic groups has thus far limited the application of the technique, particularly among non-White groups, which are drastically underrepresented in existing genomic databases. 102 Nonetheless, attention to biosocial processes is a promising direction for future research on how structural oppression is connected to health.

Recommendation 5: Build a National, Publicly Available Data Infrastructure on Contextual Measures of Structural Oppression to Catalyze Research on Its Health Effects

The measurement of structural determinants of health lags their conceptualization in the literature. Scholars posit that the relative paucity of empirical health research on structural forms of oppression is due, in part, to the challenges associated with collecting and analyzing relevant data. Indeed, the current landscape of structural oppression data is confusing and scattershot: data on structural forms of oppression are diffuse and come from many different sources, ranging from various governmental agencies, to administrative data, to think tanks, to nonprofits, to published research articles, to journalists, to teams of scholars. 20,57 Our final recommendation is to lower barriers to research in this area by building a publicly available, user-friendly data infrastructure on measures of structural oppression. Consistent with the other recommendations listed above, the data infrastructure should include valid, novel measures of structural oppression spanning many societal domains, and covering an array of spatiotemporal scales (e.g., including historical and prospective longitudinal data on various spatial units such as regions, states, counties, PUMAs, and neighborhoods). Furthermore, these data should be easily linkable to geocoded health and demographic information in data sets commonly used for population health research. Indeed, the US Centers for Disease Control and Prevention and other agencies/entities that oversee national health data collection programs should facilitate the inclusion of (or linkage to) area-based structural oppression measures in their data sets. Other key features of the data infrastructure that would likely be of interest to academic audiences as well as community based-organizations and policymakers include raw data, composite measures, codebooks, archives of published articles using the data, and interactive maps and other forms of data visualization. Funders should facilitate the development and maintenance of the data infrastructure by requiring principal investigators of publicly-funded research on social determinants of health to (a) analyze health inequities in relation to relevant data on structural conditions, and (b) deposit the data in the data repository. 103 Additionally, the National Institutes of Health should prioritize funding projects that contribute to the creation of public-use structural oppression data. Building a publicly available, user-friendly data infrastructure on structural oppression will catalyze future research on its health effects.

Conclusion

Consistent with those who have called for a renewed focus on "the causes of the causes" of health inequalities, 104,105 we have argued that upstream structural drivers are critical areas of inquiry for future research on the social determinants of health. Specifically, we highlighted the need for rigorous scientific investigation of various forms of structural oppression that are expressed as systematic exclusion of marginalized groups from power, resources, and opportunities within social, political, cultural, legal, and economic institutions. We made five recommendations for the field moving forward: (1) use theory to guide measurement approaches; (2) develop novel, theory-driven empirically based measures; (3) investigate the geography of structural drivers of health; (4) examine social pathways and biological mechanisms; and (5) build a national, publicly available data infrastructure on contextual measures of structural oppression to catalyze research on its health effects. Although these recommendations entail a number of challenging undertakings, their implementation will provide new opportunities to understand and improve population health. Examinations of structural oppression highlight the central role of power in shaping the distributions of resources, structural oppression and risks that characterize individuals' daily lives.²⁴

Structural problems require structural solutions. ¹⁰³ Innovative research on structural oppression is essential for building a robust evidence base to inform efficacious health equity policy solutions. Recent scholarship highlights how public policy, structural oppression, and population health are inextricably linked. ^{24,41,63,103,106,107} For instance, Ray and colleagues note, "addressing the fundamental root causes of population health problems and inequities must involve significant redirection and reform of public policies that shape our social structures, systems, and institutions." ¹¹¹ Given that structural oppression operates across multiple levels of society, policy reforms at the federal, state and local levels are necessary to improve population health and achieve health equity. ^{107,108} State and local health departments should also prioritize collecting data

measuring structural oppression in their jurisdictions and incorporating it into their public health research and practice. For concrete examples of policies across a variety of domains and levels that can reduce health inequities, see several studies in this special issue.^{24,107,109–111} Given the systematic nature of structural oppression and how deeply embedded it is in the fabric of society, as well as the interconnectedness of policies and their effects, it is also important to recognize how bundles of policies (or linked policy systems) can combine to support population health.^{29,62,107,110}

Importantly, there is a growing recognition that "all policy is health policy" because even policies that are not directly focused on health and health care affect proximate social determinants of health, such as access to salubrious material and psychosocial resources and exposures to social conditions that place individuals at risk of poor health. ^{62,67,68} Thus, structural oppression affects health indirectly by leading to unequal and unjust living conditions for oppressed groups. ^{20,28,31,34,37,89} Just as past oppressive policies have undermined health equity, it stands to reason that future policies that are inclusive and redress oppressive social, economic, and political conditions could improve health equity. ^{108,112–117} Taken together, an emerging body of research suggests that further broadening our focus to the wider set of forces and systems that shape daily living conditions enables us to uncover new possibilities for change that can lead to healthier and more just societies.

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