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Structural Racism as an Upstream Social Determinant of Diabetes Outcomes: A Scoping Review

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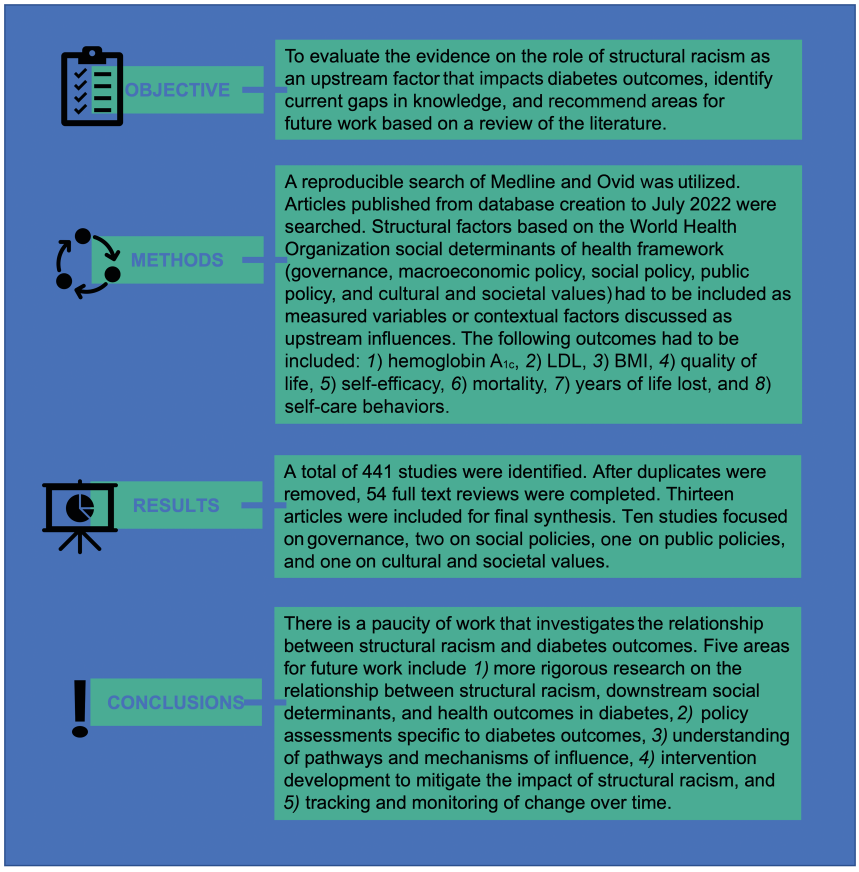

ARTICLE HIGHLIGHTS

- This scoping review was conducted to inform the development of actionable strategies to mitigate the effect of structural racism on diabetes outcomes.
- The specific research question asked: what is known on the role of structural racism as an upstream factor impacting diabetes outcomes?
- Thirteen articles were included: 10 studies focused on governance, 2 on social policies, 1 on public policies, and 1 on cultural and societal values.
- The findings of this review show that structural racism significantly impacts diabetes clinical outcomes.

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Leonard E. Egede,[1,2] Jennifer A. Campbell,[1,2] Rebekah J. Walker,[1,2] and Sebastian Linde[1,2]

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OBJECTIVE

To evaluate the evidence on the role of structural racism as an upstream factor impacting diabetes outcomes, identify current gaps, and recommend areas for future work.

RESEARCH DESIGN AND METHODS

A reproducible search of Medline and Ovid was used. Structural factors based on the World Health Organization social determinants of health framework (governance, macroeconomic policy, social policy, public policy, and cultural and societal values) had to be included as measured variables or contextual factors discussed as upstream influences. Outcomes included *1*) hemoglobin A_{1c} (HbA_{1c}), *2*) LDL, *3*) BMI, *4*) quality of life, *5*) self-efficacy, *6*) mortality, *7*) years of life lost, and *8*) self-care behaviors.

RESULTS

Thirteen articles were included for final synthesis. Ten studies focused on governance, two on social policies, one on public policies, and one on cultural and societal values. Results highlight significant associations between structural racism and poorer clinical outcomes (HbA_{1c} and blood pressure), worse self-care behaviors (diet and physical activity), lower standards of care, higher mortality, and more years of life lost for adults with diabetes.

CONCLUSIONS

There is a paucity of work investigating the relationship between structural racism and diabetes outcomes. Five areas for future work include *1*) more rigorous research on the relationship between structural racism, downstream social determinants, and health outcomes in diabetes, *2*) policy assessments specific to diabetes outcomes, *3*) research designed to examine pathways and mechanisms of influence, *4*) intervention development to mitigate the impact of structural racism, and *5*) tracking and monitoring of change over time.

Evidence over the past decade shows that social determinants of health (SDOH), the conditions in which we are born, grow, live, work, and age, play a meaningful role in the development and perpetuation of racial and ethnic disparities seen in diabetes prevalence and outcomes (1–16). Conceptually, the SDOH are classified under the following domains: economic stability, education, social and community context, neighborhood and the built environment, and health and health care access (17). The state-of-the-science review committee convened by the American

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Diabetes Association summarized the relationship between SDOH outcomes (2). This pivotal review demonstrated a preponderance of evidence on the impact of SDOH on diabetes outcomes and highlighted the need for intervention development at the individual level for adults with diabetes (2). This review also showed the paucity of evidence focused on upstream SDOH or macro-level approaches to intervention development that target the structural inequalities in diabetes care.

Structural inequalities are ubiquitous across societies and have their foundation in access to resources and power (18). Hierarchies and stratification along socioeconomic levels have consequently been defined by access to and distribution of resources and power (18). These are reinforced through structural mechanisms and, as described by the World Health Organization (WHO), are characterized by a society's unique governance, policies, and values (18). In the U.S., structural racism has been identified as a key structural mechanism through which structural inequalities operate (19). Structural racism can be defined as the totality of ways in which societies foster racial discrimination via mutually reinforcing inequitable systems (19). Structural racism differs from structural inequalities in that it reinforces discriminatory beliefs, values, and distribution of resources on the basis of race and ethnicity (19). Structural racism is antecedent to SDOH and serves as an upstream driver of racial and ethnic disparities in health outcomes in the U.S. (20–25). Other forms of racism in the U.S. that operate as structural mechanisms of inequalities include systemic racism, or racism that is embedded across all societal systems, and institutional racism, or racism that operates at core institutional levels (19,26). While distinct, structural racism, systemic racism, and institutional racism overlap and are often interrelated (19,21). For the purpose of this review, the term "structural racism" will be used to capture all three forms of racism, as the mutually reinforcing nature of structural racism is exerted through inequitable laws and regulations within housing, education, employment, work-related benefits, credit, media, criminal justice, and health care systems (21,22).

Although many policies and practices are no longer legal, the impact of historical laws and practices is still felt through ongoing economic inequalities, and many current practices reinforce disparities in health outcomes for racial and ethnic minorities (20,27–32). To effectively address structural racism as an upstream influence of diabetes outcomes, an organizing framework and the evaluation of the evidence for this relationship are needed to develop actionable strategies. For this purpose, structural racism will be discussed and organized within the WHO framework for SDOH (Fig. 1) as a structural mechanism of structural inequalities. The WHO framework for SDOH was originally designed to serve as an actionable framework to address SDOH inequalities. This framework provides an illustration for how structural racism operates upstream as a distal factor to impact societal systems, specifically through societal context (18,33). Within the framework, social and political mechanisms underlying the structure of a society, including governance, social policy, public policy, and cultural values, influence downstream factors and ultimately create health inequities (18,33). In the U.S., structural racism represents a core societal context underlying the social hierarchy that influences socioeconomic positions (18). Based on the WHO framework, upstream factors, such as structural racism, create health inequalities through material circumstances, behaviors, and biological and psychological factors. However, this framework has not been used to characterize structural determinants of health inequalities in diabetes outcomes.

Therefore, the goals of this scoping review are threefold: first, to evaluate what is known on the role of structural racism as an upstream factor impacting diabetes outcomes; second, to identify the current gaps in knowledge; and finally, to recommend areas for future work based on a review of the literature. The WHO SDOH framework will be used as a guiding framework, specifically focusing on the factors within the socioeconomic and political context that include *1*) governance, *2*) macroeconomic policies, *3*) social policies, *4*) public policies, and *5*) cultural and societal values.

RESEARCH DESIGN AND METHODS

Information Sources and Search

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines were used to identify, screen, and select studies for final synthesis (Fig. 2) (34) with the PRISMA extension for Scoping Reviews (PRISMA-ScR) checklist (35). The WHO SDOH framework was used as a guiding framework for defining structural racism according to the structural determinants specified in the framework (Fig. 1). Using this framework, Medical Subject Heading (MeSH) terms and keywords representing structural racism and structural inequalities were identified, using the following structural determinants as defined by the WHO: *1*) governance, defined as needs, patterns of discrimination, civil society participation, and accountability/transparence in public administration; *2*) macroeconomic policy, defined as fiscal policy, monetary policy, balance of payments, trade policies, and underlying labor market structures; *3*) social policies, defined as factors such as labor, social welfare, and land and housing distribution; *4*) public policy, defined as education, medical care, water, and sanitation; and *5*) cultural and societal values, defined as value placed on health and the degree to which health is seen as a collective social concern.

Medline and Ovid were used to ensure the inclusion of a robust set of articles. Articles published from 1966 to July 2022 were searched for Medline and from 1984 to July 2022 for Ovid. Table 1 outlines the search terms and the number of articles identified by each search.

Eligibility Criteria

Articles were chosen based on eligibility criteria established a priori by the authors as follows: *1*) article was published in English; *2*) data sources were based in the U.S.; *3*) study design included cross-sectional, cohort, randomized clinical trial (RCT), quasi-experimental, qualitative, and pre-post study design or natural and social experiments; *4*) study population included adults aged 18 years or older; *5*) study population included a racial or ethnic minority group or multiple racial and ethnic groups with outcomes demonstrated across racial and ethnic groups; and *6*) structural factors based on the WHO SDOH framework, including governance, macroeconomic policy, social policy, public policy, culture, and societal values, had to be included as measured variables or contextual factors or discussed as upstream influences. Additionally, one or more of the following outcomes had to be included: *1*) hemoglobin A_{1c} (HbA_{1c}); *2*) LDL;

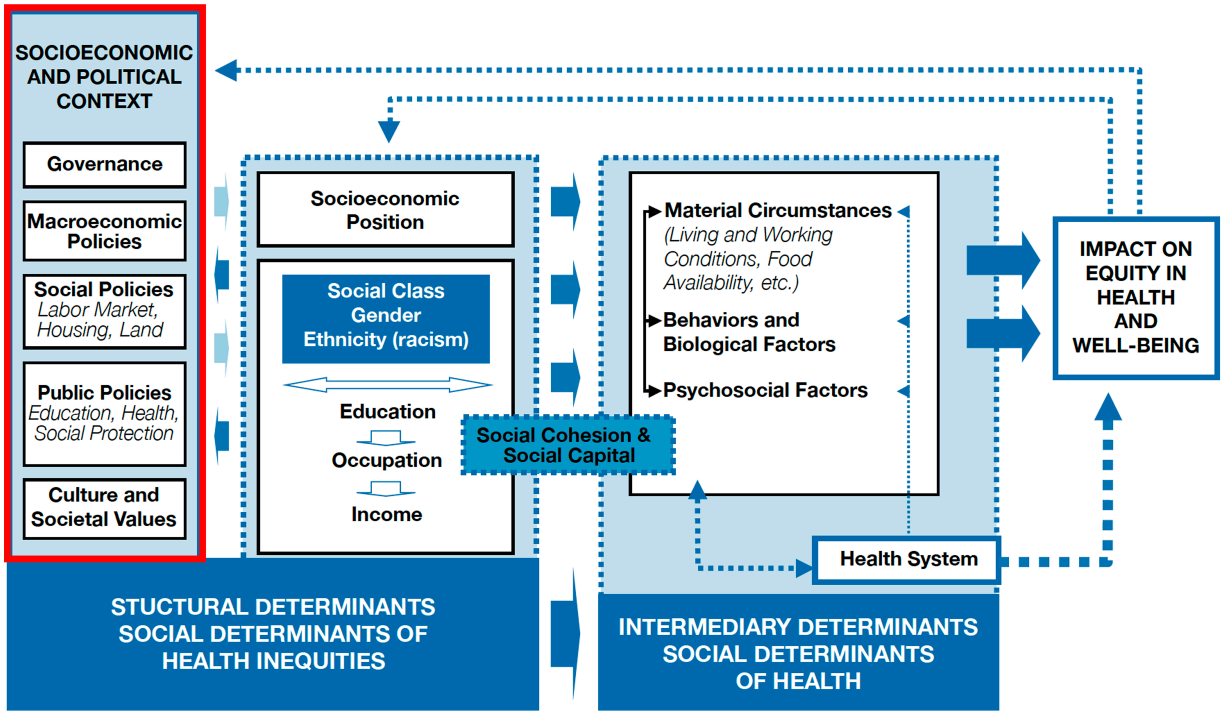

Figure 1—World Health Organization (WHO) Framework for Social Determinants of Health. Red outline added by authors for emphasis. Adapted with permission from WHO (18).

3) BMI; *4*) quality of life; *5*) self-efficacy; *6*) mortality; *7*) years of life lost; and *8*) self-care behaviors. Clinical outcomes were selected based on clinical guidelines for diabetes care and measures of standards of care set by the American Diabetes Association. Qualitative studies were included in this review and selection criteria were the same, except for outcomes, where inclusion criteria included one or more of the selected diabetes outcomes being an objective or aim rather than measurement.

Study Selection and Data Collection

Figure 2 outlines the process for selection of studies included in the review. Titles and abstracts were reviewed to ensure studies met the inclusion criteria. Studies were evaluated for inclusion using a checklist that included eligibility criteria. Studies not meeting eligibility criteria were excluded. After the title and abstract review, full-text articles that met initial inclusion criteria were included for full-text synthesis. Initial and full-text reviews of studies were done separately and finalized by all authors. The checklist ensured consistent decision-making processes were followed for each article reviewed. After full-text synthesis, articles not meeting inclusion criteria were excluded with reasons.

Data extraction included the study design, study population, sample size, and outcomes assessed. Data quality was assessed using the JBI critical appraisal checklist (36). The JBI provides checklists by study design, and this scoping review used the appropriate checklist for the appropriate design in each article. Final article decisions were made by L.E.E. based on the checklists and included articles meeting all criteria to ensure quality across articles summarized in this review.

RESULTS

Search, Study Selection, and Data Collection

Figure 2 shows the PRISMA diagram with the results for study identification, screening, eligibility, and final synthesis and details of studies excluded and retained at each phase. After searching Medline and Ovid, 441 studies were identified. After duplicates were removed, 266 articles remained for title and abstract screening using the inclusion criteria listed above. Fifty-four articles met inclusion criteria and were included in the full article review. An additional 41 articles were excluded with reasons (i.e., outcomes set a priori not included), resulting in 13 articles included for final synthesis. Articles included for data extraction are shown in Table 2.

Study Characteristics and Outcomes of Studies

Table 2 summarizes results by study design and outcome. Across the 13 studies, 7 were cross-sectional (37–43), 3 were longitudinal (20,44,45), 2 were qualitative (46,47), and 1 was an RCT (48). Sample sizes ranged from 28 to 182,756.

Table 3 summarizes each study by outcome and statistical significance. Of the 13 studies, multiple outcomes were included within each study. A total of seven included a measure of A1C as an outcome (38,39,41,43–45,47), four included a measure of diet as an outcome (38,42,46,47), two included a measure of LDL as an outcome (39,44), one included a measure of BMI (48), one included a measure of exercise (42), one included a measure of medication adherence (37), one included a measure of mortality and years of life lost (20), one included a measure of quality of life (38), and one included a general measure of self-care (40).

Table 4 summarizes results according to the WHO SDOH framework (governance, macroeconomic policy, social policy, public policy, and cultural and societal

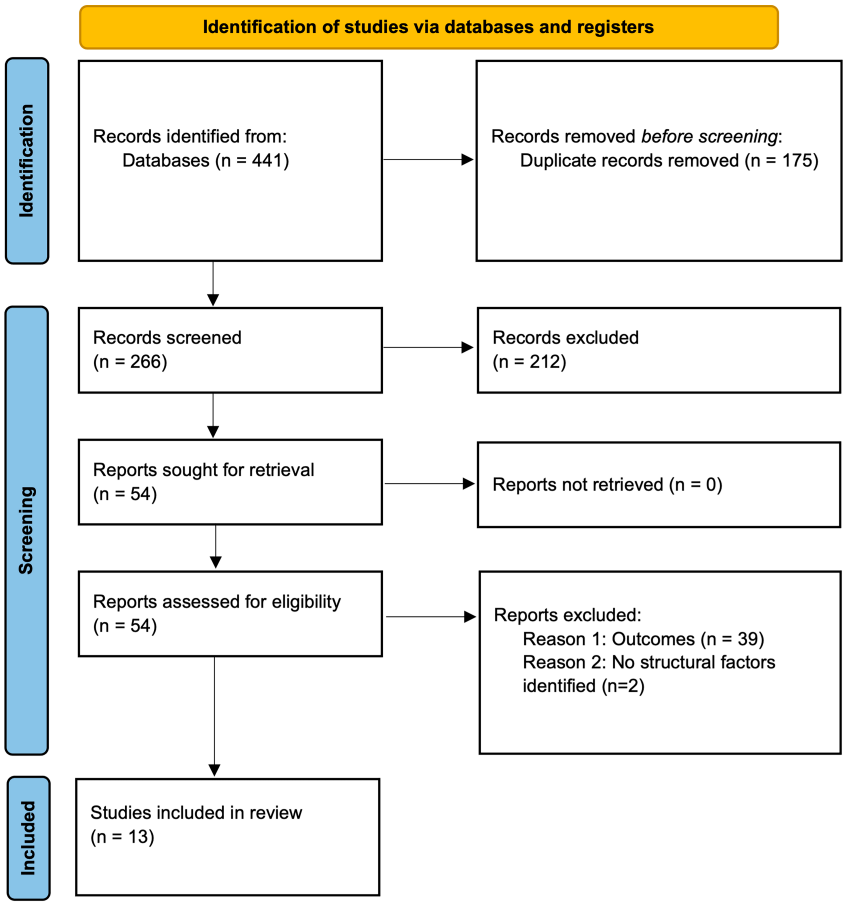

Figure 2—PRISMA 2020 flow diagram for article selection. Adapted with permission from Page et al. (34).

values) and outcomes. Of the 13 articles included in this review, 10 mapped to governance (20,38–44), 2 mapped to social policies (45,48), 1 mapped to public policy (37), and 1 mapped to cultural and societal values (46).

Study Characteristics by Structural Determinants

Governance

The WHO characterizes governance in terms of the needs of the society, patterns of discrimination, civil society participation, and accountability/transparence in public administration. A total of 10 studies included measures or context consistent with this definition. Dawson et al. (38) examined the influence of perceived racial discrimination on diabetes outcomes and quality of life in adults with type 2 diabetes. Findings showed that in a clinical sample of 602 (African American [66%] and non-Hispanic White [34%]) adults with type 2 diabetes, reports of being made to feel inferior because of one's race were significantly associated with lower mental health-related quality of life and worse diet in the full sample. When stratified by race, for African American individuals, perceived discrimination was associated with higher blood pressure, whereas for non-Hispanic White individuals, perceived discrimination was associated with lower mental health-related quality of life, worse diet, and lower glucose monitoring (38).

Gonzales et al. (39) examined the relationship between perceived racial discrimination in the health care setting, standards of diabetes care, and diabetes outcomes, including A1C and LDL, among a sample of 200 American Indian women. Findings showed that perceived racial discrimination in the health care setting was associated with higher A1C and lower standards of care for dental care, blood pressure checks, total cholesterol checks, and pneumococcal vaccination (39).

Jia et al. (40) examined the relationship between resilience and self-management, accounting for social risk exposure among 94 African American men with diabetes. Jia et al. also examined the role of incarceration on self-care. This study was included within the social policy category due to the link between policing policies and mass incarceration of Black men in the U.S. (40). Higher scores of resilience were associated with higher engagement in diabetes self-care. Among participants, having a history of incarceration was associated with lower self-care (40).

LeBrón et al. (41) examined the relationship between perceived racial discrimination, A1C, and depressive symptoms and diabetes distress in a sample of 222 Hispanic or Latino adults with diabetes. Perceived racial discrimination was measured as the occurrence of everyday experiences of discrimination based on being Hispanic or Latino and was associated with depressive symptoms and diabetes distress (41). Though not directly associated with A1C, the relationship between perceived discrimination and A1C was mediated by diabetes distress (41).

Linde et al. (20) examined the relationship between historic residential redlining and present-day diabetes mortality and years of life lost across 109 census tract-level observations. Findings from the Home Owners' Loan Corporation (HOLC) redlining scores showed that HOLC scores explained 45–56% variation in census tract-level diabetes mortality and 51–60% of the variation in the census tract diabetes years of life lost between 1990 and 2014. Higher HOLC grades were found to be associated with 53.7% higher diabetes mortality and 66.5% higher number of years of life lost (20). Given that historic redlining is based on the discriminatory practice of systematically denying various services to residents of specific neighborhoods and communities, often based on race or ethnicity, this article was considered under the category of governance; however, it overlaps the category of social policy due to the impact on housing distribution (20).

Mayne et al. (44) examined the relationship between residential segregation and diabetes management in young African American adults participating in the Coronary Artery Risk Development in Young Adults (CARDIA) study (among the cohort of 208 adults with diabetes). Findings showed that residential segregation was not associated with A1C or LDL among this subset of the study population (44).

Sittner et al. (42) examined the relationship between racial microaggressions, diabetes distress, and diet and exercise

Table 1—Search terms

Search	No. of results
Title word search ((((((“structural racism”[Title] OR “structural racism and discrimination”[Title] OR “structural racism and”[Title])) OR (“racism”[Title] OR “racism a”[Title] OR “racism and”[Title] OR “racism and antiracism”[Title] OR “racism and discrimination”[Title] OR “racism and health”[Title] OR “racism and mental”[Title] OR “racism and mental health”[Title] OR “racism attitudes”[Title] OR “racism based”[Title] OR “racism based police”[Title] OR “racism based police use”[Title] OR “racism based police use of”[Title] OR “racism based police use of force”[Title] OR “racism claim”[Title] OR “racism complaints”[Title] OR “racism discrimination”[Title] OR “racism does”[Title] OR “racism experiences”[Title] OR “racism framework”[Title] OR “racism frequency”[Title] OR “racism health”[Title] OR “racism implications”[Title] OR “racism in”[Title] OR “racism in health”[Title] OR “racism in health care”[Title] OR “racism in medicine”[Title] OR “racism in nursing”[Title] OR “racism in nursing education”[Title] OR “racism in science”[Title] OR “racism index”[Title] OR “racism lens”[Title] OR “racism of”[Title] OR “racism online”[Title] OR “racism our”[Title] OR “racism racial”[Title] OR “racism related”[Title] OR “racism related stress”[Title] OR “racism related stress inventory”[Title] OR “racism related stressors”[Title] OR “racism related vigilance”[Title] OR “racism stress”[Title] OR “racism structural”[Title] OR “racism roots”[Title] OR “racism systemic”[Title] OR “racist environments”[Title] OR “racist policies”[Title] OR “racist stereotypes”[Title] OR “racism s”[Title] OR “racist experiences”[Title])) OR (“redlining”[Title])) OR (“historic redlining”[Title])) OR (“zoning policy”[Title])) AND (“diabetes”[Title]) - Saved search	7*
MeSH term search (“diabetes mellitus, type 2”[MeSH Terms]) AND ((“racism”[MeSH Terms] OR “racism/history”[MeSH Terms] OR “racism/legislation and jurisprudence”[MeSH Terms] OR “racism/organization and administration”[MeSH Terms]) OR (“systemic racism”[MeSH Terms] OR “systemic racism/epidemiology”[MeSH Terms] OR “systemic racism/organization and administration”[MeSH Terms])) - Saved search	28*
MeSH and title/abstract search (“built environment”[MeSH Terms] OR “nutrition policy”[MeSH Terms] OR “right to work”[MeSH Terms] OR “zoning policy”[Title/Abstract] OR “redlining”[Title/Abstract] OR “residential segregation”[Title/Abstract] OR “structural inequalities”[Title/Abstract] OR “mass incarceration”[Title/Abstract] OR “unequal educational”[Title/Abstract] OR “educational inequality”[Title/Abstract] OR “wealth accumulation”[Title/Abstract] OR “state sanctioned violence”[Title/Abstract] OR “judicial system”[Title/Abstract] OR “transportation barriers”[Title/Abstract] OR “food access”[Title/Abstract] OR “employment access”[Title/Abstract]) AND (“diabetes mellitus, type 2”[MeSH Terms] OR “diabetes mellitus”[MeSH Terms])	224*
MeSH and title/abstract search (“built environment”[MeSH Terms] OR “nutrition policy”[MeSH Terms] OR “right to work”[MeSH Terms] OR “zoning policy”[Title/Abstract] OR “redlining”[Title/Abstract] OR “residential segregation”[Title/Abstract] OR “structural inequalities”[Title/Abstract] OR “mass incarceration”[Title/Abstract] OR “unequal educational”[Title/Abstract] OR “educational inequality”[Title/Abstract] OR “wealth accumulation”[Title/Abstract] OR “state sanctioned violence”[Title/Abstract] OR “judicial system”[Title/Abstract] OR “transportation barriers”[Title/Abstract] OR “food access”[Title/Abstract] OR “employment access”[Title/Abstract]) AND “diabetes”[Title]	143*
Subject heading (sh) or title (ti) (racism or systemic racism or social segregation).sh. or redlining.ti. or historic redlining.ti. or housing covenants.ti. or zoning policy.ti. (diabetes mellitus, type 2 or type 2 diabetes).sh. or type 2 diabetes.ti. or diabetes.ti.	5,908 327,602
Combined	39*
Expanded MeSH terms Racism Racial prejudice; prejudice, racial; prejudices, racial; racial prejudices; racial bias; bias, racial; everyday racism; racism, everyday; racial discrimination; discrimination, racial; discriminations, racial; racial discriminations; covert racism; racism, covert Systemic racism Racism, systemic; institutionalized racism; institutionalized racisms; racism, institutionalized; institutional racism; racism, institutional; structural racism; racism, structural; structural racisms Social segregation Segregation, social; racial segregation; racial segregations; segregation, racial	

*Filtered for English language, human, and adult.

among 192 American Indian and Alaska Native adults with diabetes. Findings showed that reports of microaggressions, defined as the daily occurrence of biased treatment and remarks based on being American Indian or Alaska Native, were directly related to distress and indirectly associated with lower engagement in exercise and worse diet via distress (42).

Wagner et al. (47) explored the role of racism in self-care, specifically diet, among African American adults with diabetes. Experiences of racism were discussed as leading to maladaptive coping

Table 2—Study design and outcome

First author	Year	Study design	Objective	Population	Sample size	Primary diabetes outcomes	Secondary other outcomes
Bailey	2012	Cross-sectional	To understand barriers to medication adherence and factors related to nonadherence in patients with diabetes	Multiple	59	Medication adherence	
Dawson	2015	Cross-sectional	To understand the influence of perceived racial discrimination on diabetes outcomes and quality of life	African American and White	602	QOL, diet, A1C	Blood pressure
Gonzales	2014	Cross-sectional	To examine the relationship between perceived racial discrimination, standards of diabetes care, and diabetes outcomes	American Indian women	200	A1C, LDL	Standards of care, blood pressure
Jia	2022	Cross-sectional	To examine the relationship between resilience and self-management accounting for social risk exposure	African American men	94	Self-care	
Kattelmann	2009	RCT	To test the effectiveness of a culturally adapted education intervention for diet and nutrition	American Indian	114	A1C, BMI	
LeBrón	2019	Cross-sectional	To examine the relationship between perceived racial discrimination and diabetes outcomes	Latino	222	A1C	Distress, depressive symptoms
Linde	2022	Longitudinal	To examine the relationship between historic residential redlining and present-day diabetes mortality and YLL	African American	109 census tract-level observations	Mortality, YLL	
Mayne	2020	Longitudinal	To examine the relationship between residential segregation and diabetes management in young adults	African American young adults	208	A1C, LDL	
Shiyanbola	2018	Qualitative	To explore perceptions and sociocultural factors that influence diabetes management	African American	40	Diet	
Sittner	2018	Cross-sectional	To examine the relationship between racial migroaggressions, diabetes distress, and diet and exercise	American Indian/Alaska Native	192	Diet and exercise	Distress, depressive symptoms
Tabaei	2018	Longitudinal	To examine the relationship between residential socioeconomic status, food, and built environment with A1C in New York City over time	Multiple	182,756	A1C	

Continued on p. 673

Table 2—Continued

First author	Year	Study design	Objective	Population	Sample size	Primary diabetes outcomes	Secondary other outcomes
Wagner	2013	Cross-sectional	To examine the relationship between perceived racial discrimination and A1C in Black and White women	African American and White women	77	A1C	Insulin resistance
Wagner	2011	Qualitative	To explore the role of racism on diabetes management	African American women	28	Diet	

QOL, quality of life; YLL, years of life lost.

that impacts diet, compounded by the existing social prohibitions that limit one's ability to address racism, resulting in anger and frustration that ultimately affect disease management (47).

Wagner et al. (43) examined the relationship between perceived racial discrimination and A1C in 77 Black and White women using a cross-sectional study design. Findings of this study showed that racial discrimination was associated with insulin resistance across the study sample. However, when looking at the impact by race, racial discrimination was associated with A1C in White women but not Black women (43).

Social Policy

Social policies defined by the WHO include factors such as labor, social welfare, land, and housing distribution. Two studies in this review included the context of social policy. Kattelmann et al. (48) developed a 6-month RCT to examine the effect of a culturally adapted education intervention for diet and nutrition among 114 American Indians with diabetes within the Cheyenne River Sioux Tribe. The social policy identified in this study included the Oahe Dam project in 1959, which displaced the Tribal Agency due to the damming of the Missouri River, resulting in flooding of the community and directly impacting farming and food access within the Cheyenne River Sioux Tribe (48,49). The intervention developed included an education intervention using a Medicine Wheel Model for Native Nutrition that included group nutritional counseling each month that was led by a dietitian and a tribe member (48). At 6 months, there were significant within-group changes in BMI for the intervention group but no differences between groups (48).

Tabaei et al. (45) examined the relationship between residential socioeconomic status, food, and the built environment with A1C in New York City among 182,756 adults with diabetes between 2007 and 2013. Findings showed that, based on A1C being $<$7%, individuals living in advantaged areas took less time to achieve glycemic control (45). Individuals who moved to a more advantaged area showed an improvement in A1C, specifically a significant decrease of 0.40% (CI 0.22; 0.55), whereas individuals who moved to a less advantaged area showed a significant increase in A1C of 0.33% (CI 0.24; 0.44) (45). This study was identified with the social policy determinant, as there was no context for explicit acts to discriminate and segregate

Table 3—Study by outcome and statistical significance

First author	Year	Study design	A1C	BMI	LDL	Self-care	MA	Mortality	YLL	QOL	SE	Statistically significant outcome
Bailey	2012	Cross-sectional					X					X
Dawson	2015	Cross-sectional	X			X				X		X
Gonzales	2014	Cross-sectional	X		X							X
Jia	2022	Cross-sectional				X						X
Kattelmann	2009	RCT	X	X								X
LeBrón	2019	Cross-sectional	X									
Linde	2022	Longitudinal						X	X			X
Mayne	2020	Longitudinal	X		X							
Shiyanbola	2018	Qualitative				X						
Sittner	2018	Cross-sectional				X						X
Tabaei	2018	Longitudinal	X									X
Wagner	2013	Cross-sectional	X									X
Wagner	2011	Qualitative				X						

MA, medication adherence; QOL, quality of life; SE, self-efficacy; YLL, years of life lost.

Table 4—Results by structural factors and impact on outcome

First author	Year	Study design	Statistically significant outcome	Structural determinants	Impact on outcomes
Bailey	2012	Cross-sectional	X	Public policy	Of the sample population, 56% were nonadherent to medications. Barriers statistically significantly related to nonadherence include cost, no refills, poor health status, and fewer disease states.
Dawson	2015	Cross-sectional	X	Governance	Perceived discrimination was associated with lower quality of life for the mental health component and diet in the full sample. In African American individuals, perceived discrimination was associated with higher blood pressure. In White individuals, perceived discrimination was associated with lower mental health-related quality of life, worse diet, and lower glucose monitoring.
Gonzales	2014	Cross-sectional	X	Governance	Perceived racial discrimination was associated with higher A1C and lower standards of care for dental care, blood pressure checks, total cholesterol checks, and pneumococcal vaccination. No relationship was found between perceived racial discrimination and blood pressure and cholesterol.
Jia	2022	Cross-sectional	X	Governance	Higher scores of resilience were associated with higher diabetes self-management engagement. History of incarceration was associated with lower diabetes self-management engagement.
Kattelmann	2009	RCT	X	Social policies	There were significant within-group changes in BMI for the intervention group but not between groups. No significant changes in A1C.
LeBrón	2019	Cross-sectional		Governance	Perceived racial discrimination was not directly associated with A1C. Perceived racial discrimination was associated with depressive symptoms and diabetes distress. Diabetes distress mediated the relationship between perceived discrimination and A1C.
Linde	2022	Longitudinal	X	Governance	HOLC redlining scores explain 45–56% of the variation in census tract-level diabetes mortality and 51–60% of the variation in the census tract diabetes YLL between 1990 and 2014. Higher HOLC grades are associated with 53.7% higher diabetes mortality and 66.5% higher YLL.
Mayne	2020	Longitudinal		Governance	Residential segregation was not associated with A1C or LDL.
Shiyanbola	2018	Qualitative		Governance and cultural and societal values	Perception that past slavery resulted in poverty across African American communities and has directly impacted diet and ability to eat healthy. Belief that providers have withheld education and direction on management leading to worse outcomes.
Sittner	2018	Cross-sectional	X	Governance	Microaggressions directly related to distress and indirectly associated with lower engagement in exercise and worse diet via distress.
Tabaei	2018	Longitudinal	X	Social policy	Individuals living in advantaged areas took less time to achieve glycemic control. Moving to more advantaged areas improved A1C (decrease by 0.40%). Moving to less advantaged areas increased A1C (increase by 0.33%).
Wagner	2013	Cross-sectional	X	Governance	Racial discrimination is associated with insulin resistance across the study sample. Racial discrimination was associated with A1C in White women but not Black women.
Wagner	2011	Qualitative		Governance	Experiences of racism lead to maladaptive coping that affects diet. Social prohibitions make it impossible to address racism, generating anger.

YLL, years of life lost.

land use based on race or ethnicity. Nevertheless, this study also overlaps the structural determinant of governance.

Public Policy

Public policy, as characterized by the WHO, includes education, medical care, water, and sanitation. One study in this review included the context for public policy and diabetes outcomes. Bailey et al. (37) used a cross-sectional study design to examine barriers to medication adherence and factors related to nonadherence in 59 patients with diabetes, across Hispanic (84%), African American (7%), non-Hispanic White (5%), and Asian (3%) adults, who lived in an underserved southwestern community. Within the sample population, 56% were nonadherent to medications (37). Cost of medications, no refills, poor health status, and fewer disease states were identified as statistically significant barriers related to nonadherence (37).

Culture and Societal Values

Culture and societal values include the value placed on health and the degree to which health is seen as a collective social concern. One study included this context and governance. In a qualitative study, Shiyanbola et al. (46) highlighted the perception that past slavery resulted in poverty across African American communities and has directly impacted diet and ability to eat healthy among adults living with diabetes (46). In addition, they found the persistent belief that providers have with held education and direction on management, leading to worse outcomes for adults with diabetes seeking treatment (46).

No studies were identified in this review that were characterized as including macroeconomic policy, defined as including fiscal, monetary, balance-of-payment, and trade policies and underlying labor market structures.

CONCLUSIONS

This scoping review provides a summary of the state of the evidence for structural racism as antecedent to the social determinants of diabetes outcomes across racial and ethnic minority populations living with diabetes in the U.S. Using the WHO SDOH framework, results highlight significant associations between structural racism and clinical outcomes (higher blood pressure and A1C), self-care behaviors (worse diet and lower engagement in physical activity), standards of care (lower standards of care for dental care, blood pressure checks, total cholesterol checks, and pneumococcal vaccination, as well as lower perceived access to education), higher mortality, and more years of life lost for adults with diabetes.

However, it is important to emphasize that this review revealed a paucity of work in this field. A limited number of studies focused on structural factors and diabetes outcomes. Most studies examined in this review underscored the role of governance as a structural determinant (20,38–44), with few or no studies identified in the areas of *1*) macroeconomic policies (no studies identified), *2*) social policies (two studies identified) (45,48), *3*) public policies (one study identified) (37), and *4*) cultural and societal values (one study identified) (46). In addition, research primarily focused on individual-level influences rather than population-level or multilevel influences, such as interventions that simultaneously address individual-, community-, institutional-, and health system-level factors. As such, there is a need for research on broader domains of structural racism to first identify policies at multiple levels of influence and how these levels impact disparities in health outcomes for diabetes. In addition, there is need for studies that examine differential effects of existing policies on disparities in diabetes outcomes across racial and ethnic minority groups.

Based on the results of this review, there are five primary recommendations for future work. First, given the paucity of research, there is a need for more rigorous investigation of structural racism and its tie to downstream social determinants and diabetes outcomes. As the field evolves, more evidence is needed to differentiate individual-level from population-level effects and to evaluate the different domains where structural racism has an effect on diabetes outcomes. Conceptualizing structural racism within the WHO framework will allow for the isolation of structural determinants, such as policy and governance, that have shaped downstream social determinants, such as material circumstances, subsequently impacting disease burden. In the 2010 Commission on Social Determinants of Health formed by the WHO, separation of the SDOH and the structural determinants that shape them was stated as an area for attention, as conflation of the two will fundamentally impact the ability to effectively change policy (18).

Second, policy assessments specific to diabetes are needed. For example, future research may examine the effect of recent government COVID-19 relief spending on the health outcomes and medical adherence of individuals living with diabetes as well as potential racial or ethnic and geographic heterogeneities within these policy effects. Such work could help address the identified absence of research on the effects of macroeconomic policies on diabetes outcomes. Additionally, work examining the effects of labor market laws on diabetes outcomes could help provide new insights into the potential relationship between social policy and diabetes outcomes. For example, future work could examine the effects that state minimum wage and paid time off laws have had on diabetes outcomes and on the labor market participation of individuals living with diabetes. Lastly, to add to the limited work currently examining the relationship between public policies and diabetes outcomes, researchers could focus efforts on the examination of other state-level policies, such as Medicaid expansion, and the longer-term impact of such laws on not only diabetes outcomes but also racial and ethnic disparities in diabetes care access and outcomes. While far from exhaustive, the noted examples highlight the need, as well as the breadth of opportunity, for additional work examining the effects of structural determinants on diabetes outcomes.

Third, an examination of pathways and mechanisms is critical. Possible pathways for these relationships identified through this review include higher levels of depressive symptoms, higher levels of distress, maladaptive coping, and financial instability associated with lower socioeconomic position. Additional psychosocial factors identified for further investigation for potential influence on outcomes are anger and frustration at the inability to address racism and the protective nature of resilience. Additionally, prior work on mechanisms through which structural racism impacts individual health should be investigated in the context of diabetes outcomes. Possible mechanisms for investigation based on prior work in other fields include *1*) economic injustice and social deprivation, *2*) environmental and occupational health inequities, *3*) psychosocial

trauma, *4*) targeted marketing of health-harming substances, *5*) political exclusion, *6*) maladaptive coping behaviors, *7*) stereotype threats, *8*) state-sanctioned violence and alienation from property and traditional lands, and *9*) inadequate health care (21). Prior work in the larger field of population health suggests additional pathways for investigation include the impact on human capital, differential access to health care resources, the differential influence of mass incarceration on racial minorities, and inequalities in the food environment (11,50–52).

Fourth, the next frontier is to develop interventions to mitigate the impact of structural racism on diabetes outcomes (53). As the WHO social determinants framework is an action framework that serves to specify pathways and potential mechanisms, identifying how structural racism operates within this context allows for developing interventions that can be linked to the broader social context and policy. The National Institute on Minority Health and Health Disparities Research Framework should also be incorporated to identify multiple levels of influence and identify targets for interventions across the multiple domains of influence (i.e., biological, behavioral, physical/built environment, sociocultural environment, and health care system) (54). Policy-level interventions are needed that reverse or mitigate the inequalities of historical racist policies. In addition, new policies informed by emerging evidence on social risk need to be developed and tested. Interventions must incorporate multiple levels of influence to capture both the individual and larger societal influences on health.

Finally, tracking and monitoring of change over time is necessary. Systems of monitoring at the national level are needed to track policies identified as detrimental, policy assessments that are underway, and areas for future work. Measures that capture policy awareness, use, and perceived benefit or risk are needed in national surveys to look at change over time. In addition, it is necessary to track changes in perceptions of and experiences with structural racism over time to evaluate if policy assessments and interventions are impacting the day-to-day experience of racial and ethnic minorities.

Limitations

There are several limitations that should be considered. First, this review only included studies completed in the U.S. and in English, so it may not be generalizable to other settings where structural inequalities exist. Second, since studies with positive results are more likely to be published, the studies in this review may reflect publication bias, but since this is a scoping review, exhaustive search of negative or unpublished studies was not performed. In addition, this study only included articles that specifically measured or explicitly described forms of structural racism as characterized by the WHO SDOH framework. For this reason, many policies and practices that exist throughout society and within U.S. health care institutions that impact diabetes care through exclusionary practice and bias may not be captured fully in this review. Finally, although studies included in this systematic review account for individual- and community-level factors, causal pathways were not formally evaluated. As a result, the unique contribution of structural racism above and beyond other potential pathways remains to be elucidated. Future work is needed to clarify these relationships as noted previously.

Conclusion

This scoping review is one of the first to summarize the evidence for structural racism as antecedent to the social determinants of diabetes outcomes in the U.S. Using the WHO SDOH model as the guiding framework, a total of 13 articles were included for synthesis. Ten studies focused on governance, two on social policies, one on public policies, and one on cultural and societal values, with several overlapping across categories. Five areas for future work include *1*) more rigorous research on the relationship between structural racism, downstream social determinants, and health inequalities in diabetes, *2*) policy assessments specific to diabetes outcomes, *3*) an examination of pathways and mechanisms of influence, 4) development of interventions to mitigate the impact of structural racism, and *5*) tracking and monitoring of change over time.

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