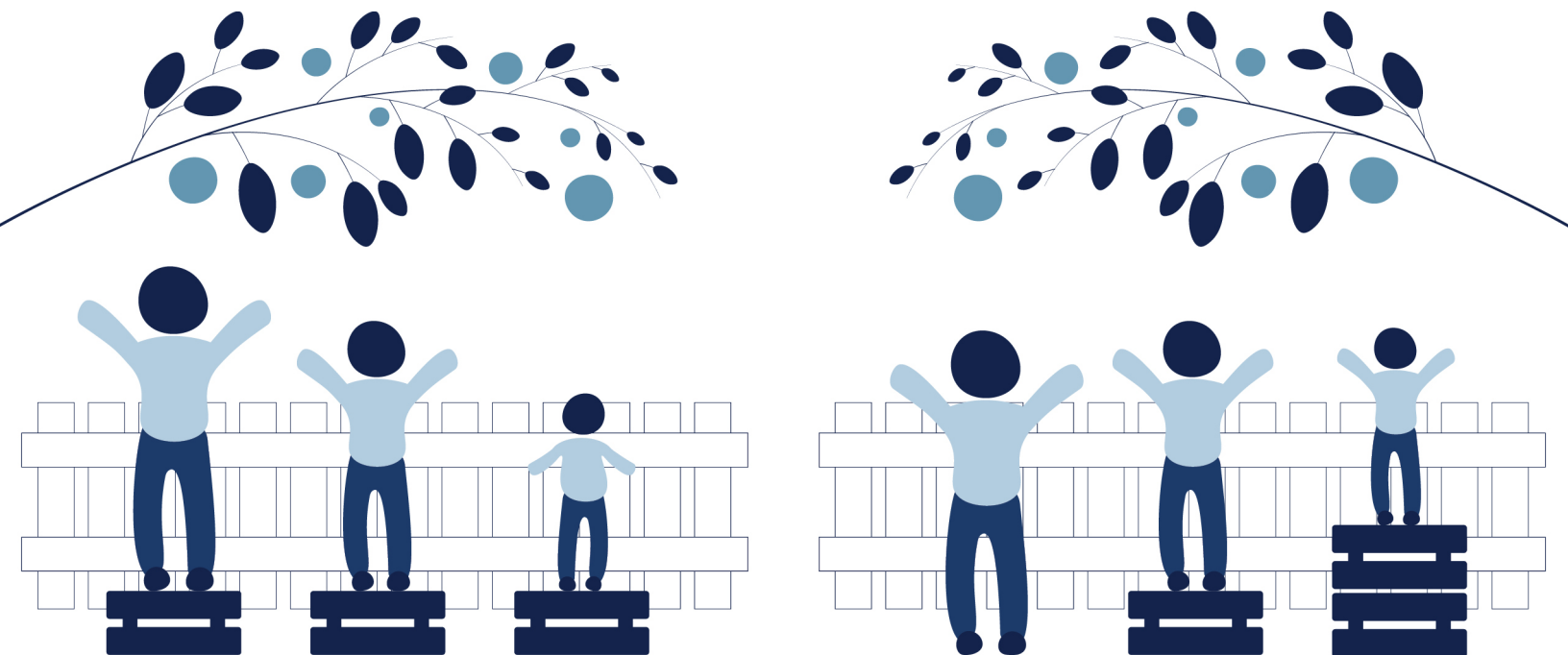


Racial Health Equity and Social Needs Interventions



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List of Acronyms and Abbreviations

- BIPOC, Black, Indigenous, and People of Color
- BMI, body mass index
- CHWs, community health workers
- CI, confidence interval
- ED, emergency department
- KQ, Key Questions
- NR, not reported
- NRS, nonrandomized study with comparison arms, includes experimental and observational designs
- OR, odds ratio
- PCORI, Patient-Centered Outcomes Research Institute
- PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses
- RCT, randomized controlled trial
- SD, standard deviation
- SIREN, Social Interventions Research & Evaluation Network
- USPSTF, US Preventive Services Task Force
- VA, Veterans Affairs

Plain Language Summary

Why was this review performed?

- ▶ *Social needs* refer to adverse social conditions such as lack of food and housing. Social needs are often associated with poor health. Addressing patients' unmet social needs could help improve health outcomes among minoritized racial or ethnic populations and potentially reduce health inequities. However, the potential for social needs interventions to advance health equity is limited by the effects of racism. Using the Patient-Centered Outcomes Research Institute's [evidence map of social needs interventions](#), we, the authors, conducted this review to understand (1) how these interventions considered race or ethnicity when evaluating effects and (2) how these interventions were tailored or adapted to address the needs, preferences, and contexts of the minoritized racial and ethnic populations who were the intended targets. We developed a framework to assess (1) whether studies were *thoughtful* in how they conceptualized race or ethnicity (“conceptually thoughtful”)—ie, noted that race or ethnicity are markers of exposure to racialized social disadvantage—and (2) whether studies' use of race or ethnicity in analyses *informed* the field of racial health equity research (“analytically informative”), ie, examined differential impacts by race or ethnicity. We abstracted data from included studies on the use of tailoring or adaptation in recruitment, retention, or intervention approach and design to meet the population's sociocultural needs or preferences.

What are the findings?

- ▶ Of the 152 studies in the evidence map conducted in multiracial or multiethnic populations, only 44 included race or ethnicity variables in their evaluation of intervention effectiveness. Social needs addressed in these studies included health care services access and quality as well as housing stability. Most often, a community health worker (CHW)/health navigator or other individual who was not a medical professional provided the interventions. Among these 44 studies, only 4 (9%) were conceptually thoughtful about race or ethnicity—ie, only 4 noted that race and/or ethnicity are markers of exposure to racialized social disadvantage. Among the studies that could have examined whether intervention effects differed by race or ethnicity, only 14% (n = 21/152) actually did so (ie, were analytically informative for advancing racial health equity research). Only 3 studies were both analytically informative *and* conceptually thoughtful. Twelve studies reported information about tailoring or adapting interventions based on race or ethnicity. Tailoring approaches typically included use of CHWs or peer mentors who shared race or ethnicity characteristics with the community targeted by the intervention. Studies frequently reported a desire to enhance trust and social connection with the target population as a reason for sociocultural tailoring. Three studies with tailored interventions reported differences in outcomes by race or ethnicity; all showed the strongest impacts or reduced inequity for Black participants.

What are the takeaways from this review?

- ▶ Although there is a growing body of evidence about the effectiveness of social needs interventions for vulnerable groups, relatively little attention is being paid to how racism, particularly structural racism, may lead to differential treatment effects among minoritized racial and ethnic populations. Our review found that studies of social needs interventions to date rarely provided conceptually thoughtful insight into the root causes for racial health inequities. Few studies reported informative analyses on intervention effectiveness by race or ethnicity. Sociocultural tailoring or adaptation can address multiple forms of racism (eg, interpersonal, internalized), including maladaptive strategies to cope with limited opportunities. Yet, studies did not often tailor or adapt interventions to address the unique needs, preferences, or contexts of minoritized racial or ethnic groups. Our findings point to a wide gap between expectations of these interventions' potential to advance racial health equity and their design, implementation, evaluation, and reporting. To advance the field of racial health equity, future work should focus on how racism affects social needs; this understanding should inform approaches for developing, implementing, and evaluating social needs interventions that affect minoritized racial and ethnic minorities.

Abstract

Objectives or Aims: A heightened focus on racism as an underlying cause of health inequities has led to increased calls for action to mitigate racism-related adverse health outcomes. Differential access to goods, services, opportunities, and risks (ie, structural inequities) due to racism results in differential exposure to food insecurity, housing instability, and other social drivers (determinants) of health among minoritized racial or ethnic communities. Social needs interventions often aim to improve health outcomes and mitigate inequities by addressing barriers to care, such as lack of transportation or food insecurity, but whether—and how—these studies include race or ethnicity to understand differential impacts is unclear.

Objective: To conduct a rapid review to understand how interventions addressing social needs among multiracial or multiethnic populations: (1) conceptualized race or ethnicity; (2) explored differential treatment effects by race or ethnicity; and (3) tailored or adapted interventions to address the sociocultural needs or preferences of minoritized racial or ethnic groups in recruitment, retention, or intervention design.

Methods: This review is based on papers described in the Patient-Centered Outcomes Research Institute’s scoping review and evidence map of social needs interventions, which built on systematic searches of resources including PubMed and the Cochrane Library. Review dates spanned January 1995 through November 29, 2021. The scoping review was inclusive of general populations and conditions commonly seen in primary care settings (eg, asthma, heart disease, diabetes, hypertension, mental health, and substance abuse). Studies were required to report on behavioral outcomes, health outcomes, health care utilization outcomes, or harms. Studies were eligible if the participants had identified social needs or if the intervention was designed to address social needs and permitted conclusions about the effect of the social needs intervention.

In addition, for this review, eligible studies had to be conducted in multiracial or multiethnic populations and had to report an analysis that included race or ethnicity. Two reviewers independently assessed all titles, abstracts, and full text for inclusion. The review team coded studies for population characteristics, intervention characteristics, social needs addressed, race or ethnicity analyses reported, health equity considerations (if any), and outcomes. We, the review team, developed a framework to assess whether the study was *conceptually thoughtful for understanding root causes of racial health inequities* (ie, noted that race or ethnicity are markers of exposure to racialized social disadvantage). We also evaluated whether analyses were *analytically informative for advancing racial health equity research* (ie, examined differential impacts by race or ethnicity). Finally, we reviewed included studies for evidence of sociocultural tailoring or adaptation in recruitment, retention, or intervention approach and design.

Results: Of the 152 studies in the evidence map conducted in multiracial or multiethnic populations, 44 included race or ethnicity variables in their evaluation of intervention effectiveness. Social needs addressed included health care services access and quality and housing stability. Interventions were most frequently provided by a community health worker (CHW)/health navigator or other medical nonprofessional. Among these 44 studies, only 4 (9%) were conceptually thoughtful about race or ethnicity—ie, only 4 noted that race and/or ethnicity are markers of exposure to racialized social disadvantage. Among all studies that could have examined whether intervention effects differed by race or ethnicity, only 14% (n = 21/152) actually did so—ie, were analytically informative for advancing racial health equity research. Only 3 studies were analytically informative *and* conceptually thoughtful. Among studies that included race or ethnicity in the analysis, 12 reported information about tailoring or adapting interventions based on race or ethnicity. Tailoring approaches typically included CHWs or peer mentors who shared race or ethnicity characteristics with the intervention’s targeted population. Studies frequently reported a desire to enhance trust and social connection with the target population as a reason for sociocultural tailoring. Three studies with tailored interventions reported differences in outcomes by race or ethnicity; all showed strongest impacts or reduced inequities for Black participants.

Conclusions: Minoritized racial and ethnic groups disproportionately experience poor health due, in part, to structural racism that increases the burden of social needs and decreases access to health-promoting goods, services, and opportunities. Consequently, social needs interventions should address and redress health inequities by race or ethnicity. Our review shows that studies of these interventions to date were rarely conceptually thoughtful for understanding root causes of racial health inequities and rarely conducted informative analyses on intervention effectiveness by race or ethnicity. Studies infrequently tailored or adapted interventions to address the unique needs of minoritized racial or ethnic populations. Our findings point to a wide gap between expectations of these interventions’ potential to advance health equity and their design, conduct, and reporting. To advance the field of racial health equity, future work should use a theoretically sound conceptualization of how racism affects social drivers of health; this understanding should inform methodological approaches to developing, implementing, and evaluating social needs interventions.

Introduction

Background and Rationale

Over the past decade, achieving health equity has become a critical priority for many health stakeholders; health equity is achieved when all individuals have the opportunity to achieve their full health potential and no one is at a disadvantage.¹ Achieving health *equity* requires directly addressing the root causes of health *inequities*. Differential access to goods, services, and opportunities and differential exposures to risks due to historical and current policies and practices (ie, structural inequities) result in food insecurity, housing instability, and inequities in other social drivers (determinants) of health.² These structural inequities do not occur randomly in the population; rather, they serve mechanistically to maintain the marginalization of groups based on social identity (eg, race, gender, sexual orientation, immigration status). Such marginalization has been put in place through long-standing social and economic policies and practices. In the United States, structural inequities based on race (ie, structural racism) have been the most pervasive, profound, and persistent, particularly for Black people.^{2,3} Racial segregation in residential housing and education remain 2 of the most pernicious causes of poor health in the United States among minoritized racial groups, such as Black, Indigenous, and other People of Color (BIPOC). Notably, we prefer and hereafter use the term *minoritized* instead of *minority* to indicate what has been done *to* these groups, as opposed to it being an intrinsic characteristic *of* the groups. In this paper, we focus on structural racism because the literature clearly demonstrates that certain minoritized racial and ethnic groups experience worse outcomes than do their White counterparts across multiple structural systems (eg, health, education, criminal justice). The theoretical framework that explains these outcome differences is that race is a proxy for exposure to 3 types of racism: structural racism, interpersonal racism, and internalized racism,⁴ each of which has been associated with poor mental and physical health outcomes.^{5,6}

In this report we use the overarching term *racial health equity* to include both race and ethnicity. Similarly, the effects of racism apply to ethnic minorities who are BIPOC. Although race and ethnicity are interrelated, we acknowledge that the 2 constructs are different. Ethnicity may be based on shared language, culture, or religion, or it may represent shared sociocultural beliefs. In other instances, it refers to a continent or country of origin of one's ancestors (eg, Africa, Europe). In practice in the United States, however, the terms *Latino* or *Hispanic* are used as the only recognized ethnicity in data reporting, which has limited our ability to discuss the ethnic variation among a range of BIPOC populations. In this report, we recognize that all racial groups have some degree of shared culture or ethnicity and that there is intragroup variation. We also acknowledge that some ethnic populations consist of multiple racial groups.

Recently, efforts have increased to develop and evaluate health care–based interventions to address individuals' unmet social needs related to social drivers of health (eg, food, housing, transportation). These interventions have been driven by the compelling evidence linking

socioeconomic disadvantage and poor health, as well as changes in the health payment landscape (eg, value-based care incentives, global payments), which provide health care organizations the flexibility to test a wider range of strategies to improve health outcomes, including by addressing health-related social needs.^{7, 8} These interventions should, in theory, reduce socioeconomic barriers to health, improve the health of individuals experiencing financial strain, and, in so doing, reduce health inequities related to socioeconomic status.⁹⁻¹³ Because minoritized racial and ethnic groups disproportionately have unmet social needs due to historical and ongoing structural racism,¹⁴ social needs interventions have the potential to disproportionately improve the health of such populations and advance racial and ethnic health equity.

However, the persistence of racism in all forms in the US means that interventions addressing socioeconomic adversity may not benefit all racial or ethnic groups equally and, specifically, that BIPOC communities may benefit less than White populations do. Minoritized groups experience socioeconomic disadvantage differently than do White groups. For example, due to redlining and other forms of institutional and interpersonal racism over generations, Black families experiencing poverty typically live in neighborhoods with higher concentrations of poverty, worse quality housing and schools, and fewer resources than do White families with the same income.¹⁵⁻¹⁸ As a result, social needs interventions to improve housing stability or food insecurity may be less effective for Black individuals. In addition, minoritized racial and ethnic groups face greater barriers, including interpersonal racism and discrimination, to accessing services and resources that can help address their unmet social needs. Finally, social needs interventions could be less effective in BIPOC populations due to low self-efficacy resulting from internalized racism. Despite the many ways in which racism may affect social needs interventions, no one has yet examined the extent to which social needs intervention studies have explicitly considered whether and how minoritization might influence the effectiveness of these interventions. Nor do we know the extent to which social needs interventions have been intentionally designed to reach minoritized racial and ethnic groups and to address their sociocultural needs and preferences (including the barriers that racism creates) to ensure that these groups benefit (and are not disadvantaged) from such interventions.

To fill these knowledge gaps, we built on the Patient-Centered Outcomes Research Institute's (PCORI's) recent scoping review and evidence map of social needs interventions in health care settings¹⁹ to explore (1) whether and how these studies conceptualize and analyze differential intervention effects by race or ethnicity and (2) the extent to which these studies report having tailored or adapted the social needs interventions to address the target populations' sociocultural needs or preferences by race or ethnicity. We focused on studies that included 2 or more racial or ethnic groups because only those studies can examine differential intervention effects by race or ethnicity.²⁰ We used rapid review methods to synthesize the evidence in a timely fashion on a topic of significant and increasing public health interest.^{21, 22}

Objectives and Key Questions

Our objective in this rapid review was to understand whether and how interventions addressing social needs among multiracial or multiethnic populations utilized and conceptualized race; analyzed differential treatment effects by race or ethnicity; and tailored or adapted interventions to address the sociocultural needs and preferences of minoritized racial or ethnic groups in recruitment, retention, or intervention design. We revisited and revised our Key Questions (KQs) for clarity (Appendix A lists our original KQs). Our revised KQs are as follows:

Key Questions

1. How do studies of social needs interventions with a study population that includes more than 1 racial and/or ethnic group conceptualize and use race or ethnicity in their analyses? Specifically:
 - a. How many studies include race or ethnicity in their analyses? Among those that do, what social needs have been addressed and what interventions have been studied?
 - b. Among studies that include race or ethnicity in their analyses, how do they conceptualize race and/or ethnicity?
 - c. How many studies examine whether intervention effects differ based on the race or ethnicity of participants? Among studies that do, how do impacts vary?
 - d. What is the overlap between studies addressing the conceptualization of race or ethnicity (thoughtfulness) and the use of race or ethnicity to examine differential impact (informativeness)?
2. Among studies with a study population that includes more than 1 racial or ethnic group and that examine outcomes separately by race or ethnicity, what are the characteristics of studies of social needs interventions that report tailoring or adapting recruitment, retention, or intervention approaches? Specifically:
 - a. How many studies report tailoring or adaptation?
 - b. What methods are described?
 - c. What rationale is discussed?

In answering these KQs, we focused on studies in multiracial or multiethnic populations that included race or ethnicity in their analyses when evaluating intervention effectiveness, as these are the studies that have the potential to examine differential treatment effects by race or ethnicity. The remainder of this report describes the methods used to identify studies, extract and assess data, and synthesize findings. Finally, we describe the contributions and limitations of this rapid review.

Methods

Rapid Review Protocol

Specifications for this rapid review are in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)²³ and the PRISMA extension on equity.^{23, 24} We followed guidance from Cochrane²¹ and the Agency for Healthcare Research and Quality on rapid reviews.²⁵ We registered the protocol in the Open Science Framework on September 17, 2021 (<https://osf.io/fmd7w/>).

Source Material: PCORI's Scoping Review and Evidence Map

As noted in the Introduction, we used studies identified for PCORI's scoping review and evidence map of social needs interventions¹⁹ for this rapid review. In other words, we relied on the searches, screening, and risk-of-bias assessment of PCORI's scoping review and evidence map.¹⁹

In brief, PCORI's scoping review and evidence map¹⁹ included literature published from January 1, 1995, to November 29, 2021, and built on prior systematic reviews, existing resources such as SIREN (Social Interventions Research & Evaluation Network), and systematic searches of the Ovid Medline and Cochrane databases and gray literature. Interventions addressed food insecurity, transportation, housing instability and quality, interpersonal violence, education, financial strain, employment, or social isolation; they also offered access to legal services, childcare, early childhood education and development, and health care and primary care. Studies of general populations and conditions commonly seen in primary care settings (ie, asthma, heart disease, diabetes, hypertension, mental health, or substance abuse) were eligible. Studies were required to report on behavioral outcomes, health outcomes, health care utilization outcomes, or harms. Studies were eligible if the participants had identified social needs or if the intervention was designed to address social needs and permitted conclusions about the effect of the social needs intervention. Because PCORI's scoping review and evidence map¹⁹ focus on effectiveness rather than *comparative* effectiveness, each arm for comparative effectiveness studies of social needs interventions was treated as a single-arm intervention with before-after data. Two reviewers independently assessed all titles, abstracts, and full text. One reviewer rated studies with comparators (randomized controlled trials, nonrandomized studies with comparators) for risk of bias; a second also rated about one-third of the studies for quality. Studies designed or treated as single-arm analyses were not rated for risk of bias. Appendices B, C, and D provide detailed methods used in PCORI's scoping review and evidence map¹⁹ that we relied on for the rapid review. Specifically, Appendix B gives further details on search strategies, Appendix C lays out inclusion criteria and study selection, and Appendix D lists the process for and ratings from risk-of-bias assessments for studies of effectiveness with comparison arms. Appendix E presents detailed evidence tables. In the description of methods below, we focus on methods specific to the rapid review.

Rapid Review Approach

To conduct this rapid review, we employed abbreviated systematic review methods to complete the product on a compressed timeline. Our rapid review approach included the following adjustments:

Rapid Review Approach

1. Used PCORI’s scoping review and evidence map¹⁹ as a data source (see Appendix B for searches and Appendix C for eligibility criteria) and further restricted eligibility to studies reporting analyses that included race or ethnicity.
2. Conducted focused data extraction, abstracting type of race or ethnicity analysis and a limited set of data addressing 1 or more Key Questions.
3. Used risk-of-bias assessments conducted for PCORI’s scoping review and evidence map.¹⁹
4. Did not conduct a Grading of Recommendations Assessment, Development, and Evaluation (GRADE) certainty-of-evidence assessment.

Technical Expert Panel for the Rapid Review

To ensure that this project met the needs of PCORI and its stakeholders, RTI International assembled a Technical Expert Panel comprising 2 researchers with research expertise in health equity and social needs interventions. Other areas of expertise included medical sociology, health inequities, participatory research, research engagement and design, and population health. We sought the experts’ input on the KQs to address in the rapid review, decisional dilemmas related to tailoring or adapting social needs interventions, data abstraction parameters, and potential audiences for the review. Table 1 lists individuals’ names and affiliations at the time of engagement on this project.

Table 1. Summary of Inclusion and Exclusion Criteria

Name	Affiliation
Nadia Islam, PhD	New York University
Sheena Nahm McKinlay, PhD, MPH	Health Leads

Inclusion and Exclusion Criteria and Study Selection for the Rapid Review

Table 1 and Figure 1 of Appendix C detail the criteria used to select studies identified for PCORI’s scoping review and evidence map on social needs interventions¹⁹ and further modified for the rapid review. Specifically, for the rapid review, we further restricted eligibility to studies in multiracial or multiethnic samples. Health equity studies can take an approach that is either “within”—ie, include a single race or ethnicity without comparison with another group—or “between” groups. The former often seeks to improve outcomes within a disparity population and identify “positive deviants,” or individuals within a disadvantaged group whose observed benefit is greater than expected,²⁶ while the latter compares a disparity population with a reference group—usually White individuals. This report focuses exclusively on between-race or -ethnic group comparison studies because its aim is to examine studies that had the potential to assess differential treatment effects across racial and ethnic groups. (Note: Because studies reported race and ethnicity data differently—some combined the categories [eg, non-Hispanic White, non-Hispanic Black], while others did not [eg, Black, Latino, White]—we use the phrase *race or ethnicity* when referring to how these variables may have been used in the studies.) We therefore performed analyses for this rapid review on the subset of studies from the PCORI review that were conducted in multiracial or multiethnic samples. To be included for KQ2, studies had to report information suggestive of sociocultural tailoring or adaptation of the intervention based on race or ethnicity. We defined *tailoring* as *considering the needs, values, preferences, history, or culture of the populations that are the target of an intervention in developing and implementing the intervention to ensure that the intervention is responsive to and appropriate for the given populations*. We defined the term *adaptation* as *intentionally modifying the content, delivery, or context of an existing intervention to ensure that the intervention is responsive to and appropriate for a specific population*. We developed these definitions by scanning relevant literature,²⁷⁻³⁶ reviewing draft definitions as a team to reach consensus, and comparing the relevance and usefulness of the definitions with our set of included studies. We were broadly inclusive of information on tailoring and adaptation if the study indicated that the tailoring or adaptation was intended to respond to the needs of the population. For example, we included studies that (1) noted that CHWs were selected to match the demographic characteristics of the study population, (2) described outreach to community members to inform study design and implementation, and (3) described creating or adapting materials to be culturally and linguistically appropriate as 1 of the approaches to tailoring used in a study. We did not include studies in which the *only* accommodation for a linguistically distinct population was the use of translated data collection instruments.

Data Extraction for the Rapid Review

One team member systematically extracted data into DistillerSR. A second reviewer checked for omissions and inaccuracies. The scoping review and evidence map¹⁹ included population and intervention characteristics, including social needs addressed, recruitment setting, intervention setting, and intervention provider. For the rapid review, we additionally abstracted the race or ethnic composition of the study sample (absolute numbers and percentages of total population). For KQ1, we abstracted whether race or ethnicity variables were included in the analyses and how (ie, as confounder or as effect modifier). For studies that include race or ethnicity in the analysis in some way, we searched for and abstracted any information about how race was conceptualized by the authors (ie, which latent construct[s] race is serving as a proxy for) as well as how race or ethnicity was conceptualized (KQ1b). To address KQ1c, we abstracted the number of participants and specific outcomes reported by race or ethnicity and reported results including effect size and direction. For KQ1d, we examined overlaps among studies reporting conceptually thoughtful or analytically informative analyses.

To answer KQ2, for each study that included race or ethnicity variables in the analysis, we assessed whether tailoring or adaptation occurred and, if so, extracted the rationale for doing so, with attention to the study's recruitment, retention plans, and intervention design. In keeping with the equity extension for PRISMA, we abstracted information on equity-related considerations in the intervention design and conduct. Abstractors considered the following definition in determining health equity–related considerations: *“Health equity means that everyone has a fair and just opportunity to be as healthy as possible. This requires removing barriers to health such as poverty, discrimination, and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care.... For the purposes of measurement, health equity means reducing and ultimately eliminating disparities in health and its determinants that adversely affect excluded or marginalized groups”* (p. 2).¹ Our abstractions included, when available, descriptions of tailoring the intervention for the study population (eg, specific education materials; addressing sociopolitical, cultural, linguistic, or other aspects of the population) and descriptions of engaging people from the target communities (eg, through community advisory boards, CHWs).

For all data abstraction, we extracted data as closely as possible to how they were reported to limit our interpretation of study investigators' intentions or assumptions. Appendix E includes evidence tables for eligible studies.

Data Analysis Framework for the Rapid Review

Key Question 1: Conceptualization and Use of Race or Ethnicity in Studies in Multiracial or Multiethnic Populations

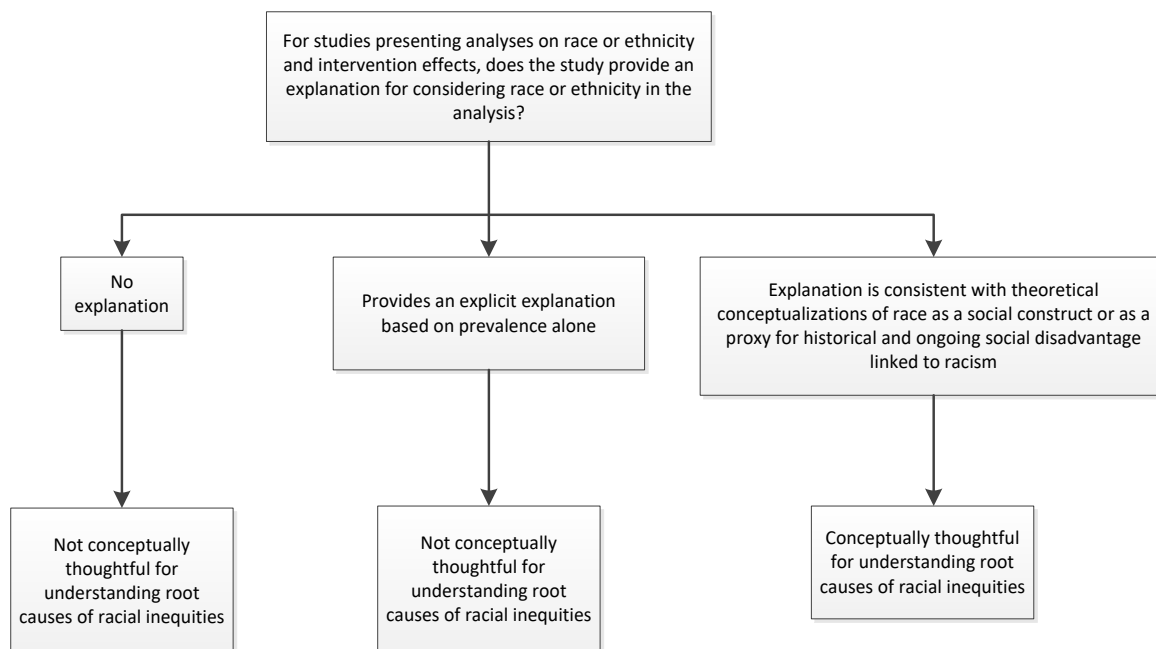
To answer KQ1, we first assessed whether studies included race or ethnicity variables in their analyses of intervention effects and described those studies (KQ1a). Among those that did include race or ethnicity in their analyses, we then examined how race or ethnicity was conceptualized (KQ1b). Specifically, we assessed (1) if there was any explanation given for the use of race or ethnicity in the analyses and (2) whether the explanation, if provided, was consistent with current understanding of race as a social construct, including that race or ethnicity often serves as a proxy for various forms of racialized disadvantage (eg, neighborhood disadvantage, structural racism, implicit bias). We considered studies that explicitly provided such explanations for race to be “*conceptually thoughtful for helping to understand the root causes of racial health inequities*” (Figure 1).

For example, studies that conceptualized race or ethnicity as a social construct or proxy for structural racism or other markers of sociopolitical disadvantage and that discussed root causes of racial inequities were considered thoughtful in their approach. In contrast, studies that did not explain why race or ethnicity was used in the analyses or what race or ethnicity was measuring were not considered conceptually thoughtful. Studies where the only explanation given for why race or ethnicity was included in the analysis was because of differential prevalence of a condition by race or ethnicity were also not considered conceptually thoughtful. This framing is consistent with recent calls for empirical research to be much more thoughtful about the use of race and ethnicity in health research and to explicitly identify structural racism as a root cause of racial health inequities.^{37,38} A conceptually thoughtful rationale for how race or ethnicity was used could be that race is considered as a social, not a biological, construct.

Examples of conceptually driven explanations for investigating the effects of interventions by race or ethnicity

- Race is conceptualized as a social, not a biological, construct.
- Race is conceptualized as a proxy for understanding the effects of:
 - Structural racism or discrimination
 - Historical or social disadvantage
 - Social exclusion/marginalization
 - Exposure to risks due to residence in socially disadvantaged neighborhoods
 - Groups who are disenfranchised based on laws or policies
 - Sociocultural adaptations to limited opportunities
 - Limited access to health care
 - Disadvantage in social drivers of health (eg, substandard housing, food insecurity)

Figure 1. Identifying Social Needs Intervention Studies That Are Conceptually Thoughtful



To examine KQ1c, we determined if analyses were conducted to examine whether intervention effects differed by race or ethnicity, either by stratifying analyses by race or ethnicity, or by including interaction terms (also known as effect modification; Figure 2). We labeled studies that examined and reported differential intervention effects by race or ethnicity as “analytically informative for advancing racial health equity research.”

Studies that are analytically informative for advancing racial health equity research addressed:

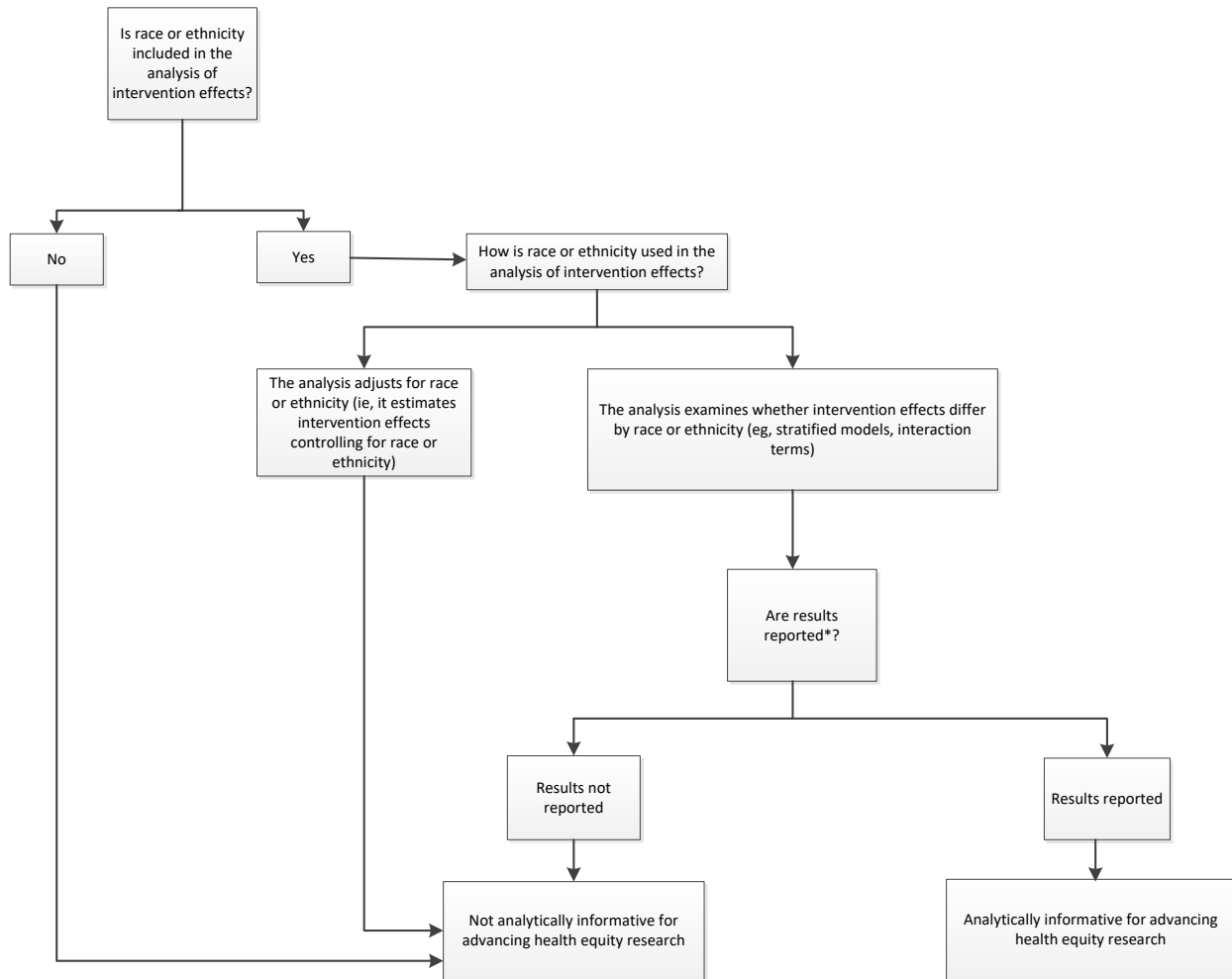
- Investigation of differential impacts of race and/or ethnicity on the effect of the intervention on outcomes by testing including an interaction term or by stratifying outcomes data by race or ethnicity
- Reporting of the resulting quantitative data to allow evaluation of the extent to which racial and ethnic groups may have benefited from the intervention

Studies that are conceptually thoughtful for understanding root causes of racial health inequities addressed:

- Explanation for the use of race or ethnicity
- An explanation, if provided, consistent with current theoretical frameworks that race is a social construct that serves as a proxy for exposure to racism and that racism is a major driver of racial health inequities
- Report of what race may be specifically serving as a proxy for (eg, neighborhood bias, implicit bias)

Studies that adjusted or controlled for race or ethnicity did not meet these criteria because these studies did not provide information about whether the interventions would reduce or increase racial or ethnic inequities in the outcomes being studied. This approach is consistent with guidance and approaches taken by investigators in recent health equity–related studies.³⁹⁻⁴⁵

Figure 2. Identifying Social Needs Intervention Studies That Are Analytically Informative for Advancing Racial Health Equity Research (ie, That Examine Whether Intervention Effects Differ by Race or Ethnicity)



* Results could be reported in brief (eg, as a statement of no differences), in detail, in the main report, or in supplemental material.

Together, these two sets of analyses generated a framework that categorized studies in terms of whether they were *conceptually thoughtful* for helping to understand the root causes of racial health inequities and *analytically informative* for advancing racial health equity research (ie, examined differential intervention impacts by race or ethnicity). We developed this framework after reviewing multiple critiques of the current approach to conducting and reporting on research to advance racial health equity and simplifying the critiques into what we perceived to be the fundamental concerns: conceptual and methodological issues. ^{37, 38, 46-49}

Key Question 2: Tailoring or Adaptation

We defined *tailoring* as considering the needs, values, preferences, history, or culture of the populations when developing and implementing an intervention that will target them; the goal is to ensure that the intervention is responsive to and appropriate for the given populations. We defined *adaptation* as intentionally modifying the content, delivery, or context of an existing intervention to ensure that the intervention is responsive to and appropriate for a specific population. We developed these definitions by scanning relevant literature,²⁷⁻³⁶ reviewing draft definitions as a team to reach consensus, and comparing the relevance and usefulness of the definitions with our set of included studies. We were broadly inclusive of information on tailoring and adaptation if the study indicated that these efforts were intended to respond to the needs of the population. For example, we included studies that (1) noted that CHWs were selected to match the demographic characteristics of the study population, (2) described outreach to community members to inform study design and implementation, and (3) described creating or adapting materials to be culturally and linguistically appropriate as 1 of the approaches to tailoring used in a study. We did not include studies in which the only accommodation for a linguistically distinct population was the use of translated data collection instruments.

Data Analysis

We conducted descriptive analyses, providing overall characteristics of the literature base addressing social needs interventions and including race or ethnicity in analyses of intervention effectiveness. We evaluated and summarized the results for each KQ qualitatively. We did not assess the certainty of the body of evidence for this rapid review, given the disparate number of interventions and populations addressed.

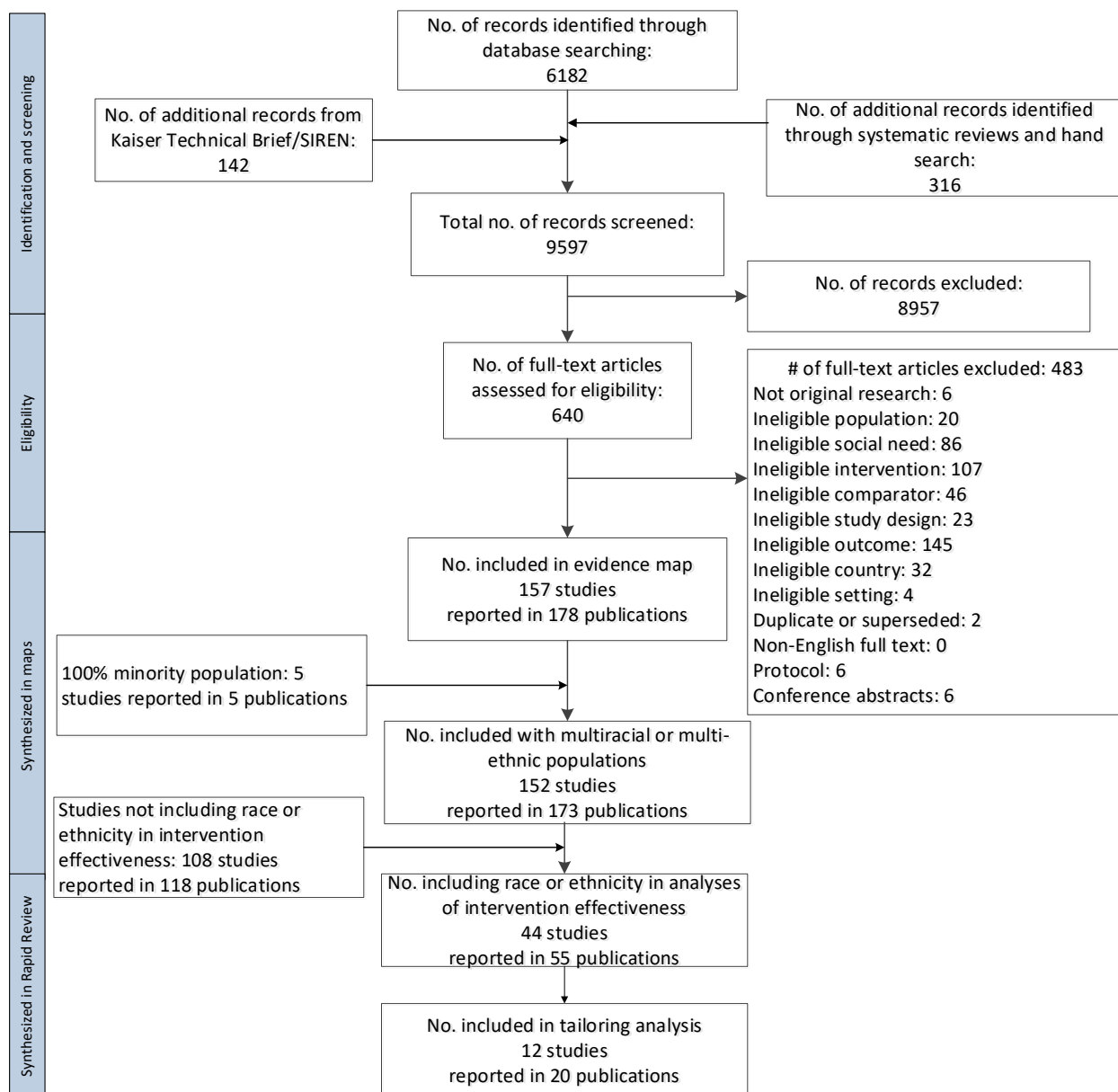
Results

We provide the results of the rapid review, organized by KQ. We summarize the literature search yields and study selection results, describe the included evidence, and provide a narrative synthesis of the evidence.

Literature Search Yields and Study Selection

Among the 157 studies included in the scoping review,¹⁹ 152 were among multiracial or multiethnic populations, therefore meeting our inclusion criteria for this rapid review (Figure 3).

Figure 3. Article Flow for Social Needs and Racial Health Equity Rapid Review



Description of Included Evidence

KQ1: Conceptualization and Use of Race or Ethnicity in the Analyses

KQ1a: How Many Studies Include Race or Ethnicity in Their Analyses?

Among 152 studies in multiracial or multiethnic populations,^{50-200, 238} 44 (comprising 49 interventions) included race or ethnicity variables in their analyses in some way. These 44 studies included 16 randomized controlled trials (RCTs),^{64, 87, 97, 111, 116, 123-125, 131, 157, 158, 164, 190, 192, 196, 199} 13 cohort studies with comparison groups,^{58, 59, 76, 92, 95, 103, 112, 114, 121, 122, 172, 180, 197} 13 single-arm studies reporting data from before and after the intervention,^{52, 55, 63, 91, 107, 109, 146, 155, 171, 188, 194, 198, 200} and 2 comparative effectiveness studies for which we used pre-post comparison data from each treatment arm.^{57, 130} We rated 6 studies as high,^{97, 111, 123, 157, 190, 199} 18 as medium,^{58, 59, 87, 92, 95, 103, 112, 114, 116, 121, 122, 124, 158, 164, 172, 192, 196, 197} and 5 as low quality.^{64, 76, 125, 131, 180} We did not assess the quality of 15 single-arm or comparative effectiveness studies^{52, 55, 57, 63, 91, 107, 109, 130, 146, 155, 171, 188, 194, 198, 200} (Table 2). As noted in the Methods section, because of our emphasis on effectiveness, we did not rate the risk of bias of single-arm studies or comparative effectiveness studies (treated analytically as pre-post studies) because they do not permit causal inference. Eligible studies enrolled diverse samples; more than a third (n = 15) of studies did not have a single racial or ethnic group as a majority. Multiple studies (n = 11) included majority Black/non-Hispanic Black, majority White/non-Hispanic White (n = 9), and majority Hispanic/Latino participants (n = 6). Twenty-one studies included at least 50% female populations, and 3 targeted pregnant persons.

- Only 28% (44 of 152) of studies of social needs interventions in multiracial or multiethnic samples identified for this rapid review included race or ethnicity in their analyses.

Among the 44 studies (comprising 49 interventions) that included race or ethnicity in their analyses, interventions most commonly targeted the social needs of health care services access and quality (n = 30), housing stability and quality (n = 19), transportation assistance (n = 15), and food insecurity (n = 14; Table 2). Nineteen of these 44 studies reported addressing other social needs but did not specify the nature of them. These studies typically offered interventions that were designed to respond to participants' social needs as they arose, such as assisting with applying for food assistance or offering transportation vouchers as needed.

- Social needs most commonly addressed among studies considering race or ethnicity included health care services access and quality, housing stability, transportation assistance, and food insecurity.
- A community health worker/health navigator or other medical nonprofessional most often provided the interventions.

Study interventions typically comprised both medical and social needs programs (n = 19), and most of the interventions targeted patients as intervention recipients (n = 47). Intervention components most often included active assistance with resources (n = 37) and patient education (n = 26). Intervention providers frequently reported in studies included nonprofessionals such as study volunteers and staff (n = 24), CHWs or navigators (n = 17), and health care providers (n = 14). Studies most often used usual care as a comparator (n = 22). Tables E-1 through E-3 in Appendix E outline additional intervention characteristics.

Table 2. Key Characteristics of Studies That Included Race or Ethnicity in Their Analyses

Study characteristic	All studies including race or ethnicity in analyses of intervention effectiveness	
	Studies (N = 44)/Interventions (N = 49)	
	n	%
Study design		
Randomized controlled trial	16	36.4
Cohort with comparison	13	29.5
Single-arm study comparing data before and after intervention	13	29.5
Comparative effectiveness	2	4.5
Case-control	0	0.0
Quality		
High	6	13.6
Medium	18	40.9
Low	5	11.4
Not rated	15	34.1

Study characteristic	All studies including race or ethnicity in analyses of intervention effectiveness	
	Studies (N = 44)/Interventions (N = 49)	
	n	%
Age group		
Children (<18 years) or children and their families	8	18.2
Adolescents/young adults (eg, 13-20 years)	4	9.1
Adults (≥18 years)	34	77.3
Older adults (eg, ≥50 years)	31	70.5
Only older adults (eg, ≥50 years)	1	2.3
Majority race or ethnicity^a		
Majority Black/non-Hispanic Black	11	25.0
Majority White/non-Hispanic White	9	20.5
Majority Hispanic/Latino	6	13.6
Majority Asian/Pacific Islander	1	2.3
Majority Native American/American Indian/Indigenous	0	0.0
Other	1	2.3
No single group was a majority	15	34.1
Not reported	1	2.3

Study characteristic	All studies including race or ethnicity in analyses of intervention effectiveness	
	Studies (N = 44)/Interventions (N = 49)	
	n	%
Social needs addressed		
Childcare assistance	0	0.0
Early childhood education and development access and quality	3	6.8
Education access and quality	6	13.6
Employment assistance	8	18.2
Financial strain assistance	6	13.6
Food security assistance	14	31.8
Health care services access and quality	30	68.2
Housing stability and quality	19	43.2
Interpersonal violence assistance	0	0.0
Legal services assistance	5	11.4
Social isolation assistance	4	9.1
Transportation assistance	15	34.1
Utilities assistance	1	2.3
Additional unspecified domains addressed	19	43.2
Multidomain intervention (none of the above)	1	2.3
Intervention components^b		
Screening	12	24.5
Patient education (including on health, other social need, or resources)	26	53.1
Health care provider education	3	6.1
Providing onsite resources	17	34.7
Passive referrals	15	30.6
Active assistance with resources (vouchers, appt scheduling, enrollment form help)	37	75.5

Study characteristic	All studies including race or ethnicity in analyses of intervention effectiveness	
	Studies (N = 44)/Interventions (N = 49)	
	n	%
Intervention provider^b		
Health care providers (doctors, nurses, therapists, etc)	14	28.6
Social worker	8	16.3
CHWs/navigators	17	34.7
Other nonprofessionals, including volunteers and study staff	24	49.0
Case manager	3	6.1
Not reported	2	4.1

Abbreviations: Appt, appointment; CHW, community health worker; n/N, number.

^a Majority defined as >50%.

^b Reported by intervention.

KQ1b: Conceptualization of race or ethnicity

- **Less than 10% of 44 studies that included race or ethnicity in their analyses provided a conceptually thoughtful rationale for their approach.**

Among the 44 studies that included race or ethnicity variables in their analyses, only 4 were categorized as conceptually thoughtful for understanding root causes of racial health inequities. In other words, only 4 explicitly or implicitly noted that race or ethnicity are markers of exposure to social disadvantage.

Notably, we erred on the side of being generous and inclusive in what, where, and how explanations were identified and considered to be thoughtful. For example, 2 of the 4 studies^{57, 190} categorized as thoughtful reported reasons for including race in their analyses in companion publications, not in the publication with the main study results.^{201, 202} Towfighi et al¹⁹⁰ noted that Black people and Latino communities are disproportionately underresourced and experience inequities in access to quality health care. Krieger et al⁵⁷ attributed part of the increased risk of asthma morbidity among low-income, minoritized racial groups to substandard housing. Two studies explained this increased risk as they described their findings in the discussion section of the paper.^{171, 194} Szilagyi et al¹⁹⁴ described complex and multifactorial reasons (individual, provider, health system access barriers, and cost) for an immunization gap between White and Black or Hispanic children, and Crisanti et al noted that structural racism may account for poorer outcomes in minoritized participants.¹⁷¹ Thus, none of the 4 studies categorized as conceptually thoughtful explicitly outlined conceptual explanations for the use of race or ethnicity in sections of manuscripts devoted to rationale or methods.^{57, 171, 190, 194}

KQ1c: Variations in Intervention Effectiveness by Race or Ethnicity

- Among 152 studies in multiracial or multiethnic populations, only 21 (14%) examined and reported whether interventions impacts differed depending on the race or ethnicity of participants.
- Among these studies, 7 (33%) reported that intervention effects varied by the race or ethnicity of participants.
- No study was explicitly powered to detect these differences; consequently, the 14 studies that did not find differences may have missed differences that would have been statistically significant if the sample sizes had been larger.
- The interventions that found that minoritized racial or ethnic groups experienced better outcomes than did White persons or other groups noted improvements in outcomes such as immunization rates, health care utilization, vocabulary scores, HbA1c, low birth weight, and reinjury after a violent injury.

Among 152 studies in multiracial or multiethnic populations, only 21 (14%) examined and reported whether intervention impacts differed depending on the race or ethnicity of participants. Table 3 presents brief intervention characteristics and outcomes for these 21 studies, categorized along the axes of conceptual thoughtfulness and analytical informativeness, and organized by broad category of intervention. Two-thirds of the studies (14 of 21 studies, 67%)⁵⁷, 91, 97, 107, 116, 122, 124, 125, 130, 155, 180, 190, 199, 200 categorized as analytically informative reported no differences in intervention effects by race or ethnicity; half were tailored interventions.

Table 3. Racial Health Equity and Social Needs Interventions: Intervention Characteristics and Results in Studies With Analytically Informative and Conceptually Thoughtful Analyses^a (N = 21)

Author, year	Design	Quality	N	Tailored	Explores root causes of racial health inequities	Majority race or ethnicity	Outcomes for overall population: health	Behavioral	Utilization
Conceptually thoughtful for understanding root causes of racial health inequities and analytically informative for advancing racial health equity research									
Improving access to health care or social services through care coordination or assistance using bridge personnel									
Krieger, 2005 ⁵⁷	RCT	Low	274	Yes	Yes	N	↕		+
Szilagy, 2002 ¹⁹⁴	Single arm ^b	NR	10 066	Yes	Yes	Varies by site			+
Towfighi, 2021 ¹⁹⁰	RCT	High	487	Yes	Yes	W	↕	↕	↕
Not conceptually thoughtful for understanding root causes of racial health inequities but analytically informative for advancing racial health equity research									
Improving access to health care or social services through care coordination or assistance using bridge personnel									
Duncan, 2020 ¹⁹⁹	RCT	High	5882	No	No	W	0	0	0
Foster, 2018 ¹⁸⁰	NRS	Low	85 701	No	No	N			0
Glendenning-Napoli, 2012 ¹⁰⁹	Single arm ^b	NR	83	No	No	W			+
Hilgeman, 2014 ¹⁵⁷	RCT	High	203	No	No	W			+
Juillard, 2016 ⁵⁵	Single arm ^b	NR	459	Yes	No	N	+		
Kelley, 2020 ⁹⁷	RCT	High	100	Yes	No	N			↕
Krieger, 1999 ¹²⁵	RCT	Low	241	Yes	No	B			+
Krieger, 2009 ¹¹⁶	RCT	Med	309	Yes	No	N	↕		0
Krieger, 2015 ¹²⁴	RCT	Med	366	Yes	No	N	↕	+	0
Lapham, 1995 ¹³⁰	CE ^c	NR	469	Yes	No	N		↕	

Author, year	Design	Quality	N	Tailored	Explores root causes of racial health inequities	Majority race or ethnicity	Outcomes for overall population: health	Behavioral	Utilization
Lyles, 2021 ¹⁸⁸	Single arm ^b	NR	618	Yes	No	B	+		
Slesnick, 2008 ⁹¹	Single arm ^b	NR	172	No	No	N		+	+
Tessaro, 1997 ⁷⁶	NRS	Low	14 714	No	No	B	0		↕
Xiang, 2019 ¹⁰⁷	Single arm ^b	NR	586	No	No	B	↕	↕	↕
Improving access to health care or social services through referrals, no care coordination or bridge personnel									
Chan, 2009 ¹⁵⁵	Single arm ^b	NR	725	No	No	NR			+
Transportation assistance									
Whorms, 2021 ²⁰⁰	Single arm ^b	NR	15 577	No	No	W			↕
Chaiyachati, 2018 ¹²²	NRS	Med	786	No	No	B			↕
Early childhood development and education									
Mendelsohn, 2001 ⁵⁸	NRS	Med	138	No	No	H		↕	

Abbreviations: A, majority Asian/Pacific Islander; B, majority Black/non-Hispanic Black; CE, comparative effectiveness; CHW, community health worker; ED, emergency department, H, majority Hispanic/Latino; N, no single group was a majority; NR, not reported; NRS, nonrandomized study with comparison arms, includes experimental and observational designs; O, other (other than Hispanic, White, Black, Asian); RCT, randomized controlled trial; W, majority White/non-Hispanic White.

Symbols or numbers in the table indicate direction of effect for the entire study population: ↕ = mixed effect; 0 = no effect; + positive effect; - negative effect.

^a Social needs interventions often include multiple components and could be characterized in many ways. In this table, key intervention-specific features were used to characterize studies rather than population-specific features (eg, peer counseling and support in participants experiencing homelessness were characterized as “Improving access to health care or social services care coordination or assistance using bridge personnel” rather than offering housing support). Appendix Tables E-2 and E-3 list detailed intervention characteristics and social needs addressed. Bridge personnel include community health workers, peer mentors, and health navigators.

^b Pre-intervention to post-intervention changes or changes over time serve as the proxy for the intervention effect in single-arm studies.

^c Each arm in comparative effectiveness studies was treated as a single-arm design to understand the effect of the intervention over time.

Seven of the 21 analytically informative studies found differential intervention impacts by race or ethnicity.^{55, 58, 76, 109, 157, 188, 194} Six of these interventions included relatively intense case management or CHW/peer mentor outreach in diverse settings, and 1 addressed the Reach Out and Read-based intervention for children (Table 4).

Among the 7 studies that found differential intervention effects, 4 found the interventions benefited minoritized racial or ethnic populations more than White populations or reduced inequities in minoritized groups compared with White populations.^{55, 157, 188, 194} Of these, 3 were tailored interventions.^{55, 188, 194} In 1 study, risk of reinjury and reinjury rates were significantly lower in Black or Latino participants than in White participants.⁵⁵ In another study, time to primary care appointment was reduced in Black participants vs White.¹⁵⁷ Another study reported reductions in differences between White—compared with Black immunization rates and White compared with Hispanic immunization rates,¹⁹⁴ and a final study reported improvement in mean HbA1c was slightly greater in Black or Hispanic/Latinx participants than that seen in White participants, though the study did not assess statistical significance.¹⁸⁸

Among the 3 remaining studies, 1 reported better vocabulary outcomes in Latino children receiving the intervention when compared with those not receiving the intervention. In this study, however, for the overall sample, which also included Black participants, the difference between the intervention and comparison clinics was not statistically significant.⁵⁸ The 2 remaining studies found mixed health equity impacts: for some outcomes, minoritized racial or ethnic participants benefited more, and for other outcomes, White participants benefited more.^{76, 109} Neither were tailored interventions.^{76, 109}

Table 4. Contribution of Race or Ethnicity Analyses to Understanding Impacts of Intervention on Racial Health Equity in Studies Reporting Differential Effects (n = 7)

Author, year	Design	Quality	N	Contribution of race or ethnicity analyses to understanding impacts of intervention on racial health equity
Conceptually thoughtful for understanding root causes of racial health inequities and analytically informative for advancing racial health equity research				
Szilagyi, 2002 ¹⁹⁴	Single arm ^a	NR	10 066	<ul style="list-style-type: none"> Disparities in White–Black and White–Hispanic immunization rates declined over time
Not conceptually thoughtful for understanding root causes of racial health inequities but analytically informative for advancing racial health equity research				
Glendenning-Napoli, 2012 ¹⁰⁹	Single arm ^a	NR	83	<ul style="list-style-type: none"> Significant pre-post declines in acute outpatient encounters in Hispanic and African American participants but not in non-Hispanic White participants Significant pre-post declines in inpatient admission and increases in clinic visits for all 3 race or ethnicity groups
Hilgeman, 2014 ¹⁵⁷	RCT	High	203	<ul style="list-style-type: none"> No significant interactions between race and intervention groups and clinic attendance Black veterans in control group took longer to attend appointment than did White veterans; no differences by race in the intervention group
Juillard, 2016 ⁵⁵	Single arm ^a	NR	459	<ul style="list-style-type: none"> Significantly lower rates of reinjury over time among minoritized (Black, Latino, other) populations vs White population No significant differences by race or ethnicity in whether the intervention met client needs
Lyles, 2021 ¹⁸⁸	Single arm ^a	NR	618	<ul style="list-style-type: none"> Improvement in mean HbA1c among Black and Hispanic/Latinx participants slightly greater than among White participants; statistical significance not assessed
Tessaro, 1997 ⁷⁶	NRS	Low	14 714	<ul style="list-style-type: none"> Lower rate of observed vs expected low/very low birth weight among African American participants; no differences for White participants Less adequate prenatal care among African American participants than control participants; no differences by intervention group for White participants
Mendelsohn, 2001 ⁵⁸	NRS	Med	138	<ul style="list-style-type: none"> Significantly better vocabulary scores in Latino families receiving intervention

Abbreviations: Med, Medium; NR, not rated; NRS, nonrandomized study; RCT, randomized controlled trial.

^a Pre-intervention to post-intervention changes or changes over time serve as the proxy for the intervention effect in single-arm studies.

Among the 21 analytically informative studies, only 3 were also categorized as conceptually thoughtful (ie, referred to race or ethnicity being markers of exposure to social disadvantage, not biological characteristics).^{57, 190, 194}

Of note, none of the 21 studies stated that they were powered a priori to look at differences by race or ethnicity; therefore, those that did not find statistically significant differences may have been underpowered. The sample sizes in these 21 studies varied significantly from 83 participants¹⁰⁹ to 85 701,¹⁸⁰ and one-third of the studies (7) had fewer than 300 participants.^{57, 58, 91, 97, 109, 125, 157}

Other concerns related to lack of clarity of analytic methods and limited reporting of results. For example, in 1 study, the authors stated that they tested for interactions but did not specify for which variables and did not report results of interaction analyses.¹⁷¹ This study was characterized as analytically noninformative. Another study never used the terms *interaction* or *effect modification* but examined racial differences in outcomes at baseline and follow-up; we coded this study as informative.¹³⁰ In another study, judged to be informative, authors noted the lack of independent association between race and changes in outcomes but did not report the racial distribution of the sample, thereby limiting the value of the information on differential impacts by race or ethnicity.¹⁵⁵

Another study in a sample of Latino and Black children,⁵⁸ judged to be informative, reported unadjusted results indicating no differences in outcomes when compared with a delayed intervention control arm; however, this study did report statistically significant (unadjusted) differences in a Latino subsample. That said, no similar analysis was reported for Black participants (who were less numerous than Latino participants). Additionally, the adjusted model did not test for effect modification by race or ethnicity but instead adjusted for race or ethnicity. This study was categorized as informative because of the unadjusted results suggesting that Latinos likely benefitted from the intervention more than Black participants did. However, the lack of information on intervention effects in Black participants alone, and the lack of interaction analysis in the adjusted model, limits the interpretation of this study in terms of differential impacts by race or ethnicity. It is important to note that this study did not have White participants as a reference group, which precludes a comparison of the effects among participants negatively affected by racism vs those who benefit from it.

KQ1d: To What Extent Do Study Analyses or Conceptualization of Race or Ethnicity Contribute to Advancing Racial Health Equity?

When we considered the combination of conceptual thoughtfulness and analytical informativeness among studies that included race or ethnicity variables in their analyses, half of studies (n = 22, 50%) were considered neither conceptually thoughtful for understanding root causes of racial health inequities nor analytically informative for advancing racial health equity research (Table 5). Three studies (7%) were conceptually thoughtful and analytically informative,^{57, 190, 194} and 1 study (2%) was conceptually thoughtful but not analytically informative (thoughtful because, in the discussion, the authors attributed racial and ethnic

differences in one of the outcomes [psychological distress] to structural racism but noninformative because analyses of intervention effects adjusted for race or ethnicity rather than stratifying or testing for effect modification by race or ethnicity).¹⁷¹ More than one-third of the studies (n = 18, 41%) were characterized as analytically informative but not conceptually thoughtful (Table 5).

Table 5. Categorization of Studies Based on Approach to the Race or Ethnicity Variable

		Analytically informative for advancing racial health equity research		
		Yes	No	Total
Conceptually thoughtful about root causes of racial health inequities	Yes	Informative and thoughtful (n = 3 studies) ^{57, 190, 194}	Not informative, but thoughtful (n = 1) ¹⁷¹	Thoughtful (n = 4) ^{57, 171, 190, 194}
Not conceptually thoughtful about root causes of racial health inequities	No	Informative, not thoughtful (n = 18 studies) ^{55, 58, 76, 91, 97, 107, 109, 116, 122, 124, 125, 130, 155, 157, 180, 188, 199, 200}	Not informative, not thoughtful (n = 22) ^{52, 59, 63, 64, 87, 92, 95, 103, 111, 112, 114, 121, 123, 131, 146, 158, 164, 172, 192, 196-198}	Not thoughtful (n = 40)
Total		Informative (n = 21)	Not informative (n = 23)	Total = 44 studies

Abbreviation: n, number.

KQ2: Tailoring in Social Needs Intervention Studies with Race or Ethnicity Analyses

KQ2a: Number of Studies and Study Characteristics

Of the 44 studies that included race or ethnicity in their analyses of intervention effects, 12 studies^{55, 57, 59, 97, 116, 124, 125, 130, 131, 188, 190, 194} contained information about tailoring or adapting interventions for race or ethnicity. Ten^{55, 59, 97, 116, 124, 125, 130, 131, 188, 194} of the studies reported tailoring the intervention to address elements specific to the race or ethnicity of populations targeted by the intervention. Two reported adapting an existing intervention^{57, 190} (Appendix E, Table E-4). Of the 2 studies reporting adaptation of existing interventions, 1 adapted a “Healthy Homes” asthma mitigation model to include CHWs,⁵⁷ and another adapted a chronic care model-based intervention to include CHWs.¹⁹⁰

Of the 12 studies, 6 were RCTs,^{97, 116, 124, 125, 131, 190} 3 were single-arm studies comparing pre-post intervention data,^{55, 188, 194} 2 were comparative effectiveness studies (analyzed as pre-post studies),^{57, 130} and 1 was a cohort study.⁵⁹ We rated 2 studies as high,^{97, 190} 3 as medium,^{59, 116, 124} and 2 as low quality.^{125, 131, 55, 59, 130, 188, 194} We did not assess the risk of bias of single-arm studies or comparative effectiveness studies (treated analytically as pre-post studies) because they do not permit causal inference.

Studies typically included adults (n = 9), 5 included at least 50% female populations, and 1 targeted pregnant persons. In 6 studies, no single race or ethnic group exceeded 50% of the sample. All these studies included CHWs, navigators, or peer support personnel with

characteristics (shared ethnic, linguistic, or cultural background, or experience of the disease) aligned with those of the targeted communities.

Most interventions in tailoring or adaptation studies addressed the social needs of health care access and quality (n = 9) or housing stability and quality (n = 7). Study interventions typically comprised both medical and social needs programs (n = 7), and intervention components most often included active assistance with resources (n = 12) and patient education (n = 9). Most of the 17 interventions targeted patients as intervention recipients (n = 16). Most studies used usual care (n = 7) or pre-intervention data (n = 7) as a comparator.

Table 6 and Table E-4 in Appendix E outline key study characteristics.

Table 6. Key Characteristics of Studies Reporting Tailoring

Study characteristic	Studies reporting tailoring or adaptation	
	Studies (N = 12)/interventions (N = 17)	
	n	%
Study design		
Randomized controlled trial	6	50
Cohort with comparison	1	8.3
Single-arm study comparing data before and after intervention	3	25
Comparative effectiveness	2	16.7
Case-control	0	0.0
Quality		
High	2	16.7
Medium	3	25.0
Low	2	16.7
Not rated	5	41.7
Age group		
Children (<18 years) or children and their families	4	33.3
Adolescents/young adults (eg, 13-20 years)	1	8.3
Adults (≥18 years)	9	75.0
Older adults (eg, ≥50 years)	6	50.0
Only Older adults (eg, ≥50 years)	0	0.0

Study characteristic	Studies reporting tailoring or adaptation	
	Studies (N = 12)/interventions (N = 17)	
	n	%
Majority race or ethnicity^a		
Majority Black/non-Hispanic Black participants	3	25.0
Majority White/non-Hispanic White participants	2	16.7
Majority Hispanic/Latino participants	1	8.3
Majority Asian/Pacific Islander participants	0	0.0
Majority Native American/American Indian/Indigenous participants	0	0.0
Other	0	0.0
No single group was a majority	6	50.0
Not reported	0	0.0
Social needs addressed		
Childcare assistance	0	0.0
Early childhood education and development access and quality	0	0.0
Education access and quality	2	16.7
Employment assistance	1	8.3
Financial strain assistance	1	8.3
Food security assistance	2	16.7
Health care services access and quality	9	75.0
Housing stability and quality	7	58.3
Interpersonal violence assistance	0	0.0
Legal services assistance	1	8.3
Social isolation assistance	2	16.7
Transportation assistance	4	33.3
Utilities assistance	0	0.0
Additional unspecified domains addressed	6	50.0
Multidomain intervention (none of the above)	0	0.0

Study characteristic	Studies reporting tailoring or adaptation	
	Studies (N = 12)/interventions (N = 17)	
	n	%
Intervention components^b		
Screening	4	23.5
Patient education (including on health, other social need, or resources)	9	52.9
Health care provider education	1	5.9
Providing onsite resources	6	35.3
Passive referrals	7	41.2
Active assistance with resources (vouchers, appt scheduling, enrollment form help)	12	70.6
Intervention provider^b		
Health care providers (doctors, nurses, therapists, etc)	4	23.5
Social worker	0	0.0
CHWs/navigators	7	41.2
Other nonprofessionals, including volunteers and study staff	9	52.9
Case manager	1	5.9
Not reported	1	5.9

Abbreviations: Appt, appointment; CHW, community health worker; n/N, number.

^a Majority defined as >50%

^b Reported by interventions

KQ2b: Methods for tailoring or adaptation of social needs interventions

Table 7 summarizes approaches to tailoring used in the 12 studies that customized or adapted interventions to meet the unique needs of the racial or ethnic populations served. Authors described a wide variety of approaches for tailoring or adaptation; specifically, across all approaches, the most common was the use of “bridge personnel”—ie, CHWs, peer mentors, or health navigators. All but 2 studies reported using CHWs, peer mentors, or navigators from the same race or ethnicity or from the same community as that of the target population (n = 10).^{57, 97, 116, 124, 125, 130, 131, 188, 190, 194} Three studies provided cultural sensitivity training or training on resources available to the community.^{97, 125, 131} One study offered “culturally appropriate” food resources to a diverse, low-income population,⁵⁹ and another reported “culturally appropriate” case management but did not describe specific modifications.⁵⁵

Table 7. Methods of Tailoring and Adaptation in Eligible Social Needs Interventions

Aspects of tailoring	n studies (%)
CHW/patient liaison shared race, ethnicity, or language	10 (89%)
Community/partner input on study design	2 (17%)
Culturally appropriate resources provided (not including matching to community)	2 (17%)
Other formative investigation to understand population needs/preferences (not including community involvement)	1 (8%)
Community member- or CHW-led training for study staff	1 (8%)
Cultural sensitivity training or training about community resources	3 (25%)
Community-based discussion of findings	1 (8%)

Abbreviations: CHW, community health worker; n, number.

KQ2c: Rationale for tailoring or adapting social needs interventions

Equity as a rationale for tailoring or adapting social needs interventions. Half of the studies (6 of 12) explicitly noted equity as a consideration for *tailoring* or *adapting* interventions to meet unique needs of minoritized racial or ethnic populations.^{57, 97, 125, 188, 190, 194} Specific reasons typically involved the desire to enhance trust and social connectedness; interventions frequently matched patient or community characteristics to address barriers to care or other participant needs more effectively.^{57, 91, 125, 190} Two studies,^{57, 190} published as companion papers, described the rationale for engaging community partners (in the design of the survey and intervention) as ensuring benefit and avoiding harm.^{201, 202} One study, in a companion paper, specifically noted the importance of flexibility to overcome barriers arising from poverty and detailed the use of outreach workers and providers caring for impoverished children.^{194, 203} Some studies cited the use of CHWs or peer mentors who shared ethnic or linguistic backgrounds with study participants as a means to provide culturally appropriate interventions to communities at higher risk of inequitable outcomes.^{57, 125, 188, 190}

Other equity considerations in intervention design. All 12 studies implicitly or explicitly addressed racial health equity in describing their research questions, target population, inclusion criteria, or intervention design. As an example of an implicit consideration of equity in *selecting the population*, several studies noted that the racial or ethnic group had been “understudied” and reported a need to understand effectiveness by race or ethnicity or in diverse populations.^{55, 57, 97, 130, 188} As examples of explicit considerations of equity in *selecting the population*, some authors noted that their studies were set in communities that experienced inequities (eg, screened positive for unmet, basic resource needs,⁵⁹ had high proportions of poverty).⁵⁹ Six of 12 studies explicitly reported equity-related considerations for tailoring or adapting interventions, which typically entailed incorporating community members or community values to foster benefits to the community.

Use and conceptualization of race and/or ethnicity in studies that tailored or adapted interventions. Of the 12 studies reporting tailoring of interventions,^{55, 57, 59, 97, 116, 124, 125, 130, 131, 188, 190, 194} 10 conducted analyses that we considered analytically informative.^{55, 57, 97, 116, 124, 125, 130, 188, 190, 194} Of them, 3 reported differences in effectiveness by race or ethnicity,^{55, 188, 194} all of which showed the strongest impact^{55, 188} or reduced inequities¹⁹⁴ for Black participants (Table 4).

Discussion

Summary and Interpretation of Findings

Use of Race or Ethnicity in Analyses of Intervention Effectiveness

The 157 studies identified in PCORI's scoping review and evidence map on social needs interventions included a diverse array of participants; 152 of the studies included multiracial or multiethnic populations.¹⁹

Among these 152 studies, only 44 (28%) included race or ethnicity in their analyses of intervention effects. Of these 44 studies, only 4 (9%) provided conceptually thoughtful explanations for race or the root causes of racial health inequities that help us understand *why* interventions may have differential impacts by race or ethnicity.

All 152 studies could have examined whether intervention effects differed by race or ethnicity, but only 14% (n = 21) did (ie, were analytically informative for advancing racial health equity research). Although none of these 21 studies were explicitly powered to detect differences by race or ethnicity, 7 found differential impacts by race or ethnicity. Four of these 7 reported greater improvements or reduced inequities in BIPOC populations when compared with White participants.

Among the 44 studies that included race or ethnicity in the analysis, 12 (27%) reported on efforts to tailor or adapt their interventions. Of these 12, 6 studies reported equity-related considerations as part of the rationale for tailoring or adapting the interventions specifically to meet the unique needs of minoritized racial or ethnic populations.

We interpreted these findings to mean that although the body of evidence about the effectiveness of social needs interventions on vulnerable populations is growing, relatively little attention has been paid to date to how racism, particularly structural racism, may lead to differential treatment effects among minoritized racial or ethnic populations. Relatively few studies (n = 21/152) in this review examined whether interventions had differential effects among participants based on race or ethnicity—both of which are markers of exposure to structural and interpersonal racism.

Among the 21 studies that did allow for the possibility of differential impacts by race or ethnicity (ie, that conducted stratified or interaction analyses), only 7 found any differences. However, none of the 21 studies were explicitly powered to identify interactions, therefore the 14 studies that found no differential impacts have false-negative results. Although sociocultural tailoring and adaptation can address multiple forms of racism (eg, interpersonal, internalized), relatively few interventions in our review used these strategies. The urgency of addressing health equity means we cannot rest on assumptions that even well-intentioned, social needs-targeted interventions will advance health equity. Instead, we will have to explicitly design interventions

based on the sociocultural needs of minoritized racial and ethnic populations and study the differential impacts of these interventions.

In this report, we offer a simple, 2-concept framework to understand how social needs interventions may advance health equity. Using these 2 concepts—conceptually thoughtful and analytically informative—can improve not only social needs–related research but also the design, conduct, and reporting of other health services research. For example, an investigator may be interested in understanding contributors to higher mortality from stroke among Black and Indigenous persons compared with White individuals. An approach that is not “conceptually thoughtful” might simply state that the researchers are interested in examining racial differences in stroke mortality. In fact, the excess risk of stroke is likely attributable to the overrepresentation of minoritized racial or ethnic groups in economically disadvantaged communities that have less access to both health-promoting and acute care resources, including stroke centers. In this example, race might serve as a proxy for neighborhood disadvantage; however, failure to state this possibility has several detrimental consequences. First, it may leave the impression that there is something inherent or biological about minoritized racial or ethnic individuals that places them at higher risk of dying from stroke. Second, it may place responsibility on those individuals instead of on the systems and structures that result in some neighborhoods having fewer resources and thereby becoming more disadvantaged than others. Further, this failure impedes our ability to identify actionable solutions at the system level, as opposed to at the individual level.

Our categorization framework can help individuals and groups that conduct systematic reviews by focusing on information with the highest utility in addressing racial health equity. For example, in 2021, the US Preventive Services Task Force published 2 papers addressing racism in preventive services, with expectations for future guideline recommendations.^{204, 205} For systematic reviews that support clinical practice guideline development, routine synthesis of differences in effectiveness by race or ethnicity that do not consider both analytic informativeness and conceptual thoughtfulness can worsen inequities in health care and may exacerbate health inequities by perpetuating what has been termed *scientific racism*, or the belief that racial hierarchies are explained by biological differences.²⁰⁶

Specifically, systematic reviews that describe differences in screening or interventions between minoritized racial or ethnic groups and majority groups, without clarifying why these differences arose, can lead to harm if these reviews create or perpetuate clinical practices that either withhold services (underuse) or result in unnecessary care delivery (overuse) because of assumed biological differences that do not exist. The recent and growing criticism of using race in clinical algorithms is an example of how failure to understand and use race in a thoughtful and informative manner can potentially exacerbate health inequities.²⁰⁷⁻²¹⁰ Our framework can be a valuable addition to the next iteration of standards for reporting of systematic reviews on health equity (PRISMA extension on health equity).^{23, 24} Use of our framework has implications for resources and staffing systematic reviews: the application of our categories required iterative reviews of the included evidence and consultation with expert methodologists.

Understanding the root causes of health inequities is critical. Racism negatively affects the health of minoritized racial and ethnic populations through multiple mechanisms.²¹¹ Optimizing the effectiveness of social care interventions in minoritized racial and ethnic populations will require addressing both unmet social need(s) and the racism that is the fundamental driver of those unmet needs. To date, most social needs interventions have dealt with the unmet social needs but have failed to address the historical and ongoing injustices that fueled them.

Our framework is consistent with and supports calls from multiple journals that have highlighted the problematic nature of imprecise definitions of race or ethnicity and the failure to acknowledge structural racism as a fundamental cause of racial health inequities; such publications have revised their author instructions to include information specific to race and racism.²¹²⁻²¹⁴ Changing the expectations of peer reviewers and journal editors about how race and racism are handled from the conceptualization through the analyses and implications of the work would facilitate acknowledging the detrimental effects of structural racism.

Tailoring in Social Needs Intervention Studies with Race or Ethnicity Analyses

Few studies in our rapid review tailored or adapted the interventions to the unique needs of minoritized racial or ethnic individuals; those studies that did generally did not use recommended strategies for tailoring to sociocultural context. Of the 44 studies in our review, only 12 reported efforts to tailor or adapt the intervention to the sociocultural needs and preferences of minoritized racial or ethnic individuals. Most of these efforts involved the use of bridge personnel (eg, CHWs, peer mentors, health navigators), a strategy for which there is a strong evidence base for the effectiveness to reach socially marginalized populations, provide social care, and improve health behaviors and chronic disease management. CHWs can address issues of distrust, disengagement, and treatment nonadherence that arise from perceived discrimination and structural racism. Given that CHWs can work in multiple contexts—health care settings, patients’ homes, community-based organizations—what remains unknown is how to best place CHWs to optimally integrate the medical and social needs of patients. Beyond the use of bridge personnel, interventions employed relatively few strategies for sociocultural tailoring (Table 7). For example, only 2 of the interventions reported tailoring resources for the population. Studies rarely explicitly described the rationale for tailoring or adapting interventions based on the race or ethnicity of the population served.

Three studies in our review that were socioculturally tailored reported greater benefits or reduced inequities in effect size of outcomes among minoritized racial and ethnic groups as compared with White individuals. The other 9 studies either found no differences ($n = 7$) or were not analytically informative ($n = 2$). Although the number of socioculturally tailored interventions in our study that reported differential treatment effects was too small ($n = 3$) to draw any meaningful conclusions, it nonetheless identifies voids in the literature. Specifically, are studies that employ more intense methods or a broader range of methods to socioculturally tailor or adapt social care interventions more effective? Which tailoring and adaptation methods may be most effective at improving engagement, processes, and health outcomes?

Limitations of the Review Methodology

Our approach to categorizing studies as conceptually thoughtful for understanding root causes of racial health inequities and analytically informative for advancing health equity research is constrained by what was reported in the studies that met our eligibility criteria. To capture articles that may have provided the information to help us evaluate conceptual thoughtfulness, we also searched ancillary publications of the main manuscripts. However, it is possible that we overlooked relevant publications, particularly in assessing whether studies were conceptually thoughtful in explaining why and how they applied race or ethnicity constructs. We did not attempt to contact authors.

Our characterization of analytic informativeness and conceptual thoughtfulness is not an established or agreed-upon framework; however, the spirit of the characterization is consistent with prevailing wisdom and concrete guidance. We think it provides a practical way for researchers to quickly appraise literature in this area and to be more intentional in their approach to conducting analyses that advance health equity and avoid scientific racism. That said, a key limitation of our review is our inability to ascertain the myriad reasons why studies may not have conducted race- or ethnicity-stratified analyses (eg, sample size and power considerations) or may have chosen to conduct single-race or -ethnicity studies (eg, prior analyses and literature may have already demonstrated that a single race or ethnic group has the greatest need and potential benefit from intervention).

For this review, we excluded studies that focused exclusively on a population from a single racial or ethnic group, even if those analyses may have been conducted in a way that was considered conceptually thoughtful and informative about intervention effects in that group. We acknowledge that single-race or single-ethnicity studies can also be informative for health equity and may have advantages such as improved efficiency (eg, recruiting fewer participants) and opportunities to evaluate within-group heterogeneity. In addition, these types of studies “center” the experiences and perspectives of minoritized racial and ethnic groups, which is important given that these groups have historically been marginalized, excluded, and often viewed only in relation to White individuals, who are considered the normative group. Importantly, studies that tailor interventions also often target single race or ethnic groups, and these studies were excluded because of our emphasis on differential effects, which limits the picture of sociocultural tailoring presented here. Table E-5 in Appendix E presents a summary of the 5 single-race or ethnicity studies²¹⁵⁻²¹⁹ that we excluded from our analyses.

We also excluded several CHW-led intervention studies. We recognize that such interventions, by their nature, are often tailored to meet the needs of a given population and can provide valuable insights on the effects of addressing patients’ social needs. However, excluded studies involving CHWs did not meet eligibility criteria for this review because they did not specifically include race or ethnicity in their analyses of intervention effects. In addition, we excluded studies in which the only approach to tailoring or adaptation was use of translated data collection instruments. Although this modification is clearly important to engaging diverse

populations, we considered translation an essential facet of an intervention and sought studies that used broader approaches to tailoring.

As part of our rapid review methods, we conducted a single (rather than dual) risk-of-bias assessment. However, our analyses are not limited or constrained by the risk of bias of included studies, thereby limiting the impact of inaccuracies or inconsistencies in risk-of-bias ratings.

We examined health, behavioral, and health utilization outcomes but did not evaluate outcomes related to social risks (eg, changes in social needs) or process measures (eg, changes in number of referrals). Examining more distal outcomes is important but does not provide a comprehensive picture about what is happening along the entire pathway from unmet need to addressed need to health outcome.

Limitations and Strengths of the Evidence Base

Most studies did not define or include a conceptual rationale for including race or ethnicity in the analysis. Specifically, the majority of studies did not acknowledge race as a social construct or racism as the fundamental driver of racial health inequities,⁶ despite increasing recognition of the importance of and calls for published work to do this.^{37, 38, 220, 221} Failure to define and acknowledge race as a social construct perpetuates what has been termed *scientific racism*,²⁰⁶ or the belief that racial hierarchies are explained by biological differences.²¹⁴

Most studies that included race or ethnicity in their analyses adjusted or controlled for the effect of race or ethnicity (and often did not report the magnitude of the covariate's effect). This approach fails to examine whether BIPOC populations, for whom racism is likely to make social risk interventions operate differently, benefit from interventions at least as much as do White populations—and therefore fails to advance our understanding of which social risk interventions can reduce racial or ethnic social risk and health inequities.^{26, 222}

Researchers may have failed to describe the rationale for using race or ethnicity in analyses for several possible reasons, including (1) limited awareness of the importance of doing so; (2) limited knowledge that it is racism, rather than race, that is associated with social risks and poor health; and (3) scientific publishing norms that limit word counts and do not have rigorous standards for reporting on race or ethnicity, thus deprioritizing such reporting. Corbie-Smith et al found, based on interviews, that investigators did think critically about the use and implications of race in their research, but they did not consistently include this reflection in their published work.²²⁰ The most comprehensive information we found was collected over the span of several papers about a single intervention (ie, separate papers describing the intervention and intervention evaluation). Research teams may have tailored or adapted their interventions but did not report these activities. Similarly, investigators may have carefully considered the conceptual underpinnings for why the target populations were chosen and the race or ethnicity analyses conducted but did not report their rationale in published papers. In the past several years, however, significant progress has been made to increase the awareness of health service researchers about the role of racism in health inequities, highlight the importance of conceptual

and methodological rigor in studies involving race or ethnicity, and increase journal expectations for reporting this information.

Research Recommendations

Recommendations for Conduct, Design, and Reporting

One strategy to help researchers ensure that race or ethnicity is used in a thoughtful way is by asking *why* race or ethnicity might be associated with the problem under study and how race or ethnicity is serving as a proxy. Applying the “5 Whys” technique can help researchers identify the root cause and structural factors driving associations between race or ethnicity and outcomes.^{206, 223, 224} This technique, which is commonly used in health care quality improvement, involves asking “Why did this happen?” when presented with a problem and asking “Why?” repeatedly until you reach the root cause.²²⁴ To inform the 5 Whys approach, a robust and growing number of articles are available to help researchers understand theoretical perspectives on race or ethnicity as social constructs and as proxies for structural racism.^{48, 211, 225-227}

To improve primary research related to the potential for social needs interventions involving multiple racial or ethnic groups to advance racial health equity, the following would be beneficial:

- Create expectations that interventions will be grounded in—and specify—their theory and conceptual understanding of race or ethnicity, and use this information to guide the study design, including whether and how sociocultural tailoring or adaptation occurs.
- Include clearly defined hypotheses related to race or ethnicity, when appropriate, that link back to the conceptual rationale for the root causes of racial health inequities.
- Include analyses that are powered to appropriately test these hypotheses.
- Incorporate robust discussion sections that explore the study’s results within the larger context of structural inequities and other drivers of poor health.

We found that when studies provided a conceptual rationale for including race or ethnicity as variables in their analysis, this information was not found in the Methods section (where study variables are typically defined). We did find relevant text elsewhere in the papers (eg, introduction, discussion) or in companion papers (eg, intervention design and methods papers or protocol papers). This finding *implies* that decisions about methodology are not aligned with the conceptual understanding of the variables being used. We recommend that future studies include descriptions in the methods about why, in addition to how, variables such as race and ethnicity are being employed. Figure 4 outlines research conduct and reporting recommendations.

Figure 4. Recommendations for Conduct, Design, and Reporting of Research

- Standardize the expectations that interventions are grounded in and specify their theory and conceptual understanding of race or ethnicity to inform intervention design.
- Clearly define hypotheses related to race or ethnicity, when appropriate, that link to the conceptual rationale for the root causes of racial health inequities.
- Power analyses to test hypotheses appropriately.
- Fully report in study methods sections *why* and *how* race and ethnicity are being used.
- Develop approaches for addressing both unmet social need(s) and the racism that is the fundamental driver of those unmet needs.
- Include robust discussion sections exploring study results within the larger context of structural inequities and other drivers of poor health.
- Clearly report on perceived discrimination, other sociodemographic factors, and the intersectionality of race and ethnicity with these factors, to improve conceptually driven understanding of the complex interactions between race or ethnicity and health.

Future Research Needs

Developing and evaluating interventions to address not only social needs but also drivers of needs, especially structural racism, is a critical area for future research. Understanding if social needs interventions are effective within minoritized racial and ethnic populations (vs the population in general) and whether there are differential treatment effects by race or ethnicity will also be important to addressing social drivers of health for these populations. Researchers should also report on perceived discrimination, other sociodemographic factors, and the intersectionality of race and ethnicity with these factors.²²¹ Similarly, research should seek to elucidate the effects of different approaches to tailoring and adaptation across the research continuum and among diverse racial or ethnic groups. Lastly, understanding barriers and facilitators of using race or ethnicity in conceptually thoughtful or analytically informative ways is necessary for broad application of such analyses. Figures 5 and 6 outline recommendations for research priorities and important areas to address.

Figure 5. Primary Research Priorities

- Implement and evaluate the effectiveness of interventions to address both unmet social needs and structural racism that is the fundamental driver of those unmet social needs.
- Examine barriers and facilitators to using race/ethnicity in a conceptually thoughtful and analytically informative manner.

Figure 6. Other Research Recommendations

- Understand the effectiveness and differential effects of social needs interventions within minoritized racial and ethnic populations.
- Compare the effectiveness of different tailoring and adaptation methods for improving recruitment, engagement, and outcomes in social needs interventions

These kinds of issues highlight the critical importance of a theory-driven conceptualization of race and ethnicity.

Conclusions

Structural racism is an underlying mechanism for the disproportionately unmet social needs among minoritized racial and ethnic groups, and it influences the subsequent health inequities among these populations. Consequently, social needs interventions should address and redress health inequities by race or ethnicity. Our review shows that studies of these interventions to date rarely offered conceptually thoughtful insight on the root causes for racial health inequities, seldom conducted informative analyses on intervention effectiveness by race or ethnicity, and infrequently tailored or adapted interventions to address the unique needs of minoritized racial or ethnic groups. Our findings point to a wide gap between expectations of these interventions' potential to advance health equity and their design, conduct, and reporting. To advance the field of racial health equity, future work should use a theoretically sound conceptualization of how racism affects social drivers of health and use this understanding to inform methodological approaches for developing, implementing, and evaluating social needs interventions.

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Appendix A: Revisions to Key Questions

The original Key Questions (KQs) reported in our published protocol are as follows.

1. Among studies with a study population that includes more than 1 racial/ethnic group, what are the characteristics of studies reporting effects of social needs interventions separately by race or ethnicity? Specifically:
 - a. How many studies report outcomes by race or ethnicity?
 - b. Among studies reporting outcomes by race or ethnicity, what social needs have been addressed and what interventions have been studied?
 - c. Among studies reporting outcomes by race or ethnicity, how do studies report their rationale for selecting specific social needs and subgroups to address?
2. Interventions may be tailored to or adapted for specific communities. What are the characteristics of studies of social needs interventions that report tailoring or adapting recruitment, retention, or intervention approaches? Specifically:
 - a. How many studies report tailoring or adaptation?
 - b. What methods are described?
 - c. What rationale is discussed?

We revised the KQs for clarity as follows:

1. How do studies of social needs interventions with a study population that includes more than 1 racial and/or ethnic group conceptualize and use race or ethnicity in their analyses? Specifically:
 - a. How many studies include race or ethnicity in their analyses? Among those that do, what social needs have been addressed and what interventions have been studied?
 - b. Among studies that include race or ethnicity in their analyses, how do they conceptualize race and/or ethnicity?
 - c. How many studies examine whether intervention effects differ based on the race or ethnicity of participants? Among studies that do, how do impacts vary?
 - d. What is the overlap between studies addressing the conceptualization of race or ethnicity (thoughtfulness) and the use of race or ethnicity to examine differential impact (informativeness)?

-
2. Among studies that have a study population which includes more than 1 racial or ethnic group and that examine outcomes separately by race or ethnicity, what are the characteristics of studies of social needs interventions that report tailoring or adapting recruitment, retention, or intervention approaches? Specifically:
 - a. How many studies report tailoring or adaptation?
 - b. What methods are described?
 - c. What rationale is discussed?

Appendix B: Search Strategy

This appendix includes exemplar tables from the November 2021 data update for the scoping review and evidence map. To access prior search information, see the August 2021 scoping review and evidence map report at <https://www.pcori.org/impact/evidence-maps-and-visualizations/social-needs-interventions-improve-health-outcomes>.

Table B-1. Ovid MEDLINE® Search String and Yield for Food Insecurity, Housing, Education and Literacy, Financial Strain, Employment, Transportation, Utilities, Social Isolation, Early Childhood Development, Legal Services, and Childcare (November 29, 2021)

Search	Query	Items found
1	"Social Determinants of Health"/	4945
2	Social Conditions/	9489
3	Social Environment/	43 890
4	Social Class/	42 869
5	Socioeconomic Factors/	166 994
6	(social* adj1 determin*).ti,ab,kf.	9586
7	((determinant* or determinate*) adj2 health).ti,ab,kf.	11 010
8	((social* or socio*) adj1 condition*).ti,ab,kf.	7195
9	((social* or socio*) adj1 environment*).ti,ab,kf.	11 819
10	((social* or socio*) adj1 (factor* or gradient*).ti,ab,kf.	40 858
11	((social* or socio*) adj1 (need* or require*).ti,ab,kf.	2583
12	((social* or socio*) adj1 (equit* or inequit* or disparit* or equal* or unequal*).ti,ab,kf.	9427
13	((social* or socio*) adj1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantag*).ti,ab,kf.	13 894
14	((social* or socio*) adj1 risk*).ti,ab,kf.	2937
15	((social* or socio*) adj1 (status* or circumstance* or position* or class*).ti,ab,kf.	64 922
16	Food Supply/	14 326
17	Hunger/	5738
18	(food adj2 (secur* or insecur* or unstable or stable or stabilit* or instabilit* or uncertain* or vulnerab* or hardship* or insufficien* or stress*).ti,ab,kf.	11 420
19	food desert*.ti,ab,kf.	234
20	Housing/	18 941
21	Almshouses/	53

Search	Query	Items found
22	Public Housing/	1532
23	((hou* or home) adj3 (secur* or insecur* or unstable or stable or stabilit* or instabilit* or uncertain* or vulnerab* or hardship* or insufficien* or stress*)).ti,ab,kf.	5912
24	Homeless Persons/	8801
25	Homeless Youth/	1369
26	(homeless* or houseless*).ti,ab,kf.	10 711
27	Transportation/	11 058
28	Transportation Facilities/	59
29	Parking Facilities/	361
30	transportation*.ti.	3857
31	commut*.ti,ab,kf.	3647
32	Educational Status/	54 767
33	Academic Failure/	53
34	Literacy/	1120
35	Reading/	24 306
36	(literacy or literate or illitera*).ti,ab,kf.	24 732
37	(read* adj2 (proficien* or skill* or comprehension or level*)).ti,ab,kf.	7491
38	((education* or academic* or schola* or school*) adj2 (achieve* or status or attain* or equit* or inequit* or disparit* or equal* or inequalit* or level* or background*)).ti,ab,kf.	86 356
39	((education* or academic* or schola* or school*) adj2 (opportunit* or disadvantage* or advantage* or marginal* or disenfranchis* or vulnerab*)).ti,ab,kf.	4342
40	Poverty/	41 209
41	Poverty Areas/	6426
42	((economic* or income* or financ*) adj2 (achieve* or status or attain* or equit* or inequit* or disparit* or equal* or inequalit* or level* or background*)).ti,ab,kf.	34 522
43	((economic* or income* or financ*) adj2 (opportunit* or disadvantage* or advantage* or marginal* or disenfranchis* or vulnerab* or low or strain* or strugg* or stable or unstable or stabilit* or instabilit* or difficult* or problem*)).ti,ab,kf.	55 348
44	(poverty or indigent* or indigency or impoverish*).ti.	5579
45	Employment/	48 301
46	Unemployment/	7430

Search	Query	Items found
47	unemployment.ti,ab,kf.	10 690
48	unemployed.ti,ab,kf.	8488
49	underemploy*.ti,ab,kf.	355
50	(occupation* adj2 (status or level or class)).ti,ab,kf.	6659
51	jobless*.ti,ab,kf.	266
52	workless*.ti,ab,kf.	30
53	(employment adj2 (status or securit* or insecurit* or marginal* or precarious* or terminat*)).ti,ab,kf.	9722
54	Child Care/	5848
55	(child adj2 care).ti,ab,kf.	9965
56	Social Isolation/	15 223
57	(social* adj2 isolat*).ti,ab,kf.	9050
58	Legal Services/	41
59	(legal adj2 service*).ti,ab,kf.	682
60	((water or power or electric* or gas or sewer or sanit* or phone or internet or cable or satellite) adj3 (utility or utilities)).ti,ab,kf.	1303
61	Early Intervention, Educational/	3315
62	Child Development/	48 979
63	Language Development/	11 407
64	((child* or toddler or infant*) adj3 (educat* or develop*)).ti,ab,kf.	82 735
65	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53	632 942
66	54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64	161 966
67	Mass Screening/	110 894
68	(Surveys and Questionnaires)	524 299
69	screen*.ti,ab,kf.	727 296
70	(instrument* or tool*).ti.	118 705
71	67 or 68 or 69 or 70	1 344 760
72	Needs Assessment/	31 907
73	Program Development/	30 084
74	(Referral and Consultation)	73 504

Search	Query	Items found
75	Pilot Projects/	135 699
76	Social Welfare/	9532
77	Food Assistance/	1475
78	Public Assistance/	2986
79	Patient Navigation/	900
80	Patient Advocacy/	24 073
81	Inservice Training/	20 668
82	Staff Development/	9764
83	intervention*.ti,ab,kf.	972 520
84	(need* adj2 (assessment* or evaluat* or determin*)).ti,ab,kf.	61 399
85	(food adj2 (assist* or aid or help*)).ti,ab,kf.	1374
86	((hous* or home) adj2 (assist* or aid or help*)).ti,ab,kf.	2558
87	(transportation adj2 (assist* or aid or help*)).ti,ab,kf.	231
88	((education* or academic* or schola* or school*) adj2 (assist* or aid or help*)).ti,ab,kf.	4339
89	((employment or occupation* or job*) adj2 (assist* or aid or help*)).ti,ab,kf.	1040
90	((economic* or income* or financ*) adj2 (assist* or aid or help*)).ti,ab,kf.	2589
91	patient navigat*.ti,ab,kf.	1037
92	patient advoca*.ti,ab,kf.	2455
93	((staff or employee*) adj2 (develop* or train* or educat* or curricul*)).ti,ab,kf.	15 273
94	((social* or socio* or communit* or neighbor* or neighbour*) adj3 (refer* or partner*)).ti,ab,kf.	12 372
95	((utility or utilities) adj2 (assist* or help or aid)).ti,ab,kf.	127
96	(legal adj2 (assist* or help or aid)).ti,ab,kf.	402
97	72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94	1 330 317
98	71 or 97	2 499 527
99	95 or 96	528
100	Primary Health Care/	85 557
101	Comprehensive Health Care/	6724
102	General Practice/	14 453
103	General Practitioners/	9206

Search	Query	Items found
104	Family Practice/	66 174
105	Physicians, Family/	16 806
106	Physicians, Primary Care/	4047
107	Primary Care Nursing/	544
108	Nurse Practitioners/	18 298
109	Family Nurse Practitioners/	64
110	Pediatric Nurse Practitioners/	176
111	Physician Assistants/	6006
112	Family Nursing/	1546
113	Community Health Nursing/	19 724
114	Community Health Centers/	7369
115	Community Mental Health Centers/	3015
116	Community Health Services/	32 618
117	Community Mental Health Services/	18 897
118	Community Health Workers/	5996
119	Safety-net Providers/	1155
120	primary care.ti,ab,kf.	113 504
121	primary health care.ti,ab,kf.	26 547
122	((family or general or primary) adj1 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician*).ti,ab,kf.	122 943
123	Patient-Centered Care/	21 528
124	Patient Care Team/	68 160
125	Health Services/	26 193
126	"Delivery of Health Care"/	102 744
127	Emergency Medicine/	14 443
128	Pediatric Emergency Medicine/	420
129	exp emergency medical services/	156 117
130	(emergency adj2 (medicine or servic* or room* or department* or physician* or doctor* or provider* or clinician*).ti,ab,kf.	134 651
131	100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130	760 741
132	65 and 98 and 131	24 383

Search	Query	Items found
133	132 and "Case Reports".sa_pubt.	166
134	132 not 133	24 217
135	limit 134 to English language	22 809
136	limit 135 to yr="2020 -Current"	2558
137	98 or 99	2 499 873
138	66 and 131 and 137	3739
139	limit 138 to case reports	100
140	138 not 139	3639
141	limit 140 to English language	3419
142	limit 141 to yr="2020 -Current"	353
143	136 or 142	2803
144	limit 143 to last year	2803

Table B-2. Cochrane Library (Including Both CDSR and TRIALS) Search String and Yield for Food Insecurity, Housing, Education and Literacy, Financial Strain, Employment, Transportation, Utilities, Social Isolation, Early Childhood Development, Legal Services, and Childcare (November 29, 2021)

Search	Query	Items found
1	social*:ti,ab,kw near/1 determin*:ti,ab,kw	397
2	(determinant* or determinate*):ti,ab,kw near/2 health:ti,ab,kw	433
3	(social* or socio*):ti,ab,kw near/1 condition*:ti,ab,kw	396
4	(social* or socio*):ti,ab,kw near/1 environment*:ti,ab,kw	1668
5	(social* or socio*):ti,ab,kw near/1 (factor* or gradient*):ti,ab,kw	5318
6	(social* or socio*):ti,ab,kw near/1 (need* or require*):ti,ab,kw	248
7	(social* or socio*):ti,ab,kw near/1 (equit* or inequit* or disparit* or equal* or inequal*):ti,ab,kw	218
8	(social* or socio*):ti,ab,kw near/1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantag*):ti,ab,kw	1261
9	(social* or socio*):ti,ab,kw near/1 risk*:ti,ab,kw	264
10	(social* or socio*):ti,ab,kw near/1 (status* or circumstance* or position* or class* or standing):ti,ab,kw	5478
11	food*:ti,ab,kw near/2 (supply or secur* or insecur* or unstable or stable or stabilit* or instabilit* or uncertain* or vulnerab* or hardship* or insufficien* or stress*):ti,ab,kw	1039
12	food:ti,ab,kw next desert*:ti,ab,kw	10

Search	Query	Items found
13	(hous* or home):ti,ab,kw near/3 (secur* or insecur* or unstable or stable or stabilit* or instabilit* or uncertain* or vulnerab* or hardship* or insufficien* or stress*):ti,ab,kw	766
14	(homeless* or houseless*):ti,ab,kw	1053
15	Transportation*:ti,ab,kw	1780
16	commut*:ti,ab,kw	242
17	(literacy or literate or illitera*):ti,ab,kw	5566
18	read*:ti,ab,kw near/2 (proficien* or skill* or comprehension or level*):ti,ab,kw	969
19	(education* or academic* or schola* or school*):ti,ab,kw near/2 (achieve* or fail* or status or attain* or equit* or inequit* or disparit* or equal* or inequalit* or level* or background*):ti,ab,kw	10 522
20	(education* or academic* or schola* or school*):ti,ab,kw near/2 (opportunit* or disadvantage* or advantage* or marginal* or disenfranchis* or vulnerab*):ti,ab,kw	251
21	(economic* or income* or financ*):ti,ab,kw near/2 (achieve* or status or attain* or equit* or inequit* or disparit* or equal* or inequalit* or level* or background*):ti,ab,kw	2202
22	(economic* or income* or financ*):ti,ab,kw near/2 (opportunit* or disadvantage* or advantage* or marginal* or disenfranchis* or vulnerab* or low or strain* or strugg* or stable or unstable or stabilit* or instabilit* or difficult* or problem* or stress*):ti,ab,kw	6660
23	(poverty or indigent* or indigency or impoverish*):ti,ab,kw	3274
24	unemployment:ti,ab,kw	822
25	unemployed:ti,ab,kw	637
26	underemployed:ti,ab,kw	10
27	(occupation* or job):ti,ab,kw near/2 (status or level or class):ti,ab,kw	444
28	jobless*:ti,ab,kw	6
29	workless*:ti,ab,kw	2
30	(employment or job or occupation*):ti,ab,kw near/2 (status or securit* or insecurit* or marginal* or precarious* or terminat*):ti,ab,kw	1345
31	child:ti,ab,kw near/2 care:ti,ab,kw	3990
32	social*:ti,ab,kw near/2 isolat*:ti,ab,kw	1074
33	legal:ti,ab,kw near/2 service*:ti,ab,kw	30
34	(water or power or electric* or gas or sewer or sanit* or phone or internet or cable or satellite):ti,ab,kw near/3 (utility or utilities):ti,ab,kw	66
35	(child* or toddler or infant*):ti,ab,kw near/3 (educat* or develop* or language*):ti,ab,kw	12 934

Search	Query	Items found
36	#5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30	38 623
37	#31 OR #32 OR #33 OR #34 OR #35	17 389
38	screen*:ti,ab,kw	81 319
39	(instrument* or tool*):ti	6419
40	#38 OR #39	87 060
41	intervention*:ti,ab,kw	453 555
42	need*:ti,ab,kw near/2 (assessment* or evaluat* or determin*):ti,ab,kw	9355
43	program*:ti,ab,kw near/2 develop*:ti,ab,kw	4252
44	pilot:ti,ab,kw next project*:ti,ab,kw	22 015
45	food:ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	294
46	(hous* or home):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	425
47	transportation*:ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	35
48	(education* or academic* or schola* or school*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	820
49	(employment or occupation* or job*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	99
50	(economic* or income* or financ*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw	317
51	patient*:ti,ab,kw near/1 navigat*:ti,ab,kw	640
52	patient*:ti,ab,kw near/2 advoca*:ti,ab,kw	378
53	(staff or employee*):ti,ab,kw near/2 (develop* or train* or educat* or curricul*):ti,ab,kw	2788
54	(social* or socio* or communit* or neighbor* or neighbour*):ti,ab,kw near/3 (refer* or partner*):ti,ab,kw	1647
55	(utility or utilities):ti,ab,kw near/2 (assist* or help or aid):ti,ab,kw	12
56	legal:ti,ab,kw near/2 (assist* or help or aid):ti,ab,kw	21
57	#41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56	476 950
58	#40 OR #57	523 172
59	#36 AND #58	24 902
60	#37 AND #58	10 076
61	primary:ti,ab,kw next care:ti,ab,kw	19 802
62	comprehensive:ti,ab,kw next care:ti,ab,kw	327

Search	Query	Items found
63	"primary health care":ti,ab,kw	7097
64	"comprehensive health care":ti,ab,kw	99
65	comprehensive:ti,ab,kw next healthcare:ti,ab,kw	16
66	primary:ti,ab,kw next healthcare:ti,ab,kw	773
67	(safety-net:ti,ab,kw or "safety net":ti,ab,kw) next clinic*:ti,ab,kw	79
68	"community health center":ti,ab,kw	302
69	"community health centers":ti,ab,kw	669
70	"federally qualified health center":ti,ab,kw	148
71	"federally qualified health centers":ti,ab,kw	136
72	fqhc:ti,ab,kw	91
73	(family or general or primary):ti,ab,kw near/2 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician* or nurs*):ti,ab,kw	29 576
74	emergency:ti,ab,kw near/2 (medicine or servic* or room* or department* or physician* or doctor* or provider* or clinician*):ti,ab,kw	18 114
75	#61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74	58 691
76	#59 AND #75 with Cochrane Library publication date between Jan 2019 and Dec 2021	1429
77	#60 AND #75 with Cochrane Library publication date between Jan 2017 and Dec 2021	616
78	#76 OR #77 with Cochrane Library publication date in the last year	390

Table B-3. Ovid MEDLINE^(R) Search String and Yield for Interpersonal Violence Medline Search (November 29, 2021)

Search	Query	Items found
1	physical abuse/	922
2	gun violence/	341
3	gender based violence	1143
4	elder abuse	2909
5	rape	10 720
6	workplace violence	1870
7	torture	2763
8	((elder* or geriatric* or aged or interpersonal or gun* or workplace) adj2 (violen* or abus* or neglect* or maltreat* or batter*)):ti.	2899

Search	Query	Items found
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	21 066
10	mass screening	113 334
11	anonymous testing	543
12	mass chest x-ray	1957
13	multiphasic screening	1159
14	risk	2 533 564
15	logistic models	150 585
16	protective factors	14 862
17	risk assessment	322 908
18	adverse outcome pathways	502
19	"healthcare failure mode and effect analysis"	180
20	risk factors	1 075 444
21	(screen* or risk).ti.	611 614
22	10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21	2 766 973
23	9 and 22	4919
24	exp "surveys and questionnaires"/	1 139 906
25	exp diagnosis/	9 051 301
26	interven*.ti.	149 727
27	24 or 25 or 26	9 797 601
28	9 and 27	4882
29	23 or 28	8085
30	limit 29 to english language	7602
31	limit 30 to last year	996

Table B-4. Cochrane Library (Including Both CDSR and TRIALS) Search String and Yield for Interpersonal Violence (November 29, 2021)

Search	Query	Items found
1	physical abuse	2415
2	gun violence	43
3	gender based violence	473
4	elder abuse	999
5	rape	430

Search	Query	Items found
6	workplace violence	78
7	torture	86
8	((elder* or geriatric* or aged or interpersonal or gun* or workplace) near/2 (violen* or abus* or neglect* or maltreat* or batter*)):ti	106
9	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8	3807
10	mass screening	9648
11	anonymous testing	334
12	mass chest x-ray	502
13	multiphasic screening	58
14	risk	260 746
15	logistic models	10 074
16	protective factors	4764
17	risk assessment	75 526
18	adverse outcome pathways	1668
19	"healthcare failure mode and effect analysis"	2
20	risk factors	84 244
21	(screen* or risk*):ti	55 968
22	10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21	279 744
23	9 and 22	1853
24	mesh descriptor: [surveys and questionnaires] explode all trees	57 574
25	mesh descriptor: [diagnosis] explode all trees	350 855
26	interven*:ti	67 128
27	24 or 25 or 26	425 559
28	9 and 27	1098
29	23 or 28 with cochrane library publication date in the last year	200

Table B-5. Ovid MEDLINE^(R) Search String and Yield for Access to Care Medline Search (November 29, 2021)

Search	Query	Items found
1	social determinants of health	8691
2	social conditions	11 664
3	social environment	48 121
4	social class	47 476
5	socioeconomic factors	172 577
6	(social* adj1 determin*).ti,ab,kf.	9586
7	((determinant* or determinate*) adj2 health).ti,ab,kf.	11 010
8	((social* or socio*) adj1 condition*).ti,ab,kf.	7195
9	((social* or socio*) adj1 environment*).ti,ab,kf.	11 819
10	((social* or socio*) adj1 (factor* or gradient*)).ti,ab,kf.	40 858
11	((social* or socio*) adj1 (need* or require*)).ti,ab,kf.	2583
12	((social* or socio*) adj1 (equit* or inequit* or disparit* or equal* or unequal*)).ti,ab,kf.	9427
13	((social* or socio*) adj1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantag*)).ti,ab,kf.	13 894
14	((social* or socio*) adj1 risk*).ti,ab,kf.	2937
15	((social* or socio*) adj1 (status* or circumstance* or position* or class* or standing)).ti,ab,kf.	65 196
16	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	326 730
17	early intervention, educational	3316
18	internet-based intervention	1095
19	early medical intervention	3545
20	needs assessment	35 341
21	program development	31 957
22	(referral and consultation)	73 504
23	pilot projects	136 253
24	social welfare	11 610
25	patient navigation	1231
26	patient advocacy	24 870
27	inservice training	20 788
28	staff development	10 812

Search	Query	Items found
29	intervention*.ti,ab,kf.	972 520
30	(need* adj2 (assessment* or evaluat* or determin*)).ti,ab,kf.	61 399
31	patient navigat*.ti,ab,kf.	1037
32	patient advoca*.ti,ab,kf.	2455
33	((staff or employee*) adj2 (develop* or train* or educat* or curricul*)),ti,ab,kf.	15 273
34	((social* or socio* or communit* or neighbor* or neighbour*) adj3 (refer* or partner*)).ti,ab,kf.	12 372
35	17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34	1 324 580
36	health services accessibility	81 817
37	health equity	5150
38	right to health	1461
39	universal health care	1202
40	(primary care adj3 (access* or avail* or utiliz*)).ti,ab,kf.	3259
41	(health services adj3 (access* or avail* or utiliz*)).ti,ab,kf.	8696
42	(healthcare adj3 (access* or avail* or utiliz*)).ti,ab,kf.	15 438
43	(health care adj3 (access* or avail* or utiliz*)).ti,ab,kf.	24 667
44	36 or 37 or 38 or 39 or 40 or 41 or 42 or 43	123 885
45	primary health care	97 503
46	comprehensive health care	7355
47	general practice	47 517
48	general practitioners	38 250
49	family practice/	66 174
50	physicians, family/	16 806
51	physicians, primary care/	4047
52	primary care nursing/	544
53	nurse practitioners/	18 298
54	family nurse practitioners/	64
55	pediatric nurse practitioners/	176
56	physician assistants/	6006
57	family nursing/	1546
58	community health nursing/	19 724

Search	Query	Items found
59	community health centers/	7369
60	community mental health centers/	3015
61	community health services/	32 618
62	community mental health services/	18 897
63	community health workers/	5996
64	safety-net providers/	1155
65	primary care.ti,ab,kf.	113 504
66	primary health care.ti,ab,kf.	26 547
67	((family or general or primary) adj1 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician*)).ti,ab,kf.	122 943
68	36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67	487 113
69	16 and 35 and 68	9381
70	limit 69 to (yr="1995 -current" and (systematic reviews pre 2019 or systematic reviews))	483
71	(systematic adj3 (review or assess* or eval*)).ti.	137 531
72	69 and 71	177
73	70 or 72	484
74	35 and 44	27 559
75	limit 74 to (yr="1995 -current" and (systematic reviews pre 2019 or systematic reviews))	1904
76	71 and 74	732
77	75 or 76	1908
78	73 or 77	2103
79	social determinants of health	8691
80	social conditions	11 664
81	social environment	48 121
82	social class	47 476
83	socioeconomic factors	172 577
84	(social* adj1 determin*).ti,ab,kf.	9586
85	((determinant* or determinate*) adj2 health).ti,ab,kf.	11 010
86	((social* or socio*) adj1 condition*).ti,ab,kf.	7195

Search	Query	Items found
87	((social* or socio*) adj1 environment*).ti,ab,kf.	11 819
88	((social* or socio*) adj1 (factor* or gradient*).ti,ab,kf.	40 858
89	((social* or socio*) adj1 (need* or require*).ti,ab,kf.	2583
90	((social* or socio*) adj1 (equit* or inequit* or disparit* or equal* or inequal*).ti,ab,kf.	9427
91	((social* or socio*) adj1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantag*).ti,ab,kf.	13 894
92	((social* or socio*) adj1 risk*).ti,ab,kf.	2937
93	((social* or socio*) adj1 (status* or circumstance* or position* or class* or standing).ti,ab,kf.	65 196
94	79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93	326 730
95	early intervention, educational	3316
96	internet-based intervention	1095
97	early medical intervention	3545
98	needs assessment	35 341
99	program development	31 957
100	(referral and consultation)	73 504
101	pilot projects	136 253
102	social welfare	11 610
103	patient navigation	1231
104	patient advocacy	24 870
105	inservice training	20 788
106	staff development	10 812
107	intervention*.ti,ab,kf.	972 520
108	(need* adj2 (assessment* or evaluat* or determin*).ti,ab,kf.	61 399
109	patient navigat*.ti,ab,kf.	1037
110	patient advoca*.ti,ab,kf.	2455
111	((staff or employee*) adj2 (develop* or train* or educat* or curricul*).ti,ab,kf.	15 273
112	((social* or socio* or communit* or neighbor* or neighbour*) adj3 (refer* or partner*).ti,ab,kf.	12 372
113	95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112	1 324 580
114	health services accessibility	81 817

Search	Query	Items found
115	health equity	5150
116	right to health	1461
117	universal health care	1202
118	(primary care adj3 (access* or avail* or utiliz*)).ti,ab,kf.	3259
119	(health services adj3 (access* or avail* or utiliz*)).ti,ab,kf.	8696
120	(healthcare adj3 (access* or avail* or utiliz*)).ti,ab,kf.	15 438
121	(health care adj3 (access* or avail* or utiliz*)).ti,ab,kf.	24 667
122	114 or 115 or 116 or 117 or 118 or 119 or 120 or 121	123 885
123	primary health care	97 503
124	comprehensive health care	7355
125	general practice	47 517
126	general practitioners	38 250
127	family practice/	66 174
128	physicians, family/	16 806
129	physicians, primary care/	4047
130	primary care nursing/	544
131	nurse practitioners/	18 298
132	family nurse practitioners/	64
133	pediatric nurse practitioners/	176
134	physician assistants/	6006
135	family nursing/	1546
136	community health nursing/	19 724
137	community health centers/	7369
138	community mental health centers/	3015
139	community health services/	32 618
140	community mental health services/	18 897
141	community health workers/	5996
142	safety-net providers/	1155
143	primary care.ti,ab,kf.	113 504
144	primary health care.ti,ab,kf.	26 547

Search	Query	Items found
145	((family or general or primary) adj1 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician*)).ti,ab,kf.	122 943
146	114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137 or 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145	487 113
147	94 and 113 and 146	9381
148	limit 147 to (yr="1995 -current" and (systematic reviews pre 2019 or systematic reviews))	483
149	(systematic adj3 (review or assess* or eval*)).ti.	137 531
150	147 and 149	177
151	148 or 150	484
152	113 and 122	27 559
153	limit 152 to (yr="1995 -current" and (systematic reviews pre 2019 or systematic reviews))	1904
154	149 and 152	732
155	153 or 154	1908
156	151 or 155	2103
157	limit to last year	129

Table B-6. Cochrane Library (Including Both CDSR and CENTRAL) Search String and Yield for Access to Care (November 29, 2021)

Search	Query	Items found
1	social*:ti,ab,kw near/1 determin*:ti,ab,kw	397
2	(determinant* or determinate*):ti,ab,kw near/2 health:ti,ab,kw	433
3	(social* or socio*):ti,ab,kw near/1 condition*:ti,ab,kw	396
4	(social* or socio*):ti,ab,kw near/1 environment*:ti,ab,kw	1668
5	(social* or socio*):ti,ab,kw near/1 (factor* or gradient*):ti,ab,kw	5318
6	(social* or socio*):ti,ab,kw near/1 (need* or require*):ti,ab,kw	248
7	(social* or socio*):ti,ab,kw near/1 (equit* or inequit* or disparit* or equal* or inequal*):ti,ab,kw	218
8	(social* or socio*):ti,ab,kw near/1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantage*):ti,ab,kw	1261
9	(social* or socio*):ti,ab,kw near/1 risk*:ti,ab,kw	264
10	(social* or socio*):ti,ab,kw near/1 (status* or circumstance* or position* or class* or standing):ti,ab,kw	5478
11	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10	13 862

Search	Query	Items found
12	intervention*:ti,ab,kw	453 553
13	need*:ti,ab,kw near/2 (assessment* or evaluat* or determin*):ti,ab,kw	9355
14	program*:ti,ab,kw near/2 develop*:ti,ab,kw	4252
15	pilot:ti,ab,kw next project*:ti,ab,kw	22 015
16	patient*:ti,ab,kw near/1 navigat*:ti,ab,kw	640
17	patient*:ti,ab,kw near/2 advoca*:ti,ab,kw	378
18	(staff or employee*):ti,ab,kw near/2 (develop* or train* or educat* or curricul*):ti,ab,kw	2788
19	(social* or socio* or communit* or neighbor* or neighbour*):ti,ab,kw near/3 (refer* or partner*):ti,ab,kw	1647
20	#12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19	476 271
21	"primary care":ti,ab,kw near/3 (access* or avail* or utiliz*or utilis*):ti,ab,kw	318
22	"health services":ti,ab,kw near/3 (access* or avail* or utiliz*or utilis*):ti,ab,kw	1188
23	healthcare:ti,ab,kw near/3 (access* or avail* or utiliz*or utilis*):ti,ab,kw	962
24	"health care":ti,ab,kw near/3 (access* or avail* or utiliz*or utilis*):ti,ab,kw	1543
25	#21 OR #22 OR #23 OR #24	3696
26	primary:ti,ab,kw next care:ti,ab,kw	19 802
27	comprehensive:ti,ab,kw next care:ti,ab,kw	327
28	"primary health care":ti,ab,kw	7097
29	"comprehensive health care":ti,ab,kw	99
30	comprehensive:ti,ab,kw next healthcare:ti,ab,kw	16
31	primary:ti,ab,kw next healthcare:ti,ab,kw	773
32	(safety-net:ti,ab,kw or "safety net":ti,ab,kw) next clinic*:ti,ab,kw	79
33	"community health center":ti,ab,kw	302
34	"community health centers":ti,ab,kw	669
35	"federally qualified health center":ti,ab,kw	148
36	"federally qualified health centers":ti,ab,kw	136
37	fqhc:ti,ab,kw	91
38	(family or general or primary):ti,ab,kw near/2 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician* or nurs*):ti,ab,kw	29 576
39	26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38	42 224
40	25 OR 39	44 848

Search	Query	Items found
41	11 AND 20 AND 40	1200
42	20 AND 25	2473
43	41 OR 42 with Cochrane Library publication date in the last year	330

Table B-7. Systematic Reviews for Hand Searches (Last Search: November 29, 2021)

1.	Allen LN, Smith RW, Simmons-Jones F, et al. Addressing social determinants of noncommunicable diseases in primary care: a systematic review. <i>Bull World Health Organ.</i> 2020;98(11):754-765. doi:10.2471/BLT.19.248278. PMID: 33177772
2.	Aubry T, Goering P, Veldhuizen S, et al. A multiple-city RCT of housing first with assertive community treatment for homeless Canadians with serious mental illness. <i>Psychiatr Serv.</i> 2016;67(3):275-281. doi:10.1176/appi.ps.20140058710.1176/appi.ps.201400587. PMID: 26620289
3.	Avancena ALV, Prosser LA. Examining equity effects of health interventions in cost-effectiveness analysis: a systematic review. <i>Value Health.</i> 2021;24(1):136-143. doi:10.1016/j.jval.2020.10.010. PMID: 33431148
4.	Baxter AJ, Tweed EJ, Katikireddi SV, et al. Effects of housing first approaches on health and well-being of adults who are homeless or at risk of homelessness: systematic review and meta-analysis of randomised controlled trials. <i>J Epidemiol Community Health.</i> 2019;73(5):379-387. doi:10.1136/jech-2018-210981. PMID: 30777888
5.	Boch S, Keedy H, Chavez L, et al. An integrative review of social determinants of health screenings used in primary care settings. <i>J Health Care Poor Underserved.</i> 2020;31(2):603-622. doi:10.1353/hpu.2020.0048. PMID: 33410796
6.	Bou Malham C, El Khatib S, Cestac P, Andrieu S, Rouch L, Salameh P. Impact of pharmacist-led interventions on patient care in ambulatory care settings: a systematic review. <i>Int J Clin Pract.</i> 2021;75(11):e14864. doi:10.1111/ijcp.14864. PMID: 34523204
7.	Brush BL, Mentz G, Jensen M, et al. Success in long-standing community-based participatory research (CBPR) partnerships: a scoping literature review. <i>Health Educ Behav.</i> 2020;47(4):556-568. doi:10.1177/1090198119882989. PMID: 31619072
8.	Budde H, Williams GA, Winkelmann J, Pflirter L, Maier CB. The role of patient navigators in ambulatory care: overview of systematic reviews. <i>BMC Health Serv Res.</i> 2021;21(1):1166. doi:10.1186/s12913-021-07140-6. PMID: 34706733
9.	Burns J, Conway DI, Gnich W, Macpherson LMD. A systematic review of interventions to link families with preschool children from healthcare services to community-based support. <i>J Public Health (Oxf).</i> 2021;43(2):e224-e235. doi:10.1093/pubmed/fdaa242. PMID: 33423052
10.	Byon HD, Lee M, Choi M, Sagherian K, Crandall M, Lipscomb J. Prevalence of type II workplace violence among home healthcare workers: a meta-analysis. <i>Am J Ind Med.</i> 2020;63(5):442-455. doi:10.1002/ajim.23095. PMID: 32052510
11.	Choi KR, Easterlin MC. Intervention models for increasing access to behavioral health services among youth: a systematic review. <i>J Dev Behav Pediatr.</i> 2018;39(9):754-762. doi:10.1097/DBP.0000000000000623. PMID: 30334855
12.	Davidson KW, Krist AH, Tseng CW, et al. Incorporation of social risk in US Preventive Services Task Force recommendations and identification of key challenges for primary care. <i>JAMA.</i> 2021;326(14):1410-1415. doi:10.1001/jama.2021.12833. PMID: 34468692

13.	Eder M, Henninger M, Durbin S, et al. Screening and interventions for social risk factors: technical brief to support the US Preventive Services Task Force. <i>JAMA</i> . 2021;326(14):1416-1428. doi:10.1001/jama.2021.12825. PMID: 34468710
14.	Evans TS, Berkman N, Brown C, et al. <i>Disparities Within Serious Mental Illness</i> . Agency for Healthcare Research and Quality; 2016. Report No.: 16-EHC027-EF. 2016. PMID: 27336120
15.	Ezell JM. Understanding the situational context for interpersonal violence: a review of individual-level attitudes, attributions, and triggers. <i>Trauma Violence Abuse</i> . 2021;22(3):571-587. doi:10.1177/1524838019869100. PMID: 31416406
16.	Fitzpatrick-Lewis D, Ganann R, Krishnaratne S, et al. Effectiveness of interventions to improve the health and housing status of homeless people: a rapid systematic review. <i>BMC Public Health</i> . 2011;11:638. doi:10.1186/1471-2458-11-638. PMID: 21831318
17.	Formosa EA, Kishimoto V, Orchanian-Cheff A, Hayman K. Emergency department interventions for homelessness: a systematic review. <i>CJEM</i> . 2021;23(1):111-122. doi:10.1007/s43678-020-00008-4. PMID: 33683611
18.	Garg A, Brochier A, Messmer E, Fiori KP. Clinical approaches to reducing material hardship due to poverty: social risks/needs identification and interventions. <i>Acad Pediatr</i> . 2021;21(suppl 8):S154-S160. doi:10.1016/j.acap.2021.02.007. PMID: 34740423
19.	Garvin LA, Pugatch M, Gurewich D, Pendergast JN, Miller CJ. Interorganizational care coordination of rural veterans by veterans affairs and community care programs: a systematic review. <i>Med Care</i> . 2021;59(suppl 3):S259-S269. doi:10.1097/MLR.0000000000001542. PMID: 33976075
20.	Ghanbarzadegan A, Balasubramanian M, Luzzi L, Brennan D, Bastani P. Inequality in dental services: a scoping review on the role of access toward achieving universal health coverage in oral health. <i>BMC Oral Health</i> . 2021;21(1):404. doi:10.1186/s12903-021-01765-z. PMID: 34404400
21.	Hand T, Rosseau NA, Stiles CE, et al. The global role, impact, and limitations of community health workers (CHWs) in breast cancer screening: a scoping review and recommendations to promote health equity for all. <i>Glob Health Action</i> . 2021;14(1):1883336. doi:10.1080/16549716.2021.1883336. PMID: 33899695
22.	Hasan M, Singh H, Haffizulla F. Culturally sensitive health education in the Caribbean diaspora: a scoping review. <i>Int J Environ Res Public Health</i> . 2021;18(4):1476. doi:10.3390/ijerph18041476. PMID: 33557252
23.	Health Quality Ontario. Interventions to improve access to primary care for people who are homeless: a systematic review. <i>Ont Health Technol Assess Ser</i> . 2016;16(9):1-50. PMID: 27099645
24.	Hopman P, de Bruin SR, Forjaz MJ, et al. Effectiveness of comprehensive care programs for patients with multiple chronic conditions or frailty: a systematic literature review. <i>Health Policy</i> . 2016;120(7):818-832. doi:10.1016/j.healthpol.2016.04.002. PMID: 27114104
25.	Huhtakangas M, Tuomikoski AM, Kyngas H, Kanste O. Frequent attenders' experiences of encounters with healthcare personnel: a systematic review of qualitative studies. <i>Nurs Health Sci</i> . 2021;23(1):53-68. doi:10.1111/nhs.12784. PMID: 33034401
26.	Jack HE, Arabadjis SD, Sun L, et al. Impact of community health workers on use of health care services in the United States: a systematic review. <i>J Gen Intern Med</i> . 2017;32(3):325-344. doi:10.1007/s11606-016-3922-9. PMID: 27921257
27.	Jones T, Luth EA, Lin SY, Brody AA. Advance care planning, palliative care, and end-of-life care interventions for racial and ethnic underrepresented groups: a systematic review. <i>Pain Symptom Manage</i> . 2021;62(3):e248-e260. doi:10.1016/j.jpainsymman.2021.04.025. PMID: 33984460

28.	Kaur H, Saad A, Magwood O, et al. Understanding the health and housing experiences of refugees and other migrant populations experiencing homelessness or vulnerable housing: a systematic review using GRADE-CERQual. <i>CMAJ Open</i> . 2021;9(2):e681-e692. doi:10.9778/cmajo.20200109. PMID: 34145051
29.	Kehle SM, Greer N, Rutks I, et al. Interventions to improve veterans' access to care: a systematic review of the literature. <i>J Gen Intern Med</i> . 2011;26(suppl 2):689-696. doi:10.1007/s11606-011-1849-8. PMID: 21989623
30.	Khanassov V, Pluye P, Descoteaux S, et al. Organizational interventions improving access to community-based primary health care for vulnerable populations: a scoping review. <i>Int J Equity Health</i> . 2016;15(1):168. DOI: 10.1186/s12939-016-0459-9. PMID: 27724952
31.	League A, Donato KM, Sheth N, et al. A systematic review of medical-legal partnerships serving immigrant communities in the United States. <i>J Immigr Minor Health</i> . 2021;23(1):163-174. doi:10.1007/s10903-020-01088-1. PMID: 32978741
32.	Luchenski S, Maguire N, Aldridge RW, et al. What works in inclusion health: overview of effective interventions for marginalised and excluded populations. <i>Lancet</i> . 2018;391(10117):266-280. doi:10.1016/S0140-6736(17)31959-1. PMID: 29137868
33.	Macedo CM, Egry EY. Conceptual frameworks for programs addressing violence against children: a scoping review. <i>Rev Esc Enferm USP</i> . 2021;55:e20200182. doi:10.1590/1980-220X-REEUSP-2020-0182. PMID: 34605530
34.	Machado AA, Edwards SA, Mueller M, Saini V. Effective interventions to increase routine childhood immunization coverage in low socioeconomic status communities in developed countries: a systematic review and critical appraisal of peer-reviewed literature. <i>Vaccine</i> . 2021;39(22):2938-2964. doi:10.1016/j.vaccine.2021.03.088
35.	Marcellus L, MacKinnon K, Gordon C, Shaw L. Interventions and programs that support the health and development of infants with prenatal substance exposure in foster care: a scoping review. <i>JBI Evid Synth</i> . 2021;19(8):1844-1886. doi:10.11124/JBIES-20-00071. PMID: 33933317
36.	Martinez GS, Chu J, Marachelian A, et al. More than health care: the value of addressing health, education, and social service needs together through community health centers. <i>J Ambul Care Manage</i> . 2020;43(1):41-54. doi:10.1097/JAC.0000000000000314. PMID: 31770185
37.	Miler JA, Carver H, Foster R, et al. Provision of peer support at the intersection of homelessness and problem substance use services: a systematic "state of the art" review. <i>BMC Public Health</i> . 2020;20(1):641. doi:10.1186/s12889-020-8407-4. PMID: 32381086
38.	Miler JA, Carver H, Masterton W, et al. What treatment and services are effective for people who are homeless and use drugs? A systematic 'review of reviews.' <i>PLoS ONE</i> . 2021;16(7):e0254729. doi:10.1371/journal.pone.0254729. PMID: 34260656
39.	Moen M, Storr C, German D, Friedmann E, Johantgen M. A review of tools to screen for social determinants of health in the United States: a practice brief. <i>Popul Health Manag</i> . 2020;23(6):422-429. doi:10.1089/pop.2019.0158. PMID: 31910355
40.	O'Brien J, Fossey E, Palmer VJ. A scoping review of the use of co-design methods with culturally and linguistically diverse communities to improve or adapt mental health services. <i>Health Soc Care Community</i> . 2021;29(1):1-17. doi:10.1111/hsc.13105. PMID: 32686881
41.	Parry J, Vanstone M, Grignon M, Dunn JR. Primary care-based interventions to address the financial needs of patients experiencing poverty: a scoping review of the literature. <i>Int J Equity Health</i> . 2021;20(1):219. doi:10.1186/s12939-021-01546-8. PMID: 34620188

42.	Peng Y, Hahn RA, Finnie RKC, et al. Permanent supportive housing with housing first to reduce homelessness and promote health among homeless populations with disability: a community guide systematic review. <i>J Public Health Manag Pract.</i> 2020;26(5):404-411. doi:10.1097/phh.0000000000001219. PMID: 32732712
43.	Ponka D, Agbata E, Kendall C, et al. The effectiveness of case management interventions for the homeless, vulnerably housed and persons with lived experience: a systematic review. <i>PLoS One.</i> 2020;15(4):e0230896. doi:10.1371/journal.pone.0230896. PMID: 32271769
44.	RAND Health Care. <i>Building the Evidence Base for Social Determinants of Health Interventions.</i> Office of the Assistant Secretary for Planning and Evaluation (ASPE), U.S. Department of Health & Human Services. May 2021. https://aspe.hhs.gov/sites/default/files/documents/e400d2ae6a6790287c5176e36fe47040/PR-A1010-1_final.pdf
45.	Raphael JL, Rueda A, Lion KC, et al. The role of lay health workers in pediatric chronic disease: a systematic review. <i>Acad Pediatr.</i> 2013;13(5):408-420. doi:10.1016/j.acap.2013.04.015. PMID: 24011745
46.	Rasmussen B, Wynter K, Rawson HA, Skouteris H, Ivory N, Brumby SA. Self-management of diabetes and associated comorbidities in rural and remote communities: a scoping review. <i>Aust J Prim Health.</i> 2021;27(4):243-254. doi:10.1071/PY20110. PMID: 34229829
47.	Rawal L, Sahle BW, Smith BJ, Kanda K, Owusu-Addo E, Renzaho AMN. Lifestyle interventions for type 2 diabetes management among migrants and ethnic minorities living in industrialized countries: a systematic review and meta-analyses. <i>BMJ Open Diabetes Res.</i> 2021;9:e001924.. doi:10.1136/bmjdr-2020-001924. PMID: 33879514
48.	Reeves TJ, Mathis TJ, Bauer HE, et al. Racial and ethnic disparities in health outcomes among long-term survivors of childhood cancer: a scoping review. <i>Front Public Health.</i> 2021;9:741334. doi:10.3389/fpubh.2021.741334. PMID: 34778176
49.	Ruiz Escobar EPS, Blanchard CM. Screening and referral care delivery services and unmet health-related social needs: a systematic review. <i>Prev Chronic Dis.</i> 2021;18:e78. doi:10.5888/pcd18.200569. PMID: 34387188
50.	Seddighi H, Salmani I, Javadi MH, Seddighi S. Child abuse in natural disasters and conflicts: a systematic review. <i>Trauma Violence Abuse.</i> 2021;22(1):176-185. doi:10.1177/1524838019835973. PMID: 30866745
51.	Smith SM, Wallace E, O'Dowd T, Fortin M. Interventions for improving outcomes in patients with multimorbidity in primary care and community settings. <i>Cochrane Database Syst Rev.</i> 2021;(1)1-111. doi:10.1002/14651858.CD006560.pub4. PMID: 33448337
52.	Solomon EM, Wing H, Steiner JF, et al. Impact of transportation interventions on health care outcomes: a systematic review. <i>Med Care.</i> 2020;58(4):384-391. doi:10.1097/MLR.0000000000001292. PMID: 31985588
53.	Stormacq C, Wosinski J, Boillat E, Van den Broucke S. Effects of health literacy interventions on health-related outcomes in socioeconomically disadvantaged adults living in the community: a systematic review. <i>JBI Evid Synth.</i> 2020;18(7):1389-1469. doi:10.11124/JBISRIR-D-18-00023. PMID: 32813388
54.	Taira BR, Kim K, Mody N. Hospital and health system-level interventions to improve care for limited English proficiency patients: a systematic review. <i>Jt Comm J Qual Patient Saf.</i> 2019;45(6):446-458. doi:10.1016/j.jcjq.2019.02.005. PMID: 30910471

55.	Thomas G, Lynch M, Spencer LH. A systematic review to examine the evidence in developing social prescribing interventions that apply a co-productive, co-designed approach to improve well-being outcomes in a community setting. <i>Int J Environ Res Public Health</i> . 2021;18(8):3896. doi:10.3390/ijerph18083896. PMID: 33917681
56.	Tsai C, Raphael S, Agnew C, McDonald G, Irving M. Health promotion interventions to improve oral health of adolescents: a systematic review and meta-analysis. <i>Community Dent Oral Epidemiol</i> . 2020;48(6):549-560. doi:10.1111/cdoe.12567. PMID: 32767825
57.	van den Berk-Clark C, Doucette E, Rottnek F, et al. Do patient-centered medical homes improve health behaviors, outcomes, and experiences of low-income patients? A systematic review and meta-analysis. <i>Health Serv Res</i> . 2018;53(3):1777-1798. doi:10.1111/1475-6773.12737. PMID: 28670708
58.	Wouk K, Morgan I, Johnson J, et al. A systematic review of patient-, provider-, and health system-level predictors of postpartum health care use by people of color and low-income and/or uninsured populations in the United States. <i>J Womens Health</i> . 2021;30(8):1127-1159. doi:10.1089/jwh.2020.8738

Appendix C: Study Selection and Inclusion and Exclusion Criteria

Study Selection

In PCORI’s scoping review and evidence map,¹⁹ 2 trained research team members using DistillerSR (Evidence Partners) software completed the study selection. Team members reviewed all titles and abstracts for eligibility against established inclusion and exclusion criteria; for studies without adequate information to determine inclusion or exclusion, the research team retrieved the full text and then made the determination. Studies marked for possible inclusion by either reviewer underwent full-text review using the process outlined in Figure C-1. Two trained team members independently reviewed each full-text article for inclusion or exclusion based on the eligibility criteria described in Table C-1. If both reviewers agreed that a study did not meet the eligibility criteria, then the study was excluded. If the reviewers disagreed, then conflicts were resolved by discussion and consensus or by consulting a third member of the review team.

Table C-1. Inclusion and Exclusion Criteria for Rapid Review^a

Category	Inclusion	Exclusion
Populations	<p>Demographic characteristics: general population, all ages, immigrants, racial/ethnic minorities</p> <p>For the rapid review, eligible studies must report analyses addressing race or ethnicity.</p> <p>Health status: Pregnant women; studies targeting people with asthma, heart disease, diabetes, hypertension, mental health, or substance abuse; persons with multiple chronic conditions</p>	<p>For the rapid review: No analyses addressing race or ethnicity</p> <p>Health status: Studies targeting people with specific diseases other than asthma, heart disease, diabetes, hypertension, mental health, substance abuse</p>
Social needs	<p>Interventions addressing individual social needs</p> <p>Food insecurity, housing instability and quality, interpersonal violence (with the exclusion of intimate partner violence and child maltreatment^b), education (including adult literacy and health literacy), financial strain, employment, social isolation, early childhood education and development, health care and primary care, transportation, utilities, legal services, childcare</p> <p>Interventions targeting single or multiple domains; can address excluded domains, if 1 of the included domains above is addressed</p>	<p>Social needs addressed by USPSTF recommendations: (depression,²²⁸ unhealthy alcohol use,²²⁹ healthy diet and physical activity,²³⁰ drug use,²³¹ tobacco use,²³² intimate partner violence,²³³ and child maltreatment²³⁴) or CDC (neighborhood and built environment²³⁵)</p> <p>Other social needs not included in Healthy People 2020</p>

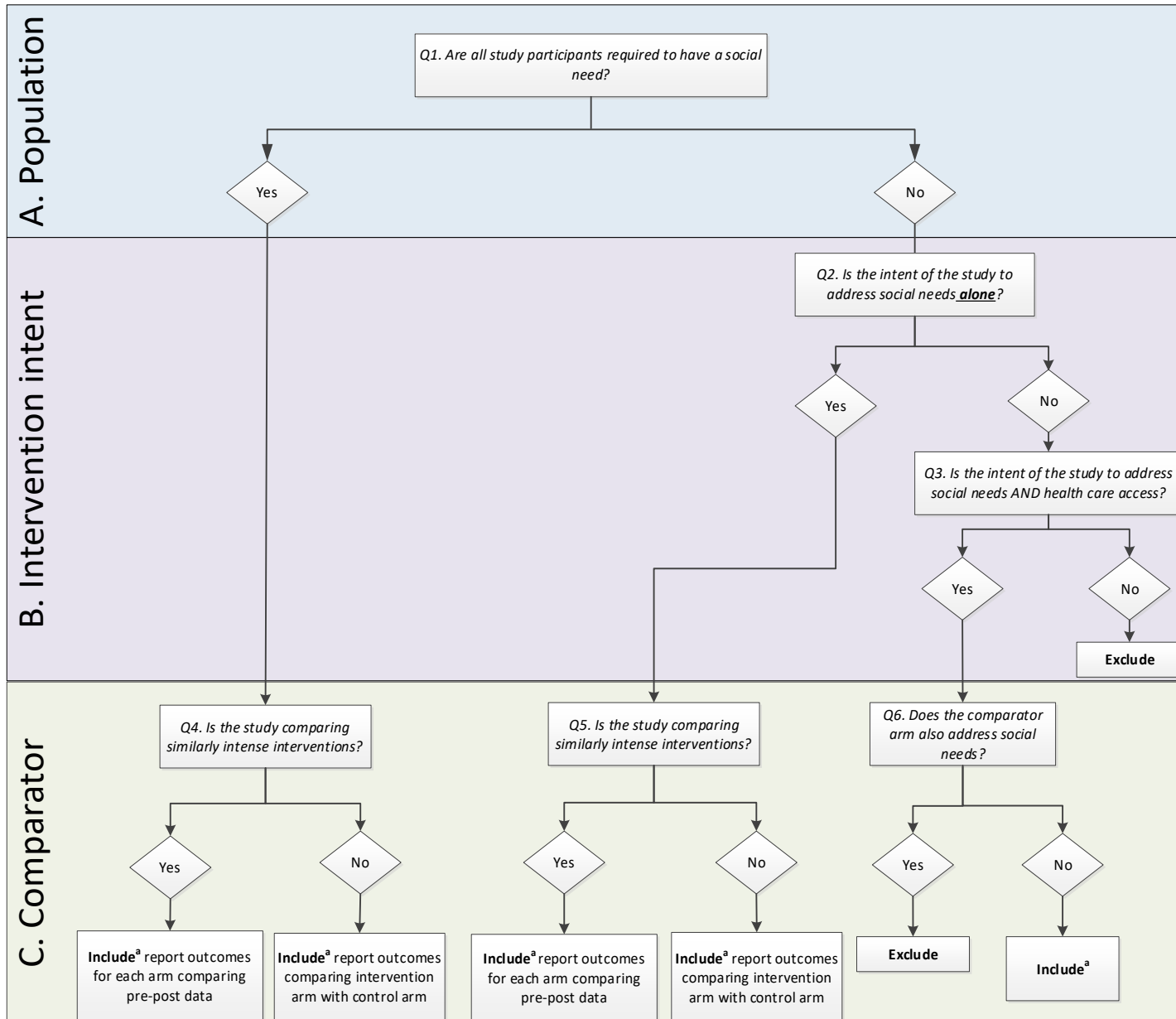
Category	Inclusion	Exclusion
Interventions	Individual level (eg, referral to social services, provision of information about resources) Health care–system level (eg, policies, programs, staff training, primary care collaboration with community services) Adjustment interventions or assistance interventions	Public health/community-level policies Individual-level interventions that target medical conditions/needs alone (rather than social needs alone or social needs in combination with medical needs) Advocacy, alignment, or awareness interventions
Comparisons	Contemporaneous or historical comparator (usual care or waitlist controls)	No comparator
Outcomes	Behavioral outcomes, health outcomes, health care utilization outcomes, harms/unanticipated outcomes	Process outcomes, social needs outcomes, cost outcomes, provider outcomes
Timing	All	None
Setting	Any setting linked with the health care system; conducted in the US	Conducted outside the US; no link with US health care system
Study design	Randomized clinical trials, nonrandomized controlled trials, cohort studies, case-control studies (cases and controls defined by presence or absence of outcome), single-arm studies with data collected before and after the intervention (pre-intervention–post-intervention) Studies of head-to-head comparisons (ie, comparative effectiveness studies) treated as pre-post interventions for each arm	Case series, case reports, dissertations, modeling studies, screening tool validation studies, studies with a comparison group defined by the absence of social needs
Language	English	Non-English

Abbreviations: CDC, Centers for Disease Control and Prevention; US, United States; USPSTF, US Preventive Services Task Force.

^a Unless otherwise specified, these criteria were first specified in PCORI's scoping review and evidence map.19

^b We excluded child maltreatment and intimate partner violence from interpersonal violence because these topics were covered by the USPSTF.

Figure C-1. Screening Approach



^aif study meets all other eligibility criteria.

Appendix D: Risk-of-Bias Approach and Ratings

Risk-of-Bias Assessment

PCORI’s scoping review and evidence map¹⁹ categorized studies first by study design: randomized controlled trial cohort studies with comparison (including controlled clinical trials, retrospective cohort studies, and prospective cohort studies); case-control, single-arm studies reporting data before and after the intervention; and other nonrandomized studies. We assessed studies with external controls using the Cochrane risk-of-bias (ROB-2.0) instrument for trials²³⁶ or ROBINS-I²³⁷ for observational studies or nonrandomized experimental studies. Single-arm studies with data before and after the intervention inherently have limited ability to assert causal inference when compared with studies with external controls; thus, we did not rate the risk of bias of these studies but relied on study strategy to infer that causal inference cannot be made. We did not rate the risk of bias of comparative effectiveness studies that we treated as single-arm studies; they, particularly if randomized, would have had inherent features that would have protected against regression to the mean and confounding. Using these studies as individual single-arm studies does not imply that their risk of bias was inherently high. One reviewer evaluated the risk of bias for each study; a second spot-checked ratings for quality. Differences were resolved through discussion. Tables C-1 and C-2 present domain ratings. We did not modify these ratings for the rapid review.

Table D-1. Risk-of-Bias Ratings for Randomized Controlled Trials, Using Cochrane Risk of Bias 2.0

Author, year	Risk of bias arising from the randomization process	Risk of bias due to deviations from the intended interventions	Missing outcome data	Risk of bias in measurement of the outcome	Risk of bias in selection of the reported result	Overall risk of bias
Berkowitz et al, 2019 ¹⁶⁴	Low	Low	Some concerns	Low	Low	Medium
Birkhead et al, 1995 ¹⁹²	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Medium
Duncan et al, 2020 ¹⁹⁹	Low	Low	Low	Low	Low	Low
Gottlieb et al, 2020 ¹⁹⁶	Low	Low	Some concerns	Low	Low	Medium
Guevara et al, 2020 ¹⁵⁸	Low	Low	Some concerns	Low	Low	Medium
Hilgeman et al, 2014 ¹⁵⁷	Low	Low	Low	Low	Low	Low
Horwitz et al, 2005 ¹¹¹	Low	Low	Low	Low	Low	Low
Kelley et al, 2020 ⁹⁷	Low	Low	Low	Low	Low	Low
Krieger et al, 1999 ¹²⁵	Low	Low	High	Low	Low	High

Author, year	Risk of bias arising from the randomization process	Risk of bias due to deviations from the intended interventions	Missing outcome data	Risk of bias in measurement of the outcome	Risk of bias in selection of the reported result	Overall risk of bias
Krieger et al, 2009 ¹¹⁶	Low	Low	Some concerns	Some concerns	Low	Medium
Krieger et al, 2015 ¹²⁴	Low	Low	Low	Some concerns	Low	Medium
Liss et al, 2019 ⁸⁷	Some concerns	Some concerns	Low	Low	Low	Medium
Melnikow et al, 1997 ¹²³	Low	Low	Low	Low	Low	Low
Nyamathi et al, 2001 ¹³¹	Some concerns	Low	High	Some concerns	Low	High
Tomita and Herman, 2012 ⁶⁴	Low	Low	High	Low	Low	High
Towfighi et al, 2021 ¹⁹⁰	Low	Low	Low	Low	Low	Low

Table D-2. Risk-of-Bias Ratings for Nonrandomized Studies of Interventions, Using ROBINS-I^a

Author, year	Confounding	Selection	Classification	Deviations from intended interventions	Missing data	Measurement of outcomes	Selection of reported result	Overall risk-of-bias judgment
Chaiyachati et al, 2018 ¹²¹	Moderate	Low	Low	Low	Low	Low	Low	Medium
Chaiyachati et al, 2018 ¹²²	Low	Low	Low	Moderate	Low	Low	Low	Medium
Ciaranello et al, 2006 ¹¹⁴	Moderate	Low	Low	Low	Low	Moderate	Low	Medium
Duru et al, 2020 ⁹⁵	Moderate	Low	Low	Moderate	Low	Low	Low	Medium
Foster et al, 2018 ¹⁸⁰	Serious ^b							High
Gusmano et al, 2018 ⁹²	Moderate	Low	Low	Moderate	Low	Low	Low	Medium
Lindau et al, 2019 ¹⁰³	Low	Low	Low	Low	Low	Moderate	Low	Medium
Mendelsohn et al, 2001 ⁵⁸	Moderate	Low	Low	Low	Moderate	Moderate	Low	Medium
Morales et al, 2016 ⁵⁹	Moderate	Low	Low	Low	Low	Low	Low	Medium
Moreno et al, 2021 ¹⁹⁷	Moderate	Low	Low	Low	Low	Low	Low	Medium
Shah et al, 2011 ¹¹²	Moderate	Low	Low	Low	Low	Low	Low	Medium
Tessaro et al, 1997 ⁷⁶	Serious ^b							High

Author, year	Confounding	Selection	Classification	Deviations from intended interventions	Missing data	Measurement of outcomes	Selection of reported result	Overall risk-of-bias judgment
Tsai and Rosenheck, 2012 ¹⁷²	Moderate	Low	Low	Low	Low	Low	Low	Medium

^a Risk Of Bias In Non-randomized Studies of Interventions.

^b We did not rate subsequent domains if confounding was rated as serious because a serious rating for confounding would lead to an overall serious rating.

Appendix E: Evidence Tables

Table E-1. Summary Characteristics of Studies Reporting Race or Ethnicity Analyses and Tailoring or Adaptation

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Study design				
Randomized controlled trial	16	36.4	6	50.0
Cohort with comparison	13	29.5	1	8.3
Single-arm study comparing data before and after intervention	13	29.5	3	25.0
Comparative effectiveness	2	4.5	2	16.7
Case-control	0	0.0	0	0.0
Comparator^a				
Pre-intervention data	17	34.7	7	41.2
Waitlist control	0	0.0	0	0.0
Other inactive control	4	8.2	2	11.8
Active control	6	12.2	2	11.8
Usual care	22	44.9	7	41.2
Other	1	2.0	0	0.0

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Quality				
High	6	13.6	2	16.7
Medium	18	40.9	3	25.0
Low	5	11.4	3	25.0
Not rated	15	34.1	5	41.7
Social needs addressed				
Childcare assistance	0	0.0	0	0.0
Early childhood education and development access and quality	3	6.8	0	0.0
Education access and quality	6	13.6	2	16.7
Employment assistance	8	18.2	1	8.3
Financial strain assistance	6	13.6	1	8.3
Food security assistance	14	31.8	2	16.7
Health care services access and quality	30	68.2	9	75.0
Housing stability and quality	19	43.2	7	58.3
Interpersonal violence assistance	0	0.0	0	0.0
Legal services assistance	5	11.4	1	8.3
Social isolation assistance	4	9.1	2	16.7
Transportation assistance	15	34.1	4	33.3
Utilities assistance	1	2.3	0	0.0
Additional unspecified domains addressed	19	43.2	6	50.0
Multidomain intervention (none of the above)	1	2.3	0	0.0

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Age group				
Children (<18 years) or children and their families	8	18.2	4	33.3
Adolescents/young adults (eg, 13-20 years)	4	9.1	1	8.3
Adults (≥18 years)	34	77.3	9	75.0
Older adults (eg, ≥50 years)	31	70.5	6	50.0
Only older adults (eg, ≥50 years)	1	2.3	0	0.0
Majority race or ethnicity^b				
Majority Black/non-Hispanic Black	11	25.0	3	25.0
Majority White/non-Hispanic White	9	20.5	2	16.7
Majority Hispanic/Latino	6	13.6	1	8.3
Majority Asian/Pacific Islander	1	2.3	0	0.0
Majority Native American/American Indian/Indigenous	0	0.0	0	0.0
Other	1	2.3	0	0.0
No single group was a majority	15	34.1	6	50.0
Not reported	1	2.3	0	0.0

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Sex				
Proportion female				
0% - 24%	4	9.1	2	16.7
25% - 49%	16	36.4	4	33.3
50% - 74%	15	34.1	4	33.3
75% - 100%	6	13.6	1	8.3
Not reported	3	6.8	1	8.3
Recruitment setting^a				
Primary care (family health centers, community health centers, family medicine, pediatric or VA clinics)	20	40.8	11	64.7
Outpatient clinic	8	16.3	4	23.5
Hospital (inpatient)	7	14.3	3	17.6
Emergency department	10	20.4	5	29.4
Transitional housing	9	18.4	6	35.3
Urgent care	1	2.0	0	0.0
Telephone-based care	2	4.1	0	0.0
Web-based care	0	0.0	0	0.0
Home-based care	0	0.0	0	0.0
Recruited from health plan membership	3	6.1	1	5.9
Other ^c	18	36.7	11	64.7
Not reported	0	0.0	0	0.0

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Intervention setting^a				
Emergency department	5	10.2	0	0.0
Home-based care	14	28.6	5	29.4
Hospital (inpatient)	3	6.1	0	0.0
Outpatient clinic	7	14.3	1	5.9
Primary care (family health centers, community health centers, family medicine, pediatric or VA clinics)	16	32.7	4	23.5
Telephone-based care	13	26.5	5	29.4
Transitional housing	6	12.2	4	23.5
Urgent care	1	2.0	0	0.0
Web-based care	2	4.1	1	5.9
Other	13	26.5	5	29.4
Not reported	4	8.2	2	11.8
Intervention target^a				
Doctor or other clinical staff	2	4.1	0	0.0
Patient	47	95.9	16	94.1
Caregiver	7	14.3	3	17.6
Community-based organizations	0	0.0	0	0.0

Study characteristic	All studies		Tailoring studies	
	Studies (n = 44)/interventions (n = 49)		Studies (n = 12)/interventions (n = 17)	
	n	%	n	%
Intervention components^a				
Screening	12	24.5	4	23.5
Patient education (including on health, other social need, or resources)	26	53.1	9	52.9
Health care provider education	3	6.1	1	5.9
Providing onsite resources	17	34.7	6	35.3
Passive referrals	15	30.6	7	41.2
Active assistance with resources (vouchers, appt scheduling, enrollment form help)	37	75.5	12	70.6
Intervention provider^a				
Health care providers (doctors, nurses, therapists, etc)	14	28.5	4	23.5
Social worker	8	16.3	0	0.0
CHWs/navigators	17	34.7	7	41.2
Other nonprofessionals, including volunteers and study staff	24	49.0	9	52.9
Case manager	3	6.1	1	5.9
Not reported	2	4.1	1	5.9
Approach to addressing social needs				
1 social need addressed	14	31.8	3	25.0
More than 1 clearly defined social need addressed	5	11.4	0	0.0
Any social need that arises in population addressed	6	13.6	2	16.7
Medical and social need program	19	43.2	7	58.3

Abbreviations: Appt, appointment; CHW, community health worker; n/N, number; VA, Veterans Affairs.

^a Reported by intervention.

^b Defined as greater than 50%.

^c Other recruitment settings included community referrals, food pantries, social workers, low-income housing, and drop-in centers for homeless individuals.

Table E-2. Detailed Characteristics of Studies That Are Analytically Informative for Advancing Racial Health Equity Research (N = 21)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Conceptually thoughtful for understanding root causes of racial health inequities and analytically informative for advancing racial health equity research					
Krieger, 2005 ⁵⁷ Comparative effectiveness (Not rated) N = 274	Home assessment and action plan with CHW follow-up to assist with completion and provision of resources to mitigate asthma/home-based care or single CHW visit and action plan with limited education/home-based care Children with persistent asthma and their caregivers enrolled in Medicaid and living in King County (Washington) CHWs/navigators Tailoring: Yes	Housing stability and quality	No single group was a majority Caregiver ethnicity High intensity Non-Hispanic White: (12.3) Non-Hispanic African American: (31.9) Vietnamese: (25.4) Other Asian: (9.4) Hispanic: (17.4) Other: (3.6) Low Intensity Non-Hispanic White: (21.3) Non-Hispanic African American: (27.9) Vietnamese: (22.1) Other Asian: (5.2) Hispanic: (17.7) Other: (5.9)	Mixed results for morbidity; positive effects for quality of life; positive effects for ED and urgent care visits	No significant interactions between group allocation and caregiver's race/ethnicity for any of the primary outcomes (quality of life, urgent health care service use, or symptom days; ie, the intervention effect was equivalent across caregivers of all racial/ethnic groups)
Szilagyi, 2002 ¹⁹⁴ Single arm ^b (Not rated) N = 10 066	Lay outreach worker immunization tracking and promotion/primary care Children aged 0-2 living in Monroe County (New York) Other nonprofessionals ^a Tailoring: Yes	Transportation assistance Health care services access and quality	Varied by region addressed Inner city, % Black (non-Hispanic): 58 Hispanic: 21 White (non-Hispanic): 15 Asian and others: 6 Rest of city, % Black (non-Hispanic): 37	Positive effects for immunizations	Immunization rates at 12 months old, % 1996 White (non-Hispanic): 95 Black (non-Hispanic): 83 Hispanic: 84 All children: 90 1999 White (non-Hispanic): 94 Black (non-Hispanic): 86

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Szilagyi, 2002 (continued)			<p>Hispanic: 15 White (non-Hispanic): 38 Asian and others: 10</p> <p>Suburbs, % Black (non-Hispanic): 7 Hispanic: 3 White (non-Hispanic): 84 Asian and others: 6</p> <p>County, % Black (non-Hispanic): 28 Hispanic: 10 White (non-Hispanic): 55 Asian and others: 7</p>		<p>Hispanic: 89 All children: 90</p> <p>Disparity, % 1990 White-Black: 12 ($P < .001$) White-Hispanic: 11 ($P < .001$)</p> <p>1999 White-Black: 8 ($P < .01$) White-Hispanic: 5 ($P = .1$)</p> <p>Immunization rates at 24 months old, % 1996 White (non-Hispanic): 89 Black (non-Hispanic): 76 Hispanic: 74 All children: 83</p> <p>1999 White (non-Hispanic): 88 Black (non-Hispanic): 81 Hispanic: 87 All children: 87</p> <p>Disparity, % 1990 White-Black: 13 ($P = .001$) White-Hispanic: 15 ($P < .001$)</p> <p>1999 White-Black: 7 ($P = .4$) White-Hispanic: 1 ($P = .7$)</p>

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Towfighi, 2021 ¹⁹⁰ RCT (High) N = 487	CHW-provided education and advanced practice clinician clinic visits and blood pressure monitors/primary care, telephone-based, home-based care Adults (≥40 years) experiencing recent TIA, stroke, or ICH and high blood pressure Health care providers, CHWs/navigators Tailoring: Yes	Transportation assistance Health care services access and quality Social isolation assistance	Majority White/non-Hispanic White Overall White: 335 (70.4) Black: 87 (18.3) Asian: 30 (6.3) ≥1 Race: 10 (2.1) Native American or Alaskan Native: 9 (1.9) Native Hawaiian or other Pacific Islander: 5 (1.1) Hispanic ethnicity: 347 (71.3)	No effects for mental health; no effects for functional status; no effects for quality of life; mixed results for other health outcomes (non-HDL, HbA1c, Log CRP, BMI); mixed results for diet; no effects for physical activity; no effects for other behavior (smoking); mixed results for frequency of health care use; mixed results for adherence to treatment	Changes in systolic blood pressure over time in usual care vs intervention, by subgroup Systolic blood pressure, mmHg, mean (SD) Hispanic <ul style="list-style-type: none"> • Usual care at baseline: 147 (19) • Usual care at 3 months: 137 (21) • Usual care at 12 months: 136 (21) • Intervention at baseline: 145 (17) • Intervention at 3 months: 134 (20) • Intervention at 12 months: 133 (19) • P value= .99 Not Hispanic <ul style="list-style-type: none"> • Usual care at baseline: 142 (16) • Usual care at 3 months: 134 (17) • Usual care at 12 months: 139 (24) • Intervention at baseline: 140 (16) • Intervention at 3 months: 134 (23) • Intervention at 12 months: 132 (23) • P value= .22 Asian <ul style="list-style-type: none"> • Usual care at baseline: 141 (14)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Towfighi, 2021 (continued)					<ul style="list-style-type: none"> • Usual care at 3 months: 126 (18) • Usual care at 12 months: 131 (22) • Intervention at baseline: 141 (20) • Intervention at 3 months: 130 (23) • Intervention at 12 months: 128 (15) • <i>P</i> value= .68 <p>Black</p> <ul style="list-style-type: none"> • Usual care at baseline: 142 (14) • Usual care at 3 months: 135 (15) • Usual care at 12 months: 136 (22) • Intervention at baseline: 141 (15) • Intervention at 3 months: 137 (24) • Intervention at 12 months: 136 (28) • <i>P</i> value= .94 <p>White</p> <ul style="list-style-type: none"> • Usual care at baseline: 148 (19) • Usual care at 3 months: 139 (21) • Usual care at 12 months: 137 (23) • Intervention at baseline: 144 (18) • Intervention at 3 months: 133 (19)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Towfighi, 2021 (continued)					<ul style="list-style-type: none"> Intervention at 12 months: 133 (19) P value= .64 <p>Other</p> <ul style="list-style-type: none"> Usual care at baseline: 142 (24) Usual care at 3 months: 122 (10) Usual care at 12 months: 138 (20) Intervention at baseline: 141 (17) Intervention at 3 months: 139 (19) Intervention at 12 months: 140 (20) P value= .14 (ie, no improvements in BP control compared with usual case) <p>Other potential moderators, including site, race, ethnicity, and preferred language, were not associated with primary or secondary outcomes</p>
Not conceptually thoughtful for understanding root causes of racial health inequities but analytically informative for advancing racial health equity research					
Chaiyachati, 2018 ¹²² Cohort with comparison (Medium) N = 786	Free transportation to medical appointment/other Adults receiving Medicaid and living in high-poverty neighborhood Other nonprofessionals ^a	Transportation assistance	Majority Black/non- Hispanic Black Intervention White: 10 (2.5) Black: 371 (94.2) Other/mixed: 13 (3.3) Hispanic: 2 (0.5)	No effects for EDs and urgent care visits; no effects for clinic attendance; positive effects for missed appointments	No statistically significant intervention results analyses by race/ethnicity for missed appointments, same-day cancellations, and no show appointments Results by race (not including intervention effect)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Chaiyachati, 2018 (continued)	Tailoring: No		Non-Hispanic: 392 (99.5) Control White: 4 (1.0) Black: 377 (96.2) Other/mixed: 11 (2.8) Hispanic: 1 (0.3) Non-Hispanic: 391 (99.7)		All missed appointments, OR (95% CI) <ul style="list-style-type: none"> • Black: 0.94 (0.70- 1.26), <i>P</i> =.66 • Non-Black: 3.86 (0.59- 25.3), <i>P</i> = .16 Ethnicity <ul style="list-style-type: none"> • Hispanic: NR • Non-Hispanic: 0.99 (0.74-1.32), <i>P</i> = .92 Same-day cancellation, OR (95% CI) <ul style="list-style-type: none"> • Black: 0.87 (0.55 -1.36), <i>P</i> = .56 • Non-Black: 0.83 (0.05- 15.1), <i>P</i> = .90 Ethnicity <ul style="list-style-type: none"> • Hispanic: NR • Non-Hispanic: 0.85 (0.55-1.33), <i>P</i> = .49 No show, OR (95% CI) <ul style="list-style-type: none"> • Black: 0.99 (0.71-1.38), <i>P</i> = .97 • Non-Black: 6.25 (0.60- 64.9), <i>P</i> = .13 Ethnicity <ul style="list-style-type: none"> • Hispanic: NR • Non-Hispanic: 1.07 (0.78-1.48), <i>P</i> =.70

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Chan, 2009 ¹⁵⁵ Single arm ^b (Not rated) N = 725	Computerized referral system to community clinics/ED, primary care, web-based care People without primary care providers visiting an ED Health care providers	Health care services access and quality	NR	Positive effects for EDs and urgent care visits; positive effects for post-discharge primary care visits	For the multivariate logistic regression analysis to identify which factors were associated with adherence with follow-up at the community clinics during the post period, there were no independent associations among patient characteristics (age, sex, race/ethnicity, marital status, ED visit acuity, and health coverage insurance status) and period
Duncan 2020 ¹⁹⁹ RCT (High) N = 5882 (ITT analysis)	Telephone and clinic follow-up and individualized care plan including referral to community resources/outpatient clinic, telephone-based care Adults with stroke or TIA discharged from hospital to home Health care providers, Other nonprofessionals ^a Tailoring: No	Food security assistance Transportation assistance Financial strain assistance Health care services access and quality Additional unspecified domains addressed	Majority White/non- Hispanic White Intervention White: 2112 (79.1) Non-White: 559 (20.8) Missing: 18 (0.67) Usual care White: 2122 (67.2) Non-White: 1037 (32.5) Missing: 34 (1.1) (Data for non-White calculated)	No effects for mortality; no effects for mental health; no effects for other health outcomes (general health); no effects for physical activity; no effects for other behavior (cognition); no effects for hospital readmissions; no effects for adherence to treatment; no effects for EDs and urgent care visits; no effects for other health care use outcomes (risk of skilled nursing or rehab admission)	Cognition, mean difference Non-White: -0.96 (confidence limits: -1.80 to -0.11) White: 0.04 (confidence limits: - 0.57 to 0.65) P = .09 Satisfaction with care coordination, mean difference Non-White: 0.25 (confidence limits: 0.02- 0.49) White: 0.02 (confidence limits: - 0.12 to 0.16) P = .45 Stroke Impact Scale, White vs non-White: 9.73 (95% CI, 8.01- 11.46), P < .0001 Regression models for ED use, readmissions (all cause and stroke), mortality were adjusted for race White race as predictor of skilled

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Duncan 2020 ¹⁹⁹ (continued)					nursing or rehab admission: HR = 0.96 (2.5% CI = 0.72, 97.5% CI = 1.27), P = .765
Foster, 2018 ¹⁸⁰ Cohort with comparison (Low) N = 85 701	Care coordination to support primary care appointments/ED, telephone-based care Adults visiting an ED Other nonprofessionals ^a Tailoring: No	Health care services access and quality	No single group was a majority Referred-successful linkage African American: 646 (61) Caucasian: 338 (31.9) Other/not documented: 63 (5.9) Hispanic: 6 (0.6) Asian: 6 (0.6) Referred-unsuccessful linkage African American: 403 (64.1) Caucasian: 187 (29.7) Other/not documented: 33 (5.2) Hispanic: 5 (0.8) Asian: 1 (0.2) Referred-assistance declined African American: 262 (57.7) Caucasian: 154 (33.9) Other/not documented: 30 (6.6) Hispanic: 7 (1.5) Asian: 1 (0.2) Nonreferred	No effects for EDs and urgent care visits	Referred and successful linkage to primary care, n (%) <ul style="list-style-type: none"> African American: 646 (61.0) Caucasian: 338 (31.9) Other/not documented: 63 (5.9) Hispanic: 6 (0.6) Asian: 6 (0.6) Referred and unsuccessful linkage to primary care, n (%) <ul style="list-style-type: none"> African American: 403 (64.1) Caucasian: 187 (29.7%) Other/not documented: 33 (5.2) Hispanic: 5 (0.8) Asian: 1 (0.2) Referred and assistance declined, n (%) <ul style="list-style-type: none"> African American: 262 (57.7) Caucasian: 154 (33.9) Other/not documented: 30 (6.6) Hispanic: 7 (1.5) Asian: 1 (0.2) Nonreferred, n (%) <ul style="list-style-type: none"> African American: 34 581 (41.3) Caucasian: 39 386 (47.1)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Foster, 2018 (continued)			African American: 34 581 (41.3) Caucasian: 39 386 (47.1) Other/not documented: 8061 (9.6) Hispanic: 1146 (1.4) Asian: 463 (0.6)		<ul style="list-style-type: none"> • Other/not documented: 8061 (9.6) • Hispanic: 1146 (1.4) • Asian: 463 (0.6) <p>Among those referred to and accepting of care coordination, participants successfully and unsuccessfully linked to care, difference in proportions (95% CI) White: -2.2 (-6.7, 2.4)</p>
Glendenning-Napoli, 2012 ¹⁰⁹ Single arm ^b (Not rated) N = 83	Case management/outpatient clinic, hospital, telephone and home-based Patients with diabetes, hypertension, CHF, CAD and history of hospital admission or outpatient encounter Social workers, CHWs/navigators Tailoring: No	Food security assistance Housing stability and quality Financial strain assistance Health care services access and quality	Majority White/non-Hispanic White Non-Hispanic White: 43 (51.8) Hispanic: 19 (22.9) African American: 21 (25.3)	Positive effects for outpatient visits; positive effects for clinic attendance; positive effects for inpatient admissions	Acute outpatient encounters, pre-intervention mean (SD) vs post-intervention mean (SD) Non-Hispanic White: 0.60 (0.93) vs 0.33 (0.71), <i>P</i> = .12 Hispanic: 0.84 (1.12) vs 0.11 (0.46), <i>P</i> = .02 African American: 0.76 (0.83) vs 0.29 (0.46), <i>P</i> = .01 Inpatient admissions, pre-intervention mean (SD) vs post-intervention mean (SD), <i>P</i> value Non-Hispanic White: 1.33 (1.13) vs 0.74 (1.16), <i>P</i> = .005 Hispanic: 1.16 (0.96) vs 0.32 (0.48), <i>P</i> = .0003 African American: 1.14 (1.15) vs 0.48 (0.98), <i>P</i> = .02 Clinic visits, pre-intervention mean (SD) vs post-intervention mean (SD), <i>P</i> value

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Glendenning-Napoli, 2012 (continued)					<p>Non-Hispanic White: 3.79 (4.39) vs 11.47 (9.53), $P < .0001$ Hispanic: 4.79 (3.44) vs 9.42 (5.94), $P = .004$ African American: 4.24 (3.75) vs 10.76 (10.62), $P = .004$</p> <p>Cost of acute outpatient encounters, pre-intervention mean (SD) vs post-intervention mean (SD), P value Non-Hispanic White: 1453 (2860) vs 941 (2829), $P = .40$ Hispanic: 2397 (3813) vs 331 (1441), $P = .05$ African American: 2090 (2852) vs 541 (1153), $P = .04$</p> <p>Cost of inpatient admissions, pre-intervention mean (SD) vs post-intervention mean (SD), P value Non-Hispanic White: 16 655 (22 158) vs 8483 (15 079), $P = .01$ Hispanic: 11 822 (27 911) vs 4616 (8880), $P = .27$ African American: 7931 (9431) vs 3449 (7709), $P = .03$</p> <p>Cost of clinic visits, pre-intervention mean (SD) vs post-intervention mean (SD) Non-Hispanic White: 941 (1143) vs 2277 (4751), $P = .07$ Hispanic: 1235 (1007) vs 1367 (981), $P = .63$</p>

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Glendenning-Napoli, 2012 (continued)					<p>African American: 1052 (940) vs 4049 (8362), $P = .12$</p> <p>Aggregate costs of health care utilization, pre-intervention mean (SD) vs post-intervention mean (SD), P value</p> <p>Non-Hispanic White: 19 048 (22 254) vs 11 700 (15 994), $P = .02$</p> <p>Hispanic: 15 454 (27 423) vs 6314 (9180), $P = .16$</p> <p>African American: 11 073 (9573) vs 8039 (11 492), $P = .25$</p> <p>All costs USD</p>
Hilgeman, 2014 ¹⁵⁷ RCT (High) N = 203	<p>Veteran community outreach worker/home based</p> <p>Rural veterans who had not accessed VA health care for ≥ 2 years</p> <p>CHWs/navigators</p> <p>Tailoring: No</p>	Health care services access and quality	<p>Majority White/non-Hispanic White</p> <p>Intervention</p> <p>White: 52 (51.5) Black: 49 (48.5) Asian: 0 (0) Hispanic: 0 (0)</p> <p>Comparison</p> <p>White: 67 (64.4) Black: 34 (62.7) Asian: 1 (0.96) Hispanic: 2 (1.9)</p>	Positive effects for clinic attendance; positive effects for other health care use outcomes (time to first clinical visit)	<p>Logistical regression controlling for race, while predicting attendance at an appointment within 6 months (yes/no), revealed no significant differences by race [Wald's $\chi^2(1) = 0.63, P = .43$; OR = 1.36, 95% CI, 0.69-2.68] or the race by group interaction.</p> <p>Survival curves were presented for veterans by treatment group and separately by racial group to depict the significant group by race interaction.</p> <p>General linear modeling was used to further explore the interaction detected in the Kaplan-Meier survival curve ($F(1)$)</p>

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Hilgeman, 2014 (continued)					= 10.61, $P = .0014$). Results indicated that regardless of race, veterans in the EEE [enhanced enrollment and engagement; treatment] group attended their first appointment at about 28 days (ie, White veterans $M = 28.6$, Black veterans $M = 28.0$, $P = .97$). For veterans in the AO [administrative outreach; control] group, time to attendance at an appointment was significantly different by race, such that Black veterans took twice as many days to attend an appointment as did their White counterparts (ie, $M = 119.4$ days vs $M = 46.1$ days, $P < .0001$, respectively).
Juillard, 2016 ⁵⁵ Single arm ^b (Not rated) N = 459	Intensive case management/outpatient clinic Patients presenting to ED with violent injury CHWs/navigators Tailoring: Yes	Housing stability and quality Education access and quality Employment assistance Legal services Additional unspecified domains	No single group was a majority Black/African American: 215 (46.8) Latino: 200 (43.5) White: 23 (5.0) Other (Native American, native Alaskan, native Hawaiian, Asian Pacific Islander, and mixed race): 21 (4.5)	Positive effects for other health outcomes (reinjury)	Reinjury, number of clients (%) Black: No = 210 (98), Yes = 5 (2) Latino: No = 178 (89), Yes = 22 (11) White: No = 0 (0), Yes = 23 (100) Other: No = 19 (68), Yes = 2 (7) Unadjusted $P < .001$ χ^2 measures of association showed no differences in intervention meeting client needs in terms of race, gender, or age

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Kelley, 2020 ⁹⁷ RCT (High) N = 100	Patient navigation/primary care, telephone-based care Adults receiving Medicaid and visiting local ED 4-18 times in prior year Health care providers, other nonprofessionals ^a Tailoring: Yes	Food security Housing stability and quality Transportation assistance Health care services access and quality Additional unspecified domains	No single group was a majority Intervention White, non- Hispanic/Latino: 6 (12.24) Black, non- Hispanic/Latino: 23 (46.94) Hispanic/Latino: 19 (38.78) Other: 1 (2.04) Usual Care White, non- Hispanic/Latino: 12 (23.53) Black, non- Hispanic/Latino: 25 (49.02) Hispanic/Latino: 14 (27.45) Other: 0	No effects for outpatient visits; positive effects for EDs and urgent care visits; positive effects for inpatient admissions	Change in ED visits by race/ethnicity, reduced ED visits n (%) vs nonreduced ED visits n (%) White, non-Hispanic/Latino: 3 (7.69) vs 2 (20.0) Black, non-Hispanic/Latino: 18 (46.15) vs 5 (50.0) Hispanic/Latino: 16 (41.03) vs 3 (30.0) Other: 2 (5.13%) vs 0 (0) <i>P</i> = .5789 No statistical differences between the groups in race/ethnicity among participants who reduced their ED utilization vs those who did not
Krieger, 1999 ¹²⁵ RCT (Low) Krieger, 1999 (continued) N = 241	Assistance with making appointments and removing barriers to care (childcare, etc)/telephone-based care Adults with high blood pressure and low income CHWs/navigators Tailoring: Yes	Health care services access and quality	Majority Black/non- Hispanic Black Intervention Black: (79.4) Control Black: (78.8)	Positive effects for other health care use outcomes (follow-up appointment with a medical care provider)	No significant (<i>P</i> < .05) interactions between intervention and age, sex, and race were present. The intervention thus appeared to be equally effective across ages, sexes, and races for appointment completion, although the sample size limited the study's ability to detect small differences in efficacy (<50% with 80% power) across subgroups.

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Krieger, 2009 ¹¹⁶ RCT (Medium) N= 309	CHW-delivered education and asthma mitigation support/home- based care Children with persistent asthma and their caregivers enrolled in Medicaid and living in King County (Washington) CHWs/navigators Tailoring: Yes	Housing stability and quality Health care services access and quality	No single group was a majority Enrolled in study: White: (11.3) African American: (20.1) Vietnamese: (11.0) Other Asian: (5.8) Hispanic: (47.9) Other: (3.9) Completed study: White: (10.3) African American: (20.3) Vietnamese: (10.7) Other Asian: (5.5) Hispanic: (49.8) Other: (3.3)	Mixed results for functional status; positive effects for quality of life; mixed results for other health outcomes (asthma symptoms); positive effects for other behavior (environmental trigger reduction, self- medication management actions); no effects for EDs and urgent care visits; no effects for clinic attendance	In separate regression models for each of the 3 primary outcomes (caretaker quality of life, symptom-free days, and urgent health service use), no significant interactions between group allocation and child's age, baseline asthma severity, baseline symptom-free days, or caretaker's race/ethnicity and education Coefficients for regression models controlling for race/ethnicity were NR.
Krieger, 2015 ¹²⁴ RCT (Medium) N = 366	CHW-delivered education and asthma mitigation support/telephone-, home-, and web-based care Adults with low household income and poorly controlled asthma living in King County (Washington) Health care providers, CHWs/navigators Tailoring: Yes	Housing stability and quality Financial strain assistance Education access and quality Social isolation assistance Legal services assistance Health care services access and quality Additional unspecified domains	No single group was a majority Intervention White: (26.0) Black: (16.9) Hispanic: (48.6) Other: (8.5) Control White: (31.2) Black: (16.4) Hispanic: (45.0) Other: (7.4)	Positive effects for mental health; no effects for functional status; positive effects for quality of life; positive effects for self- reported health status; positive effects for other health outcomes (asthma symptom-free days); no effects for frequency of health care use; no effects for EDs and urgent care visits	No significant interactions between race/ethnicity and study group for the 3 primary outcomes (symptom-free days, asthma-related quality of life, unscheduled health care use)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Lapham, 1995 ¹³⁰ Comparative effectiveness (Not rated) N = 469	Case management and substance use counseling and peer- supervised housing OR peer- supervised housing and peer- resident support OR apartment or hotel housing only OR service referrals, bus fare, and payment for biweekly check-ins/ transitional housing, other Homeless adults who abuse alcohol Other nonprofessionals ^a Tailoring: Yes	Housing stability and quality Health care services access and quality	No single group was a majority Overall Non-Hispanic White: (41) Hispanic White (Hispanic): (31) Native American: (18) Other race groups: (10)	Mixed results for substance use	No statistically significant differences in substance use, housing stability, and employment status by race/ethnicity
Lyles, 2021 ¹⁸⁸ Single arm ^b (Not rated) N = 179 (analyzed, 618 participants)	Peer mentor coaching/ telephone based People with poorly controlled HbA1c or unknown control status Other nonprofessionals ^a Tailoring: Yes	Housing stability and quality Transportation assistance Health care services access and quality Additional unspecified domains addressed	Majority Black/non- Hispanic Black Black: 318 (51) Hispanic/Latinx: 145 (23) White: 35 (6) Asian: 5 (1) Other: 45 (7) Missing/unknown: 70 (11)	Positive effects for other health outcomes (HbA1c)	Mean change in HbA1c by race/ethnicity Black: -1.79% Hispanic/Latinx: -1.51% White: -1.36%

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Martinez, 2006 ¹⁴⁶ Single arm ^{b,c} (Not rated) N = 236	Supportive housing with onsite services including case management, psychiatric care, health care, and vocational training/transitional housing Formerly homeless, disabled, single adults with disabilities who entered supportive housing Social workers, CHWs/navigators Tailoring: No	Housing stability and quality Employment assistance Health care services access and quality	Majority Black/non- Hispanic Black African American: 126 (53) White: 76 (32) Latino: 18 (8) Native American: 11 (5) Asian: 5 (2)	Positive effects for EDs and urgent care visits; positive effects for inpatient admissions	Coefficients for White, Latino, Asian and Native American (African American = reference group) were NS in the case- control model of predictors of change in the number of ED visits from year 1 to year 2.
Mendelsohn, 2001 ⁵⁸ Cohort with comparison (Medium) N = 138	Literacy support program based on Reach Out and Read/primary care Children aged 2-5.9 years and of Latino or Black ethnicity Health care providers, other nonprofessionals ^a Tailoring: No	Early childhood education and development access and quality	Majority Hispanic/ Latino	Mixed results for child development	Unadjusted analysis of Latino families (n = 86), difference in score between intervention and comparison clinic Receptive vocabulary score: 10.5 points (95% CI, 4.8, 16.3; $t = 3.7$; $P < .001$) Expressive vocabulary score, difference in score: 5.3 points (95% CI, 0.3, 10.3; $t = 2.1$; $P = .04$) Unadjusted analysis of all families (Black and Latino, n = 138), difference in score between intervention and comparison clinic Receptive vocabulary score: 9.7 points (95% CI, 4.5, 15.0; $t = 3.7$; $P < .001$) Expressive vocabulary score: 2.7 points (95% CI, -1.7, 7.1; $t = 1.2$; $P = .23$)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Mendelsohn, 2001 (continued)					Multiple regression where main predictor is "child attends intervention clinic" (Latino ethnicity as a covariate [Black is reference]) For receptive language score <ul style="list-style-type: none"> Latino ethnicity: B = 4.6, P = .15 For expressive language score Latino ethnicity: B = -0.5, P = .83
Slesnick, 2008 ⁹¹ Single arm (Not rated) ^b N = 172	Case management and individual therapy/homeless center Adolescents and young adults experiencing homelessness Other nonprofessionals ^a Tailoring: No	Housing stability and quality Education access and quality Employment assistance Health care services access and quality Additional unspecified domains	No single group was a majority White (37.2) Hispanic (31.4) Native American (12.2) African American or Black (7.6) Mixed ethnicity (11.6)	Positive effects for mental health; positive effects for substance use; positive effects for clinic attendance	Individual characteristics including age, education level, and ethnicity were not predictive of change in homelessness Coefficients for ethnicity were all NS for change in alcohol and drug use, change in percent days housed, or change in psychological distress (all P > .05). Coefficients for ethnicity for likelihood of being employed, being in school, and having access to medical care were NR.

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Tessaro, 1997 ⁷⁶ Cohort with comparison (Low) N = 14 714	Lay health worker pregnancy health promotion/home based Pregnant people at risk for poor birth outcomes CHWs/navigators Tailoring: No	Housing stability and quality Education access and quality Employment assistance Early childhood education and development access and quality Health care services access and quality Additional unspecified domains	Majority Black/non- Hispanic Black Maternal outreach worker program African American: (61.8) Caucasian: (38.2) Care coordination program African American: (59.4) Caucasian: (40.6)	No effects for low birth weight; no effects for preventive care utilization; mixed results for prenatal visits	Adequacy of prenatal care among participants and comparisons, % African American (live births: 893 among participants, 5607 among comparisons) <ul style="list-style-type: none"> • Adequate: Participants 60.7%, Comparisons 63.8% • Intermediate: Participants 32.6%, Comparisons 31.5% • Inadequate: Participants 6.7%, Comparisons 4.7% (row mean score, $P < .05$) Caucasian (live births: 724 among participants, 7120 among comparisons) Adequate: Participants 77.4%, Comparisons 75.1% Intermediate: Participants 19.7%, Comparisons 22.8% Inadequate: Participants 2.9%, Comparisons 2.1% (row mean score, $P > .05$ [no statistically significant difference in distribution]) Adverse events among participants, observed vs expected number African American (total births = 895) Low birth weight: Observed 104, Expected 117; Difference -13 (P = .12)

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Tessaro, 1997 (continued)					<p>Very low birth weight: Observed 14, Expected 20; Difference -6 ($P = .10$)</p> <p>Caucasian (total births = 724):</p> <ul style="list-style-type: none"> • Low birth weight: Observed 62, Expected 61; Difference 1 ($P = .58$) • Very low birth weight: Observed 7, Expected 7; Difference 0 ($P = .60$) <p>Caucasian people were significantly more likely than African American people to report a high number of emotional ($P < .01$) and informational ($P = .001$) needs. The assistance needs for African American people and Caucasian people were similar.</p> <p>A significantly higher percentage of African American people reported a high level of emotional ($P < .05$) and assistance ($P < .01$) needs met compared with Caucasian people, regardless of participant/comparison status. No difference in information needs met associated with race.</p>

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Whorms, 2021 ²⁰⁰ Single arm ^b (Not rated) N = 15 577	Rideshare service/outpatient clinic Patients scheduling for imaging appointment and experiencing transportation difficulties Other nonprofessionals ^a Tailoring: No	Transportation assistance	Majority White/non- Hispanic White Rideshare appointments White: 114 Black/African American: 11 Asian: 8 Hispanic: 12 Other: 3 Non-rideshare appointments, pre- intervention White: 6041 Black/African American: 383 Asian: 357 Hispanic: 749 Other: 491 Nonrideshare appointments, post- intervention White: 5769 Black/African American: 353 Asian: 277 Hispanic: 720 Other: 215	No effects for missed appointments; positive effects for other health care use outcomes (being on time for appointments)	Missed appointments, non- White participants, n (%) Pre-intervention: 323 (31.6) Post-intervention: 288 (30.6) Adjusted OR: 1.19 (95% CI, 0.77- 1.84), <i>P</i> = .429 Analyses adjusted for race as a potential confounder

Author, year Study design (quality) Categorization Total N participants	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Race/ethnicity, n (%)	Overall results	Results reported by race or ethnicity
Xiang, 2019 ¹⁰⁷ Single arm ^b (Not rated) N = 586	Care coordination and case management/hospital, telephone- based care Adults with ≥5 hospital admissions in prior year Social workers Tailoring: No	Health care services access and quality Additional unspecified domains	Majority Black/non- Hispanic Black White: (39.8) African American: (52.7) Other: (7.5)	Positive effects for hospital readmissions; positive effects for EDs and urgent care visits; positive effects for inpatient admissions; no effects for hospital days	In multiple regression models, race was not associated with changes in health services utilization and cost measures after the intervention; results from regression were NR.

Abbreviations: AO, administrative outreach; BMI, body mass index; BP, blood pressure; CAD, coronary artery disease; CHF, congestive heart failure; CHW, community health worker; CI, confidence interval; CRP, C-reactive protein ; ED, emergency department; EEE, enhanced enrollment and engagement; HDL, high-density lipoprotein; HR, hazard ratio; ICH, intracerebral hemorrhage ; ITT, intention to treat; N, number; NR, not reported; NS, not significant ; OR, odds ratio; RCT, randomized controlled trial; SD, standard deviation; TIA, transient ischemic attack ; USD, US dollar; VA, Veterans Affairs.

^a Other nonprofessionals include nonclinicians such as CHWs, lay workers, volunteers.

^b Pre-intervention to post-intervention changes or changes over time serve as the proxy for the intervention effect in single-arm studies.

^c Study has a randomized subanalysis.

Table E-3. Detailed Characteristics of Studies With Analyses That Are Not Informative for Advancing Racial Health Equity Research (N = 23)

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Conceptually thoughtful for understanding root causes of racial health inequities but not analytically informative for advancing racial health equity research					
Crisanti, 2017 ¹⁷¹ Single arm ^b (Not rated) N = 237	Housing and support services delivered by peer support worker/outpatient clinic, home-based care Homeless adults or adults at risk for homelessness, diagnosed with serious mental illness or substance use disorder Case manager Tailoring: No	Housing stability and quality Education access and quality Employment assistance Legal services assistance	No single group was a majority	No effects for mental health; no effects for other health outcomes (overall health)	Psychological distress, difference of means (95% CI) Hispanic: 1.0 (0.3-1.6) Coefficient for race/ethnicity in the final model for overall health was NR.
Not analytically informative for advancing racial health equity research					
Berkowitz, 2017 ⁵² Single arm ^b (Not rated) N = 1774	Assistance of advocate to prioritize unmet social needs, identify community resources, facilitate receipt of resource/primary care Adults screened for unmet social needs at internal medicine practices Other nonprofessionals, including volunteers and study staff Tailoring: No	Multiple domains	Majority White/non-Hispanic White	Mixed results for functional status	Race/ethnicity coefficients in regression models were NR.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Berkowitz, 2019 ¹⁶⁴ RCT (Medium) N = 122	Subsidized community supported agriculture vegetable share/primary care Adults with a BMI >25 being treated at community health center Other nonprofessionals, including volunteers and study staff Tailoring: No	Food security assistance	Majority White/non- Hispanic White	No effects for mental health; mixed results for functional status	Sensitivity analyses of Healthy Eating Index adjusted for race and other factors found similar benefit for the intervention (difference: 3.7, 95% CI, 0.3-7.0, <i>P</i> =.03)
Birkhead, 1995 ¹⁹² RCT (Medium) N = 459	Additional food vouchers as immunization incentive or passive referral for immunization/primary care, WIC clinic Children (12-59 months) whose families presented for WIC certification Other nonprofessionals, including volunteers and study staff Tailoring reported: No	Health care access and quality Food security assistance	Majority Hispanic/Latino	Positive effects for immunizations	Immunized during the intervention period, N (%) Hispanic: 353 (75) Black: 238 (73) White and Asian: 27 (68) Bivariate analysis of the relative risk of immunization, compared with White and Asian children Hispanic: 1.12 (95% CI, 0.90-1.39) Black: 1.06 (95% CI, 0.86-1.35); not included in multivariate analyses that includes interventions
Chaiyachati, 2018 ¹²¹ Cohort with comparison (Medium) N = 506	Free transportation to medical appointment/primary care Adults with Medicaid scheduled for nonurgent primary care visit Other nonprofessionals, including volunteers and study staff Tailoring: No	Transportation assistance	Majority Black/non- Hispanic Black	Positive effects for clinic attendance	Race/ethnicity coefficients in the models of show rates for clinics were NR.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Ciaranello, 2006 ¹¹⁴ Cohort with comparison (Medium) N = 252	Integrated care by health care professionals and social workers/transitional housing, telephone based Adults living in transitional housing Health care providers, social workers, other nonprofessionals, including volunteers and study staff Tailoring: No	Food security assistance Housing stability and quality Transportation assistance Employment assistance Health care services access and quality Legal services assistance Additional unspecified domains addressed	No single group was a majority	No effects for mental health; positive effects for functional status; no effects for self-reported health status; positive effects for EDs and urgent care visits; no effects for inpatient admissions	Regression coefficients for race (non-White vs White) were NR.
Duru, 2020 ⁹⁵ Cohort with comparison (Medium) N = 194 834	Care coordination, including links to social services and CHW-facilitated enrollment in services/NR Adult Medicaid beneficiaries or United Healthcare beneficiaries with diabetes and supplemental Medicare or Medicare insurance or other supplemental Health care providers, CHWs/navigators Tailoring: No	Food security assistance Health care services access and quality Additional unspecified domains addressed	No single group was a majority	Mixed results for EDs and urgent care visits; mixed results for inpatient admissions	Coefficients for race were NR.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Gottlieb, 2020 ¹⁹⁶ RCT (Medium) N = 611	In-person navigation with provision of written resource information addressing participants' social needs or written information alone/urgent care, telephone-based care Children (≤ 17 years) and caregiver residing in county of enrollment CHWs/navigators Tailoring: No	Food security assistance Financial strain assistance Any social need that arises in population addressed	Majority Hispanic/Latino	No effects for quality of life; no effects for self-reported health status; no effects for other health outcomes (caregiver general health, perceived stress, or depression)	No statistically significant differences between groups in outcomes with or without adjustment for race or other factors
Guevara, 2020 ¹⁵⁸ RCT (Medium) N = 120	Provision of books and reading promotion/primary care, home-based care, other (text messages) Infants <30 days old at enrollment without neurodevelopmental disabilities or congenital malformations and receiving Medicaid Health care providers, other nonprofessionals ^a Tailoring: No	Early childhood education and development access and quality	Majority Black/non-Hispanic Black	No effects for child development	Coefficients for race were NR.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Gusmano, 2018 ⁹² Cohort with comparison (Medium) N = 17 195	Affordable housing with supportive services/home-based care Residents of affordable housing, aged 65 years or older, enrolled in Medicare Social workers Tailoring: No	Food security assistance Housing stability and quality Transportation assistance Social isolation assistance Health care services access and quality Additional unspecified domains addressed	Majority Asian/Pacific Islander	Positive effects for inpatient admissions; positive effects for hospital days; positive effects for other health care use outcomes	Coefficient (SE), odds ratio Race/ethnicity (reference: White) <ul style="list-style-type: none"> Non-Hispanic Black: 0.737 (0.214), <i>P</i> = .001, OR = 2.090 Hispanic: 0.697 (0.221), <i>P</i> = .002, OR = 2.007 Other: 0.115 (0.014), <i>P</i> = .001, OR = 1.1215 Non-Hispanic Asian: 0.471 (0.145), <i>P</i> = .001, OR = 0.625
Horwitz, 2005 ¹¹¹ RCT (High) N = 230	Intensive case management/ED Uninsured adults not seen for only substance use or mental health issues CHWs/navigators Tailoring: No	Health care services access and quality	No single group was a majority	No effects for EDs and urgent care visits; positive effects for post-discharge primary care visits; no effects for inpatient admissions	Intervention patients linked to primary care contacts, relative risk (95% CI): African American vs White: 0.80 (0.55-1.18) Hispanic vs White: 1.07 (0.75-1.53)
Izumi, 2020 ¹⁹⁸ Single arm ^b (Not rated) N = 48	Subsidized community supported agriculture share plus cooking education/outpatient clinic Individuals receiving care at target clinic CHWs/navigators, other nonprofessionals, including volunteers and study staff Tailoring: No	Food security assistance	Majority Hispanic/Latino	Positive effects for mental health; positive effects for self-reported health status; mixed results for diet; mixed results for other behavior (fruit, vegetable, dark green vegetable, orange vegetable intake)	GEE models were adjusted for race/ethnicity, income, and number of shares picked up.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Lindau, 2019 ¹⁰³ Cohort with comparison (Medium) N = 420	Provision of list of community resources personalized to patient conditions/primary care, ED Patients aged 45-74 who were beneficiaries of Medicare, Medicaid, or both who resided in the 16 zip-code study region Health care providers, other nonprofessionals ^a Tailoring: No	Food security assistance Housing stability and quality Transportation assistance Utilities assistance Education access and quality Employment assistance Health care services access and quality Legal services assistance Additional unspecified domains addressed		No effects for quality of life	Adjusted SF-12 MCS, Estimate (SE) Race/ethnicity: 3.82 (1.83), <i>P</i> = .04 Adjusted SF-12 PCS, Estimate (SE) Race/ethnicity: -0.94 (0.84), <i>P</i> = .26 Adjusted logistic model for confidence in finding resources, Estimate (SE), 95% CI Race/ethnicity: 0.07 (0.35), 95% CI: -0.62, 0.76, <i>P</i> = .84 Adjusted logistic model for likelihood of recalling receiving intervention materials among intervention group participants, estimate, 95% CI Race/ethnicity: 0.27, (-1.39, 1.93), <i>P</i> = .75 Adjusted logistic model for conditional on recalling the likelihood of telling someone about the materials, estimate, 95% CI Race/ethnicity: 0.44, (-1.27, 2.15), <i>P</i> = .61

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Liss, 2019 ⁸⁷ RCT (Medium) N = 654	Transitional care/primary care, ED Adults discharged from hospital or ED care and with no or inadequate usual source of care Health care providers, social workers Tailoring: No	Transportation assistance Health care services access and quality Additional unspecified domains addressed	No single group was a majority	No effects for mortality; no effects for self-reported health status; no effects for EDs and urgent care visits; mixed results for inpatient admissions; mixed results for other health care use outcomes (hospital encounters)	Race/ethnicity regression coefficients were NR.
Martinez, 2006 ¹⁴⁶ Single arm ^{b,c} (Not rated) N = 236	Supportive housing with onsite services including case management, psychiatric care, health care, and vocational training/transitional housing Formerly homeless, disabled, single adults with disabilities who entered supportive housing, social workers, CHWs/navigators Tailoring: No	Housing stability and quality Employment assistance Health care services access and quality	Majority Black/non-Hispanic Black	Positive effects for EDs and urgent care visits; positive effects for inpatient admissions	Coefficients for White, Latino, Asian and Native American (African American = reference group) were NS in the case-control model of predictors of change in the number of ED visits from year 1 to year 2.
Melnikow, 1997 ¹²³ RCT (High) N = 104	Taxi voucher to prenatal care appointment/primary care Pregnant individuals Other nonprofessionals ^a Tailoring: No	Transportation assistance, Health care services access and quality	Majority White/non-Hispanic White	Positive effects for prenatal visits	Controlling for ethnicity had no effect on the OR for appointment compliance among women who received a taxi voucher.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Morales, 2016 ⁵⁹ Cohort with comparison (Medium) N = 145	Assistance with food resources including SNAP or WIC enrollment/primary care Pregnant individuals aged 18 years or older NR Tailoring: No	Food security assistance	Majority Hispanic/ Latino	Mixed results for functional status	Race/ethnicity coefficients in the regression models were NR.
Moreno, 2021 ¹⁹⁷ Cohort with comparison (Medium) N = 1120	Social worker and CHW assessment of needs and assistance with connection to community resources and integration with primary care, telephone-based care, home-based care Individuals requiring case management at level of intensity beyond that offered by medical group Social workers, CHWs/navigators Tailoring: No	Food security assistance Housing stability and quality Transportation assistance Financial strain assistance Health care services access and quality Additional unspecified domains addressed	Other (other than Hispanic, White, Black, Asian)	Positive effects for EDs and urgent care visits; positive effects for inpatient admissions	Models were adjusted for race/ethnicity and other factors, but data are NR.
Nyamathi, 2001 ¹³¹ RCT (Low) N = 845	Nurse and outreach worker–provided health education and assistance with local resources or peer mentor and outreach worker–provided education and assistance with local resources/NR Homeless women (aged 18-50) and their intimate partners (aged >18) Health care providers, other nonprofessionals ^a Tailoring: No	Health care services access and quality Additional unspecified domains addressed	Majority Black/non- Hispanic Black	Negative effects for mental health; no effects for substance use; no effects for other behavior (multiple sexual partners/sex without a condom)	Coefficients for race/ethnicity were NR.

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Seligman, 2015 ⁶³ Single arm ^b (Not rated) N = 687	Diabetes screening and diabetes- appropriate food distribution + primary care referral and self-management education/food pantry Adult food pantry clients with an HbA1c \geq 6.5% or self-reported diabetes + presentation diabetes medication bottles Other nonprofessionals ^a Tailoring: No	Food security assistance Health care services access and quality Additional unspecified domains addressed	Majority Hispanic/ Latino	Positive effects for functional status; no effects for morbidity; positive effects for diet; positive effects for adherence to treatment	All regression models included race/ethnicity as a covariate. White race was the reference category, and race was not statistically significant in any model (all $P > .05$).
Shah, 2011 ¹¹² Cohort with comparison (Medium) N = 258	Case management including linkage to community resources/primary care, outpatient clinic, hospital, telephone- based care, home-based care Adults (aged 18-64), with income below 200% of the federal poverty level, uninsured, and not eligible for any public insurance programs Health care providers, CHWs/navigators Tailoring: No	Housing stability and quality Transportation assistance Health care services access and quality Legal services assistance Additional unspecified domains addressed	No single group was a majority	Positive effects for EDs and urgent care visits; no effects for inpatient admissions; no effects for hospital days	Poisson regression results for number of ED visits (White reference group) estimate (SE) Asian: 0.5905 (0.3034), 0.0516 Black: -0.0565 (0.1295), 0.6625 Hispanic: 0.0474 (0.0864), 0.5836 Poisson regression results for number of inpatient admissions (White reference group) estimate (SE) Black: 0.0886 (0.3159), 0.7791 Hispanic: -0.2656 (0.2249), 0.2376

Author, year Study design (quality) Reported N	Intervention/ intervention setting Population description Intervention provider Tailoring reported	Social need(s) addressed	Majority race or ethnicity	Overall results and direction of effect	Information about race or ethnicity (unrelated to intervention effects)
Tomita, 2012 ⁶⁴ RCT (Low) N = 150	Critical time intervention including case worker assistance with community resources/home-based care Individuals with psychotic disorders and history of homelessness living in transitional residences Social workers Tailoring: No	Housing stability and quality Health care services access and quality Additional unspecified domains addressed	Majority Black/non-Hispanic Black	Positive effects for hospital readmissions	Race/ethnicity coefficients in models were NR.
Tsai, 2012 ¹⁷² Cohort with comparison (Medium) N = 31 246	Case management including support with housing vouchers and transition to community/NR Homeless veterans with psychiatric, substance use, or general medical problems Case manager Tailoring: No	Housing stability and quality Employment assistance Financial strain assistance Social isolation assistance	No single group was a majority	No effects for mental health; positive effects for quality of life; no effects for substance use	Coefficients for race/ethnicity were NR.

Abbreviations: BMI, body mass index; CHW, community health worker; CI, confidence interval; ED, emergency department; GEE, generalized estimating equation; HbA1c, hemoglobin A1c; MCS, Mental Composite Score; N, number; NR, not reported; NS, not significant; OR, odds ratio; PCS, Physical Component Score; RCT, randomized controlled trial; SE, standard error; SF-12, Short Form-12; SNAP, Supplemental Nutrition Assistance; WIC, Women, Infants, and Children.

^a Other nonprofessionals include nonclinicians such as CHWs, lay workers, and volunteers.

^b Pre-intervention to post-intervention changes or changes over time serve as the proxy for the intervention effect in single-arm studies.

^c Study has a randomized subanalysis.

Table E-4. Overview of Studies Reporting Tailoring or Adaptation Data

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Juillard, 2016 ⁵⁵ Single arm ^b (Not rated) N = 459	Intensive case management/outpatient clinic Patients presenting to ED with violent injury CHWs	Housing stability and quality Education access and quality Employment assistance Legal services Additional unspecified domains	No single group was a majority Black/African American: 215 (46.8) Latino: 200 (43.5) White: 23 (5.0) Other (Native American, native Alaskan, native Hawaiian, Asian Pacific Islander, and mixed race): 21 (4.5)	Intervention design: Provided “culturally competent” intensive case management (not further described)
Kelley, 2020 ⁹⁷ RCT (High) N = 100	Patient navigation/primary care, telephone-based care Adults receiving Medicaid and visiting local ED 4-18 times in prior year Health care providers, other nonprofessionals ^a	Food security Housing stability and quality Transportation assistance Health care services access and quality Additional unspecified domains	No single group was a majority Intervention White, non-Hispanic/Latino: 6 (12.24) Black, non-Hispanic/Latino: 23 (46.94) Hispanic/Latino: 19 (38.78) Other: 1 (2.04) Usual Care White, non-Hispanic/Latino: 12 (23.53) Black, non-Hispanic/Latino: 25 (49.02) Hispanic/Latino: 14 (27.45) Other: 0	Intervention design: Surveyed Medicaid- insured patients in ED to understand patient motivations and preferences for seeking care in the ED vs a primary care setting to inform intervention Training of study staff: Navigators completed training that emphasized needs and resources within the local community.
Krieger, 1999 ¹²⁵ RCT (Low) N = 241	Assistance with making appointments and removing barriers to care (childcare, etc)/telephone-based care Adults with high blood pressure and low income CHWs	Health care services access and quality	Majority Black/non-Hispanic Black Intervention Black: (79.4) Control Black: (78.8)	Intervention design: CHWs were predominantly Black, and all came from low-income neighborhoods similar those where the project was conducted. CHWs were able to identify with their clients and provide culturally appropriate services. Training of study staff: CHWs were trained on community resources.

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
<p>Krieger, 2005⁵⁷</p> <p>Comparative effectiveness (Not rated)</p> <p>N = 274</p>	<p>Home visits and provision of resources to mitigate asthma/home-based care</p> <p>Children with persistent asthma and their caregivers enrolled in Medicaid and living in King County (Washington)</p> <p>CHW</p>	<p>Housing stability and quality</p>	<p>No single group was a majority</p> <p>Caregiver ethnicity</p> <p>High Intensity</p> <p>Non-Hispanic White: (12.3)</p> <p>Non-Hispanic African American: (31.9)</p> <p>Vietnamese: (25.4)</p> <p>Other Asian: (9.4)</p> <p>Hispanic: (17.4)</p> <p>Other: (3.6)</p> <p>Low Intensity</p> <p>Non-Hispanic White: (21.3)</p> <p>Non-Hispanic African American: (27.9)</p> <p>Vietnamese: (22.1)</p> <p>Other Asian: (5.2)</p> <p>Hispanic: (17.7)</p> <p>Other: (5.9)</p>	<p>Recruitment: Project staff recruited from the communities served by healthy homes project</p> <p>Intervention design: CHWs had characteristics that allowed them to bridge the gap between community members and health agencies and institutions; connection to and understanding of the community; shared ethnic, linguistic, and cultural background with project participants; and recognition as a person who can be respected and trusted. CHW ethnicities matched the ethnicities of participants as possible. CHWs communicated in the primary language of nearly all their clients.</p> <p>Community members were hired as field staff workers (eg, outreach coordinator was community advocate with asthma).</p> <p>Community partners contributed knowledge of local resources, cultural values and beliefs, and awareness of feasibility of intervention strategies.</p> <p>Community partners and parents contributed insights into how the project could increase its benefit to the community, respect community values, and avoid doing harm. They described the sensitivity of entering people's homes to evaluate conditions and behaviors related to asthma triggers. They noted many people of color (especially immigrants) mistrust government, and this could lead to difficulty in recruitment. They raised questions about the</p>

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Krieger, 2005 (continued)				<p>length, cultural appropriateness, and validity of questionnaires. They challenged the concept of a control group's not receiving benefit and the random assignment of participants to study arms. They found some intervention protocols too complex or unacceptable.</p> <p>Training of study staff: All staff participated in 6 hours of cultural competency training, which emphasized effective communication with diverse clients.</p> <p>Translation: Educational materials were available in Spanish, Vietnamese, and English.</p> <p>Dissemination: Sent all participants a summary of project results, discussed them with the Parent Advisory Group, and hosted a project-end gathering for all participants to discuss findings.</p> <p>Discussed results with project partners, collaborative group of community agencies, community activists, public health professionals, academics, and health providers, and local asthma coalition.</p> <p>Sustainability: Easier to sustain participation from community agencies than from community members. Constraints limited ability of the group to review all relevant aspects of the project.</p>

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Krieger, 2009 ¹¹⁶ RCT (Medium) N = 309	CHW-delivered education and asthma mitigation support/home-based care Children with persistent asthma and their caregivers enrolled in Medicaid and living in King County (Washington) CHWs	Housing stability and quality Health care services access and quality	No single group was a majority Enrolled in study: White: (11.3) African American: (20.1) Vietnamese: (11.0) Other Asian: (5.8) Hispanic: (47.9) Other: (3.9) Completed study: White: (10.3) African American: (20.3) Vietnamese: (10.7) Other Asian: (5.5) Hispanic: (49.8) Other: (3.3)	Intervention design: Followed community- based participatory research principles. A steering committee of community residents with asthma and community-based organizations identified the study question, approved the study design, gave advice on implementation, and commented on the findings. CHWs shared ethnic backgrounds with participants and had personal or family experience with asthma.
Krieger, 2015 ¹²⁴ RCT (Medium) N = 366	CHW-delivered education and asthma mitigation support /telephone-, home-, web-based care Adults with low household income and poorly controlled asthma living in King County (Washington) Health care providers, CHWs	Housing stability and quality Financial strain assistance Education access and quality Social isolation assistance Legal services assistance Health care services access and quality Additional unspecified domains	No single group was a majority Intervention White: (26.0) Black: (16.9) Hispanic: (48.6) Other: (8.5) Control White: (31.2) Black: (16.4) Hispanic: (45.0) Other: (7.4)	Recruitment: CHWs were full-time employees recruited from the communities that the project served and had high school or equivalent degrees. CHWs were native Spanish speakers with strong connections to the community and personal experience with asthma. Intervention design: CHWs used motivational interviewing methods to work with participants to develop a tailored asthma management plan. CHWs provided as-needed support via telephone, email, or additional home visits. Training of study staff: CHWs received 80 hours of classroom training followed by biweekly training sessions.

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Lapham, 1995 ¹³⁰ Comparative effectiveness (Not rated) N = 469	Case management and substance use counseling and peer-supervised housing OR peer-supervised housing and peer-resident support OR apartment or hotel housing only OR service referrals, bus fare, and payment for biweekly check- ins/ transitional housing, other Homeless adults who abuse alcohol Other nonprofessionals ^a	Housing stability and quality Health care services access and quality	No single group was a majority Overall Non-Hispanic White: (41) Hispanic White (Hispanic): (31) Native American: (18) Other race groups: (10)	Intervention design: Majority of project recovery aides are in recovery themselves and represent a diversity of ethnic/cultural backgrounds including Native American, Hispanic, non-Hispanic White, and Afro- American. Project residence managers are recovering alcoholics/addicts. Program and research emphasis is on structuring the program to meet the needs of all members of the population, including Hispanic people and Native American people. Training of study staff: Staff development activities ranged from participation in a Navajo healing ceremony to technical assistance and staff training by an expert in social model programs.
Lyles, 2021 ¹⁸⁸ Single arm ^b (Not rated) N = 179 (analyzed, 618 participants)	Peer mentor coaching/ telephone based People with poorly controlled HbA1c or unknown control status Other nonprofessionals ^a	Housing stability and quality Transportation assistance Health care services access and quality Additional unspecified domains addressed	Majority Black/non-Hispanic Black Black: 318 (51) Hispanic/Latinx: 145 (23) White: 35 (6) Asian: 5 (1) Other: 45 (7) Missing/unknown: 70 (11)	Recruitment: Recruited patients, who are successfully managing their chronic conditions, trained them to provide education and support to others and then matched them with similar patients who are not in clinical control. Intervention design: Clinical partners (eg, health plans, health systems) securely share data on patients with poorly controlled diabetes. InquisitHealth then initiates a multichannel outreach campaign (via interactive voice response, mail, letter) to each patient, leading to: 1) a phone conversation to enroll patients (in English or Spanish), 2) matching patients with a

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Lyles, 2021 ¹⁸⁸ (continued)				mentor based on multiple shared attributes (eg, race/ethnicity, language, clinical profile [eg, use of insulin], common life experiences), and 3) a detailed health assessment of each patient. Translation: Enrollment and coaching conversations conducted in English or Spanish.
Morales, 2016 ⁵⁹ Cohort with comparison (Medium) N = 145	Connection to food security resources/primary care People receiving obstetrical care at a community health center NR	Food security	Majority Hispanic/Latino Referred to Food for Families Non-Hispanic White: (4.83) Non-Hispanic Black: (6.90) Hispanic: (84.83) Asian/other/multiracial: (3.45) Not referred to Food for Families Non-Hispanic White: (30.35) Non-Hispanic Black: (8.0) Hispanic: (55.48) Asian/other/multiracial: (6.17)	Intervention design: Provided assistance with obtaining food resources tailored to participants' specific situation, considering patient preferences, cultural appropriateness, where patients lived, and program eligibility
Nyamathi, 2001 ¹³¹ RCT (Low) N = 432	Peer mentor- or nurse-led education and referral to resources/NR Women experiencing homelessness and their intimate partners Health care providers, Other nonprofessionals ^a	Health care services access and quality Additional unspecified domains addressed	Majority Black/non-Hispanic Black Nurse case-managed: Women African American: (65.8) Hispanic/Latino: (21.9) AngloAmerican: (11.4) Other: (0.9) Nurse case-managed: Partners African American: (69.8) Hispanic/Latino: (21.7)	Intervention design: Culturally and linguistically appropriate materials were distributed by nurse case managers to participants in the case management arm. Women and their intimate partners assigned to the peer-mentored program received the same intervention as those in the nurse case-managed program, except that the role of the nurse was assumed by female peer mentors whose ethnicity matched that of participants and who had led lifestyles similar to their clients,

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Nyamathi, 2001 (continued)			<p>AngloAmerican: (8.5) Other: 0</p> <p>Peer-mentored women: African American: (41.4) Hispanic/Latino: (46.5) AngloAmerican: (10.1) Other: (2.0)</p> <p>Peer-mentored partners: African American: (47.0) Hispanic/Latino: (46.0) AngloAmerican: (7.0) Other: 0</p> <p>Standard care, women: African American: (80.2) Hispanic/Latino: (10.8) AngloAmerican: (7.2) Other: (1.8)</p> <p>Standard care, partners: African American: (82.2) Hispanic/Latino: (13.9) AngloAmerican: (3.0) Other: (1.0)</p>	<p>experiencing such things as homelessness and/or drug and alcohol addiction.</p> <p>Training: Peer mentors were trained extensively by the research team to administer the peer-mentored program and questionnaires, as well as to facilitate referrals to health and social services.</p> <p>Translation: All instruments were translated into the Spanish language by a bilingual researcher of Hispanic ethnicity.</p>
Szilagyi, 2002 ¹⁹⁴ Single arm ^b (Not rated) N = 10 066	<p>Lay outreach worker immunization tracking and promotion/primary care</p> <p>Children aged 0-2 living in Monroe County (New York)</p> <p>Other nonprofessionals^a</p>	<p>Transportation assistance</p> <p>Health care services access and quality</p>	<p>Varied by region addressed</p> <p>Inner city, % Black (non-Hispanic): 58 Hispanic: 21 White (non-Hispanic): 15 Asian and others: 6</p> <p>Rest of city, %</p>	<p>Recruitment: Outreach workers were recruited from the neighborhoods in which the practices were located.</p>

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Szilagyi, 2002 (continued)			Black (non-Hispanic): 37 Hispanic: 15 White (non-Hispanic): 38 Asian and others: 10 Suburbs, % Black (non-Hispanic): 7 Hispanic: 3 White (non-Hispanic): 84 Asian and others: 6 County, % Black (non-Hispanic): 28 Hispanic: 10 White (non-Hispanic): 55 Asian and others: 7	
Towfighi, 2021 ¹⁹⁰ RCT (High) N = 487	CHW-provided education and advanced practice clinician clinic visits and blood pressure monitors/primary care, telephone-based, home-based care Adults (≥40 years) experiencing recent TIA, stroke, of ICH and high blood pressure Health care providers, CHWs	Transportation assistance Health care services access and quality Social isolation assistance	Majority White/non-Hispanic White Overall White: 335 (70.4) Black: 87 (18.3) Asian: 30 (6.3) ≥1 Race: 10 (2.1) Native American or Alaskan Native: 9 (1.9) Native Hawaiian or other Pacific Islander: 5 (1.1) Hispanic ethnicity: 347 (71.3)	Recruitment: Partnered with 3 community-based organizations to recruit CHWs; selected bilingual (English and Spanish) individuals to complete a 36-hour training workshop Intervention design: A community advisory board offered input throughout intervention development and implementation. Goal tools were developed using input and feedback from approximately 10 individuals including stroke survivors, community advocates, and members of community-based organizations. Further input on the design, content, language, practicality, cultural sensitivity, and usefulness of the goal cards was obtained from 15 stroke survivors.

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Towfighi, 2021 (continued)				<p>Included community representatives and stroke survivors in the development of the intervention and employed CHWs from the communities served to culturally tailor the intervention and address potential barriers, understand participants' needs, and provide patient-centered care</p> <p>Assessed appropriateness of outcome measures for patient population, including considerations such as literacy and cultural appropriateness; used the National Institutes of Neurological Disorders and Stroke Common Data Elements if they were available and appropriate. If survey instruments were not Common Data Elements, tested them with a pilot group of volunteer participants who fit the study's eligibility criteria. This group provided feedback on the clarity of the outcome measures and surveys.</p> <p>Training of study staff: CHWs received 9 days of training to lead workshops. Conducted separate training of English and Spanish speakers to address cultural differences. Each participant received a companion book in English or Spanish and a relaxation CD in their preferred language.</p> <p>Translation: Intervention was delivered in participants' preferred language (English or Spanish). All CHWs were bilingual in English and Spanish.</p>

Author, year Study design (quality) Total N participants	Intervention/ intervention setting Population description Intervention provider	Social need(s) addressed	Race/ethnicity, n (%)	Tailoring or adaptation description by domain ^a
Towfighi, 2021 (continued)				<p>CHWs provide participants with appropriate literacy-level, culturally adapted educational materials (for Hispanic, African American, Chinese, and Korean racial/ethnic groups) that were developed in conjunction with community-academic teams.</p> <p>All consent materials were translated into Spanish by an American Translators Association-certified translator. Consent forms were translated into Korean and Chinese.</p>

Abbreviations: CHW, community health worker; ED, emergency department; ICH, intracerebral hemorrhage; NR, not reported; TIA, transient ischemic attack.

^a Domains used to facilitate data extraction included recruitment of study staff or participants, intervention design, methods for training study staff, translation of study materials, dissemination of study findings, sustainability of study partnerships, other.

^b We did not rate the quality of single-arm studies or comparative effectiveness studies.

Table E-5. Studies Including Single Race or Ethnicity Populations

Author, year Study design (quality) Total N	Race or ethnicity ^a	Information supporting rationale for population selection	Social need(s) addressed by the Intervention	Outcomes reported	Tailoring elements reported
Nguyen, 2016 ²¹⁵ Single arm (Not rated) N = 18	Hispanic	Hispanic people are disproportionately affected by diabetes. Lower socioeconomic status is associated with poorer self-management, and Hispanic people are less likely than White people to engage in some self-management behaviors; ability to maintain self-management behaviors and engage in lifestyle changes may be constrained by social environment and access to resources. Study goal was to test a primary care-based intervention designed to help older Hispanic patients with diabetes identify and access community resources for help with daily needs.	Food security assistance Housing stability and quality Transportation assistance Employment assistance Health care services access and quality Additional unspecified domains addressed Screening for social needs and assistance with connection to local resources	No effect on self-management or self-efficacy	NR—notes using translated survey instruments
Turyk, 2013 ²¹⁷ Single arm (Not rated) N = 218	African American	Higher rates of asthma exist among African American and low-income populations. Project used a community focus in an area of high asthma prevalence (Englewood, Chicago, IL) and economic disadvantage. Geographic setting for study included 98% African American population; community struggles with issues of poverty, high crime rates, high prevalence of pediatric asthma,	Housing stability and quality Early childhood education and development access and quality Health care services access and quality Additional unspecified domains addressed Community health educator-delivered asthma education, home assessment and reduction in asthma triggers and environmental remediation	Hospitalizations, ED, urgent care visits decreased (intended direction = decrease). Missed school (child) and work days (caregiver) decreased. Uncontrolled asthma decreased.	Field staffing consisted of individuals from or with close ties to the community. Strengths of the program included the integration of the program in the community, administration of the program by CHWs with strong ties to the community, extensive initial and ongoing training of field staff, the experience and stability of the project staff

Author, year Study design (quality) Total N	Race or ethnicity ^a	Information supporting rationale for population selection	Social need(s) addressed by the Intervention	Outcomes reported	Tailoring elements reported
Turyk, 2013 (continued)		and poor access to quality health care.			and evaluation team, and the intervention program tailored to community demographics and needs.
Talavera, 2012 ²¹⁶ RCT (Medium) N = 456	Latino	<p>Latino people are disproportionately at risk for diabetes and have poor medication adherence and control, as well as higher complications risks.</p> <p>Adequate disease management is hampered in Latinx people by a lack of access to quality, culturally appropriate care that accommodates the significant influence of social determinants of health.</p> <p>Study focused on a patient-centered, team-based care approach that adheres to the chronic care model to meet medical, social, and psychological needs of Latino people with diabetes.</p>	<p>Food security assistance</p> <p>Housing stability and quality</p> <p>Health care services access and quality</p> <p>Additional unspecified domains addressed</p> <p>Integrated medical and behavioral health care, action planning, care coordination, CHW-led culturally appropriate health education</p>	<p>Greater improvement in HbA1c in intervention group vs usual care</p> <p>No effect on lipids or blood pressure</p>	<p>Education by bilingual educators; education provided included “healthy eating (2 classes; with special emphasis on the traditional Latino diet).</p> <p>Cultural tailoring included discussion of activities, foods, and food preparation common in the Latino community.</p> <p>Emphasis was on involving family in self-management and lifestyle activities, attention to strategies appropriate to a lower resourced community, and discussion of common culturally driven beliefs, attitudes, and values that might either promote or interfere with effective self-management, including assessment of psychosocial factors (stress, relationships), environmental factors (family, community), barriers and facilitators, and cultural factors.</p>

Author, year Study design (quality) Total N	Race or ethnicity ^a	Information supporting rationale for population selection	Social need(s) addressed by the Intervention	Outcomes reported	Tailoring elements reported
Jones, 2020 ²¹⁹ Single arm (Not rated) N = 212	American Indian (Navajo)	Overweight and obesity are major health concerns among American Indian populations; childhood obesity is linked to increased risk for later life disease. Food insecurity is driver of health disparities in many American Indian populations. Intervention addressed health behavior and strengthening food systems.	Food security assistance Lay health educator–led health coaching, provider-prescribed vouchers (maximum \$5/day) for produce/healthy foods redeemable at local retailers.	Increase in fruit and vegetable consumption Decrease in food insecurity No effect on overall BMI, physical activity, sleep	Original home-based intervention (Healthy Habits, Happy Homes) was adapted to the Navajo context based on feedback from trainers and families, to (1) involve children in sessions and goal setting and (2) include Diné foods and language (eg, Diné children’s books as incentives, memory game with Diné words for fruits and vegetables, cooking demonstrations and recipe cards using traditional foods).
Hassaballa, 2021 ²¹⁸ Single arm (Not rated) N = 200	African American	Prevalence of diabetes is higher among racial and ethnic minorities. Diabetes complications are higher among African American people. Target neighborhoods were selected based on high diabetes prevalence, lack of available resources, and existence of a neighborhood-based organization that was willing to partner; these neighborhoods, located in central Durham, NC, were historically Black and low income.	Food security assistance Housing stability and quality Health care services access and quality Additional unspecified domains addressed Self-management education, access to clinical care and social supports and resources (housing, food pantry, etc), CHW home visits	Decrease in ED visits and hospital admissions (intended direction = decrease)	7 measures of social risk mapped per individual: (1) social support; (2) neighborhood deprivation; (3) racial residential segregation; (4) food resources; (5) neighborhood stability; (6) health literacy; and (7) green space. After completing a risk algorithm, program participants were distributed into low-, moderate-, or high-risk groups. A culturally and contextually appropriate community approach is instrumental in engaging participants and increasing program satisfaction.

Author, year Study design (quality) Total N	Race or ethnicity ^a	Information supporting rationale for population selection	Social need(s) addressed by the Intervention	Outcomes reported	Tailoring elements reported
Hassaballa, 2021 (continued)					<p>Team members who implemented the workshops and trainings were from the local county and ethnically matched the target population.</p> <p>Intervention activities incorporated culturally sensitive and contextually relevant workshops for the target population (eg, educational pamphlet images included African American people, behavior change intervention teams referred to local foods and cultural norms).</p>

Abbreviations: CHW, community health worker; ED, emergency department; N, number; NR, not reported; OR, odds ratio; RCT, randomized controlled trial.

^a Race or ethnicity as designated in the study.

Key Findings from Social Needs Interventions Addressing a Single Racial or Ethnic Group

- Five studies addressed a single race or ethnic group: 2 addressed Hispanic/Latino populations,^{215, 216} 2 addressed African American populations,^{217, 218} and 1 addressed a Navajo population.²¹⁹
- Four studies were pre-post (single arm) studies^{215, 217-219} and 1 was an RCT.²¹⁶
- Health conditions addressed included diabetes (3 studies^{215, 216, 218}), asthma (1 study²¹⁷), and overweight/obesity (1 study²¹⁹).
- Studies typically did not explicitly state a rationale for addressing a single race but referenced higher rates of chronic disease (asthma, diabetes) in the targeted population, worse outcomes compared with those of White populations, and inequities in care/access to care. One study reported that target neighborhoods for interventions were selected based on “high diabetes prevalence, lack of available resources, and [existence of] a neighborhood-based organization that was willing to partner. These neighborhoods, located in central Durham, were historically Black and low income.”^{218(p 28)}
- Studies generally reported using materials tailored for the target population (eg, culturally appropriate educational brochures, culturally appropriate foods), CHWs or educators aligned to community characteristics, and translated materials.
- Studies addressed multiple social needs including food security assistance, housing stability and quality, and health care access and quality.
- Intervention components included referral to local services and resources including food, health education, and use of CHWs or community/layperson health educators.

Outcomes assessed included health care utilization, self-management, vegetable consumption, and missed school; 1 study measured clinical outcomes (HbA1c, blood pressure, cholesterol).²¹⁶ Utilization (ED use, hospitalizations) improved (decreased) in studies measuring these outcomes.^{217, 218} HbA1c improved but other health outcomes did not,²¹⁶ and self-management also did not improve²¹⁵ in studies measuring these outcomes. Vegetable consumption improved in 1 study evaluating it, but body mass index (overall participants) did not.²¹⁹