Technical Brief

Screening and Interventions for Social Risk Factors: A Technical Brief to Support the U.S. Preventive Services Task Force

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In designing the study questions, the EPC consulted a panel of Key Informants who represent subject experts and end-users of research. Key Informant input can inform key issues related to the topic of the Technical Brief. Key Informants are not involved in the analysis of the evidence or the writing of the Technical Brief. Therefore, in the end, study questions, design, methodological approaches, and/or conclusions do not necessarily represent the views of individual Key Informants.

Key Informants must disclose any financial conflicts of interest greater than $10,000 and any other relevant business or professional conflicts of interest. Because of their role as end-users, individuals with potential conflicts may be retained. The Task Order Officer and the EPC work to balance, manage, or mitigate any conflicts of interest.

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Structured Abstract

Background: Identifying and addressing patients' social conditions is becoming a focus of many national efforts to reduce health inequities and improve overall health and well-being. Evidence-based guidance is limited on how clinicians should screen for social risk factors and elicit patient priorities about social needs. Evidence is also limited on which social interventions improve health outcomes for patients facing social adversity.

Purpose: This Technical Brief aims to identify research related to screening and intervention for social risk factors and to outline important gaps in the research. It also presents an overview of contextual factors and challenges of implementing social risk screening and interventions in healthcare. The landscape of research provided in this Technical Brief will inform considerations of the implications for the U.S. Preventive Services Task Force (USPSTF) portfolio of recommendations for preventive services in primary care. In keeping with the USPSTF scope, this Technical Brief focuses on population-based screening in primary care to detect unrecognized social risk factors and interventions to address them, which is different than helping patients with their perceived social needs.

Methods: This Technical Brief integrates a systematic search of published literature, hand searches of gray literature, and discussions with Key Informants to inform eight Guiding Questions (GQs): GQ1, valid tools for detecting social risk; GQ2, the effects of social risk-related interventions; GQ3, how improvements in process (e.g., patients screened, identified unmet needs, referrals/resources provided), healthcare utilization (e.g., emergency department visits, inpatient admissions), and social risk (e.g., receipt of public or other benefits, reduction of unmet needs) outcomes affect physiologic and behavioral health outcomes; GQ4, perceived or potential challenges with implementation of social risk factor screening and intervention within healthcare and their potential solutions; GQ5, challenges or unintended consequences and acceptability of screening and interventions for social risk factors to patients and clinicians; GQ6, ways in which the USPSTF has addressed social risk in its recommendations; GQ7, guidance from other professional organizations; and GQ8, research gaps. We included individual-level and healthcare system–level interventions addressing seven social risk domains: housing instability, food insecurity, transportation difficulties, utility needs, interpersonal safety, education, and financial strain. The evidence for each GQ was synthesized in a narrative format, with supporting summary tables appropriate to the identified evidence.

Findings: Many multidomain social risk screening tools are available but vary widely, and few are validated. Food security, housing, and transportation were identified by Key Informants as the most important social needs to identify in healthcare. We identified 106 social risk intervention studies, 69 percent of which targeted multiple social risk domains. The most frequently addressed domains were food insecurity, followed by housing instability, financial strain, and transportation needs. The majority of studies were conducted in primary care. Thirty-eight studies (36%) used an observational design with no comparator, and 19 studies (18%) were randomized, controlled trials. Healthcare utilization measures were the most commonly reported outcomes in the 68 studies with a comparator. Many perceived or potential barriers to the implementation of social risk screening or intervention programs in healthcare were identified, such as stigma and privacy concerns, lack of referral resources, and logistical barriers (e.g.,

transportation issues) that make it difficult for patients to follow through with referrals. However, few actual unintended consequences were encountered during implementation of social risk screening and intervention in included studies that reported these outcomes. Social risk factors—primarily socioeconomic status, race and ethnicity, and substance use—are mentioned in two-thirds of USPSTF recommendation statements in the context of disparities or inequalities, research gaps, risk assessment, or differences in condition prevalence. Most other professional organizations provide only limited information on social risk–related activities on their websites, although six explicitly promote clinician engagement in social risk screening and referrals. Evaluation of the body of evidence identified from our published literature searches shows areas where evidence is lacking, including the actual challenges encountered during implementation of social risk screening and intervention in healthcare settings and ways these challenges have been addressed successfully; use of social risk data to alter clinical care of patients to accommodate identified social barriers; and the effectiveness of social risk interventions in improving health outcomes in the general population.

Conclusions: There are many multidomain social risk screening tools available, but few included validity testing. Key Informants suggested that food security, housing, and transportation are the most important social needs to identify in healthcare, and these are three of the most frequently addressed domains in included studies. The majority of studies address multiple social risk domains, and most outcomes reported show positive intervention effects. Social risk factors—primarily socioeconomic status, race and ethnicity, and substance use—are mentioned in two-thirds of USPSTF recommendation statements, and six other professional medical organizations explicitly promote clinician engagement in social risk screening and referrals.

Definitions and Target Social Risk Domains

Social determinants of health: The underlying, communitywide "social and economic conditions in which people live, rather than the immediate needs of any one individual"[1]

Social risk factors: The measurable and intervenable individual-level social and economic conditions that are shaped by broader social and structural determinants of health

Social needs: Social risk factors that a patient prioritizes as important to address[2]

Target social risk domains for this Technical Brief:

- Housing instability
- Food insecurity
- Transportation difficulties
- Utility needs
- Interpersonal safety (excluding aspects already addressed by U.S. Preventive Services Task Force recommendations*)
- Education
- Financial strain

Nontarget social risk domains for this Technical Brief: All social risk domains not listed above as target domains (e.g., employment, healthcare and medication access/affordability)

*Intimate partner violence, elder abuse, and child maltreatment

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Chapter 1. Background

Significance and Purpose

The relationship between social conditions and health outcomes is well established, although available data do not support conclusions about whether this relationship is causal or correlational. For example, there is a strong, graded, and consistent association between income and health. Low socioeconomic status is related to mortality from each of the broad categories of chronic diseases, communicable diseases, and injuries as well as mortality from each of the 14 major causes of death in the International Classification of Diseases. Socioeconomic status is also associated with a number of risk and protective factors for disease and other causes of death, including smoking, sedentary behavior, overweight, stressful life conditions, social isolation, and receipt of preventive healthcare.[3] For example, a 2014 systematic review of the impact of social conditions on outcomes for patients with type 2 diabetes found that some social determinants have an impact on glycemic control, lipid levels, and blood pressure, and they mediate or moderate other variables, such as self-care, access to care, and processes of care.[4]

Social conditions and the structural forces that shape them underlie preventable disparities in many health and disease outcomes and affect a substantial segment of the U.S. population. In 2018, there were an estimated 38.1 million people in poverty in the United States, including 11.9 million people younger than age 18 years. The poverty rate was highest for children younger than age 18 years at 16.2 percent, compared with 10.7 percent for people ages 18 to 64 years and 9.7 percent for people age 65 years and older.[5] An estimated 1.42 million people experienced sheltered homelessness at some point in 2016, one-third of whom were families with children.[6] In 2018, 8.5 percent of people in the United States were uninsured for the entire year,[7] and the Bureau of Labor Statistics reports an unemployment rate of 3.5 percent in the United States in December 2019.[8]

Identifying and addressing patients' social conditions is becoming a focus of many national efforts to reduce health inequities and improve overall health and well-being. In 2014, the Institute of Medicine recommended a set of 11 core social and behavioral domains and measures for inclusion in electronic health records, but the recommendations do not reference related interventions when risks are identified.[9] Many professional organizations, including the American College of Physicians, American Academy of Pediatrics, and American Academy of Family Physicians, also have recently issued statements, position papers, and guidelines promoting the importance of addressing social conditions to reduce health inequities and improve outcomes.[10-12] However, evidence-based guidance is limited on *how* clinicians should screen for select social risk factors and elicit patient priorities about social needs. Evidence is also limited on *which* social interventions improve health outcomes for patients facing social adversity.

In keeping with its focus on recommendations for primary care providers about preventive services for asymptomatic people, the U.S. Preventive Services Task Force (USPSTF) is interested in understanding the effectiveness of population-based screening in primary care to detect unrecognized social risk factors and interventions to address them. This is a

different focus than helping patients with known or suspected social risks, where addressing social risks is part of patient care management. The USPSTF considers services that are provided in or referable from primary care. While screening for social risk factors can be done in primary care clinical settings, most interventions to address social risks take place outside the clinical setting in public health, social service, and community-based organizations. Therefore, addressing social risks in primary care usually involves referral to community or public resources, which requires effective partnerships with these resources.

This Technical Brief aims to identify completed and in-process research related to screening and intervention for social risk factors and to outline important gaps in the research. It also presents an overview of contextual factors and challenges of implementing social risk screening and interventions in healthcare, as well as the ways in which the USPSTF and other professional organizations have addressed social risk in their recommendations. The landscape of research provided in this Technical Brief will inform considerations of the implications for the USPSTF portfolio of recommendations, such as the type of evidence the USPSTF would need to make a recommendation related to social risk screening and the methods required to evaluate the evidence in support of an evidence-based recommendation.

Given the amount of information addressed by this Technical Brief, many of the details are found in the appendixes.

Definitions

Because of the strong relationships between social and economic circumstances and health, social conditions are often referred to as "social determinants of health." The World Health Organization defines social determinants of health (SDH) as "the conditions in which people are born, grow up, live, work and age. These conditions influence a person's opportunity to be healthy, his/her risk of illness and life expectancy. Social inequities in health—the unfair and avoidable differences in health status across groups in society—are those that result from the uneven distribution of social determinants."[13] Healthy People 2020 defines SDH similarly, as "conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks."[14]

Health and healthcare stakeholders conceptualize, categorize, and define SDH in many ways. For example, Healthy People 2020 highlights five primary SDH domains: economic stability, education, social and community context, health and healthcare, and neighborhood and built environment. Each of these broad domains has several subcategories; as an example, economic stability is shaped by poverty, and key indicators of poverty can include employment status, food insecurity, and housing instability.[14] These individual-level indicators of poverty are sometimes referred to as social risk factors.

Consensus on the precise distinctions between social determinants and social risk factors is not yet firmly established.[1,2,15] For the purposes of this Technical Brief, we refer to **social determinants of health** as the underlying, communitywide "social and economic conditions in which people live, rather than the immediate needs of any one individual."[1] We define **social risk factors** as the measurable and intervenable individual-level social and economic conditions

that are shaped by broader social and structural determinants of health. Social risk factors are increasingly incorporated into screening tools used in healthcare settings. Social risk factors captured on these screening tools, however, are not always reflective of patient priorities or perceived needs. We also use the term "**social needs**" to refer to social risk factors that a patient prioritizes as important to address.[2]

Approaches to screening for social risk factors—and to eliciting patient perceptions of social needs—differ among healthcare settings and target populations. As one example, in 2017, the Centers for Medicare & Medicaid Services (CMS) developed a screening tool for use in clinical settings that focuses on a select number of social risk factors included under the broad social determinants domains. The tool includes five core patient social risk factors that CMS considered most actionable in healthcare settings: housing instability, food insecurity, transportation difficulties, utility needs, and interpersonal safety. It also includes supplemental domains related to financial strain, employment, family and community support, education, physical activity, substance use, mental health, and disabilities.[16] Other healthcare sector groups have proposed similar patient-level social risk screening tools that reflect different social risk domains. **Box 1** provides a comprehensive list of domains and subdomains included in common social risk screening tools, many of which are summarized by the Social Interventions Research and Evaluation Network (SIREN) and available at https://sirenetwork.ucsf.edu/tools-resources/mmi/screening-tools-comparison/adult-nonspecific.[17]

Notably, race and ethnicity is included in some social risk screening tools currently in use in many clinical settings. The use of race and ethnicity as predictors of social risks can be problematic because of the potential to reinforce stereotypes and bias, as well as overrepresentation of racial and ethnic minorities in prediction models. In addition, the relationship between race and ethnicity and health is often confounded with factors like poverty, lower education, homelessness, and unemployment, and has important historical roots in slavery, discrimination, and racism. As a result, in the United States a disproportionate number of people living below the poverty threshold are Hispanic or Latino, Mexican American, or African American.[14] African American people experience homelessness more than other groups.[6] In 2018, Hispanic, African American, and Asian people had higher uninsured rates than non-Hispanic White people,[7] and unemployment rates were highest in American Indian, Alaska Native, and African American people compared with other groups.[18] African American and Hispanic people also have lower rates of educational attainment compared with Asian and non-Hispanic White populations.[19]

Current Clinical Practice

Processes for successfully integrating social risk screening and intervention into clinical practice have not been fully developed. Further, significant barriers remain to widespread adoption of social risk screening in clinical practice, such as time constraints and lack of provider training on and knowledge of available community and government resources to which patients can be referred.[20] Despite increased recognition of the importance of SDH generally, the prevalence of social risk screening in clinical settings remains low. In a 2017–2018 nationally representative survey, 33 percent of 2,190 physician practices and 8 percent of 739 hospitals reported no screening for any of the five core domains of the CMS Accountable Health Communities (AHC)

Model (food insecurity, housing instability, utility needs, transportation needs, and interpersonal violence). Only 16 percent of practices and 24 percent of hospitals reported screening for all five domains.[21] After an electronic health record–based social risk screening tool was activated in a national network of more than 100 community health centers, only 2 percent of patients with a visit over a 2-year period had a documented social risk screening, and more than half of these screenings included responses for only one social risk domain.[22]

Chapter 2. Methods

Guiding Questions

The Guiding Questions (GQs) below were used to guide data collection for this Technical Brief. Due to ethical considerations, we anticipated that no studies would provide direct evidence of the effects of screening for social risk factors on health outcomes (i.e., trials comparing screening with no screening, without intervention); therefore, our analytic framework represents an indirect pathway linking screening to health outcomes. We looked for literature addressing valid tools for detecting social risk (GQ 1); the effects of social risk–related interventions (GQ 2); and how improvements in process (e.g., patients screened, identified unmet needs, referrals/resources provided), healthcare utilization (e.g., emergency department visits, inpatient admissions), and social risk (e.g., receipt of public or other benefits, reduction of unmet needs) outcomes affect physiologic and behavioral health outcomes (GQ 3). For GQ 4, we provide the context for implementation of social risk factor screening and intervention within healthcare, including perceived or potential challenges faced and their potential solutions. For GQ 5, we address the challenges or unintended consequences and acceptability of screening and interventions for social risk factors reported in studies. GQs 1 to 5 are mapped onto a standard analytic framework for USPSTF screening topics (**Figure 1**). For GQs 6 and 7, we audited the ways in which the USPSTF (GQ6) and other professional organizations (GQ7) have addressed social risk in their recommendations. For GQ 8, we summarize the gaps in social risk screening and intervention research.

1. What are the available multidomain screening tools to identify social risk and what social risk domains do they identify? How valid are these tools? How does measurement of specific social risk domains vary by screening tool?
2. What social risk–related interventions have been evaluated? What are the characteristics of the studies that have evaluated these interventions and what outcomes do they report?
3. What are the effects of improvements in process outcomes, healthcare utilization outcomes, or social risk outcomes on physiologic and behavioral health outcomes?
4. What are the perceived or potential challenges to implementation of widespread screening and interventions for social risk factors within healthcare? What potential solutions have been proposed to address these challenges?
5. What are the challenges or unintended consequences of screening and interventions for social risk factors to patients and clinicians? What is the acceptability of screening for and intervening on social risk factors for patients and clinicians?
6. To what extent has the USPSTF already addressed social risk in its recommendations? How have health disparities and social risk been examined in USPSTF recommendation statements?
7. How have other professional organizations provided guidance or resources related to social risk factors? What methods from other organizations may be applicable for USPSTF considerations?
8. What are the key gaps in social risk research and implementation of screening and interventions for social risk factors?

This Technical Brief integrates discussions with Key Informants, searches of the gray literature, and searches of the published literature.

Discussions With Key Informants

Solicitation of stakeholder views through the Key Informant process was critical to ensure the relevance and utility of the Technical Brief to the USPSTF. We conducted 60-minute, semistructured telephone interviews with 17 Key Informants who contributed to an understanding of current clinical context and issues with implementation and apprised us of any published or in-process studies they were aware of. Key Informants were identified from the SIREN Research Advisory Committee; the National Academies of Sciences, Engineering, and Medicine (NASEM) Committee on Integrating Social Needs Care into the Delivery of Healthcare; and researchers currently conducting studies and actively publishing in the field. These experts represent primary care, policy, research, patient advocacy, social services, public health, Federal agency, and payer perspectives, and their work addresses many social risk domains, disadvantaged populations, and healthcare and community settings. Many clinicians who directly provide patient care and health system representatives were recruited to obtain multiple perspectives on practice variations, issues with implementation, and current clinical context.

We had two sets of interview questions—one focused on the evidence base (GQs 1, 2, 3, 5, and 8) used with researchers and one focused on implementation of social risk screening and interventions (GQ 4) used with implementation experts (**Appendix A**). We limited our standardized questions to no more than nine non-government–associated individuals per set of interview questions (four Key Informants are Federal employees). One team member served as the interviewer and one to three additional team members took notes on a standard guide created by the research team. All interviews were audio recorded with Key Informant consent. One team member listened to each audio recording and categorized segments of interviewee responses by one or more GQ. The team then integrated findings from Key Informant interviews with evidence from the published and gray literature.

Gray Literature Search

GQs 1 to 5 were partly informed by searches of the gray literature. We reviewed conference abstracts and proceedings and other preliminary, unpublished study findings and searched Clinicaltrials.gov and Health Services Research Projects in Progress (HSRProj) for in-process research. Our evaluation of contextual factors and implementation challenges included information from conference and committee proceedings, such as:

- The NASEM committee on *Integrating Social Needs Care Into the Delivery of Health Care to Improve the Nation's Health*.[23]
- A national conference focused on *Medical and Social Care Integration* hosted by SIREN, the Oregon Community Health Information Network, and Kaiser Permanente.
- SIREN Webinars on patient acceptability of social risk screening, the validity of social risk screening tools, and community resource referral platforms. SIREN is housed at the

Center for Health and Community at the University of California, San Francisco, and is supported by Kaiser Permanente and the Robert Wood Johnson Foundation. SIREN's mission is to improve health and health equity by advancing high-quality research on healthcare sector strategies to improve social conditions.

GQs 6 and 7, covering the ways in which the USPSTF (6) and other professional organizations (7) have addressed social risk in their recommendations, were answered by audits of relevant websites. GQ 6 involved an audit of all USPSTF recommendation statements for any discussion of social risk or health disparities, and GQ 7 required an audit of professional organizations' websites. In our audit of professional organizations' websites, we also looked for any identified gaps in social risk research to inform GQ 8.

Published Literature Search

GQs 1 to 5 involved searches of the published literature (**Appendix A**). Any published or in-process studies and articles suggested by Key Informants were evaluated and incorporated when relevant. We worked closely with a research librarian to develop our search strategy, which was peer reviewed by a second research librarian. Searches were limited to articles published in English. The Medical Subject Heading for SDH was not introduced until 2014, so prior published literature cannot be captured using that heading. Thus, search terms focusing on individual social risk domains and interventions were employed. Our search strategies were guided by those used in existing reviews on the topic, with necessary tailoring to fit the scope of this Technical Brief.[24,25] We did not conduct a separate search for available screening tools (GQ 1) because a 2019 review covers this question.[24] We searched the Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Ovid MEDLINE, Sociological Abstracts, and Social Services Abstracts from database inception to December 2018.

We supplemented searches by reviewing reference lists of recent reviews and primary studies, the evidence library on the SIREN website through May 2021, and the LitWatch Newsletter (a regular audit of information sources to locate newly published research, guidelines, or both relevant to USPSTF topics) through May 21, 2021. Literature search results were managed using DistillerSR systematic literature review software (Evidence Partners, Ottawa, Canada).

Inclusion and Exclusion Criteria

As shown in Box 1, the range of social risk domains is very broad and required narrowing to keep the Technical Brief feasible and relevant to the USPSTF scope and purpose. As such, searches for GQs 1 to 5 were limited to modifiable social risk domains for which there are primary care–referable interventions that are available to most patients. We aligned our included domains to those in the CMS AHC Model since it is a demonstration in 31 different sites across the United States, all domains in the model were required to be intervenable, and most communities have interventions in most of the social risk categories as defined by the model. Therefore, we included studies focusing on all the core domains of the CMS AHC Model (i.e., housing instability, food insecurity, transportation difficulties, utility needs, and interpersonal

safety) except for the aspects of interpersonal safety that are already addressed by USPSTF recommendations (i.e., intimate partner violence, elder abuse, and child maltreatment). We also included studies addressing education and financial strain—two of the supplemental domains included in the CMS AHC Model for which intervention may include adaptation of the care plan to accommodate needs.[26] **Throughout this Technical Brief, we refer to these seven social risk domains we are focusing on as our "target domains" and all other domains as "nontarget domains."**

The inclusion criteria shown in **Table 1** guided our published literature searches as well as abstract and article review for GQs 2 to 5. Studies of patients of all ages conducted in the general population were included. Studies targeting persons with a specific disease were excluded because these studies are typically focused on management of the particular condition and are not applicable to other patients. However, studies that recruited patients with one or more unspecified chronic illness were included. Interventions were included if they addressed at least one of the target social risk domains: housing instability, food insecurity, transportation difficulties, utility needs, aspects of interpersonal safety that are not already addressed by USPSTF recommendations, education, and financial strain. Interventions at the individual and healthcare system levels targeting a single or multiple social risk domains were included. Included studies had to have a link to the healthcare system. Randomized and nonrandomized controlled intervention studies; cohort, case-control, observational, and pre-post studies; and case series were included for GQs 2 and 3. For GQ 4, all study designs were included except case reports. For GQ 5, all study designs except case reports, editorials, and reviews were included. No studies were excluded based on outcomes reported.

Data Management and Presentation

One team member reviewed the title and abstracts of all articles identified for GQs 1 to 5. A second reviewer verified a subset of abstracts to ensure sufficient interrater reliability and clarity about inclusion criteria. Two reviewers then independently evaluated the full text of all potentially relevant articles. Differences in the abstract or full-text review were resolved by discussion. For studies meeting inclusion criteria, we designed data abstraction forms to gather pertinent information from each article, including participant, intervention, and study characteristics. One reviewer abstracted information into the forms, and a second member of the team reviewed data abstractions for completeness and accuracy.

Presentation of study findings is limited to descriptive text of the authors' results summary, with no evaluation of the results. Following the standard procedures for Technical Briefs, quality assessment (i.e., critical appraisal) of identified studies was not conducted. The evidence for each GQ has been synthesized in a narrative format, with supporting summary tables and figures appropriate to the identified evidence.

Expert Reviewers

Expert reviewers were invited to provide written comments on the draft Technical Brief. Reviewer comments on the preliminary draft of the Technical Brief were considered by the

Evidence-based Practice Center in preparation of the final draft of the Technical Brief.

Chapter 3. Findings

GQ1. What Are the Available Multidomain Screening Tools to Identify Social Risk and What Social Risk Domains Do They Identify? How Valid Are These Tools? How Does Measurement of Specific Social Risk Domains Vary by Screening Tool?

We did not conduct a separate search for available screening tools because we identified a 2019 review by Henrikson and colleagues that addressed this question.[24] This review includes randomized and nonrandomized study designs describing development or empirical use of screening tools assessing two or more social risk domains in U.S. populations published since 2000. It excludes tools assessing health behavior or behavioral health only.

Validity of Screening Tools

Henrikson and colleagues evaluated the degree to which gold standard methods were used to develop the screening tools, as well as the available psychometric and pragmatic evidence for the tools using the Psychometric and Pragmatic Evidence Rating Scale (PAPERS) criteria.[27] PAPERS includes nine psychometric properties (internal consistency, convergent validity, discriminant validity, known-groups validity, predictive validity, concurrent validity, structural validity, responsiveness, and norms) and five pragmatic properties (cost, accessibility of language, assessor burden [training], assessor burden [interpretation], and length).

For the 18 tools included in the Henrikson review that are intended for use in primary care settings and address at least one of the seven domains targeted in this Technical Brief, the number of items in the tools range from seven to 118, and administration time ranges from 5 to 25 minutes (see **Appendix B Table 1** for tool citations). Henrikson and colleagues found that few gold standard methods were used in measure development. The median was two of eight steps for gold standard measurement (range, 0 to 7). Only two screening tools provide a clear construct definition, but expert input was sought for measure development in 12 tools. Seven tools performed reliability and validity tests. In subsequent empirical use, nearly three-quarters of the tools had been modified from their original forms with the addition, deletion, or alteration of items in studies.

No tool reported discriminant validity, known-groups validity, structural validity, or responsiveness, and few tools reported on other psychometric properties. One of the three tools that reported predictive validity was rated as poor and two as minimal. Two of the three tools that reported on internal consistency were rated as adequate and one as excellent. Overall, the total psychometric scores for the tools on the PAPERS scale are low, ranging from -1 to 9 (mode of 2), out of a possible range of -9 to 36. Based on these ratings, Henrikson and colleagues concluded that there are currently no social risk screening tools with evidence that they can accurately identify social risk, detect changes in social risk, and measure intervention effects.

Experts have recently argued for methods to address unmet social needs beyond the use of validated social risk screening tools. As discussed below, two-thirds of the tools in the Henrikson review frame one or more questions in a manner to detect patient-identified social needs, but few tools assess patients' desire for an intervention to address identified social needs. Studies have found inconsistencies between patients screening positive on social risk screening tools and those who want help; therefore, a validated tool that measures social risk accurately, alone, may not effectively address patients' perceived needs, and offering referrals based on patient priorities, perceived needs, and desire for assistance may be a more successful strategy.[28]

Pragmatic properties of the tools are reported more frequently than psychometric properties, with the majority of tools reporting some pragmatic properties. Fourteen tools are available in the public domain and 14 were rated as "excellent" in terms of accessible language.

Domains Addressed in Screening Tools

Appendix B Table 1 presents the domains addressed in the 18 tools included in the Henrikson review that are intended for use in primary care settings and address at least one of the seven domains targeted in this Technical Brief. The most frequently included domains (in 10 or more tools) are food insecurity, intimate partner violence, housing instability, financial strain, education, and social isolation. Four of these are target domains included in this Technical Brief, while two are nontarget domains (intimate partner violence, social isolation). Three nontarget domains—incarceration history, migrant farm work, and veteran status—are only included in one tool (PRAPARE).

Variation in Assessment of Social Risk Domains

Appendix B Table 2 shows the variation in the ways the tools assess the seven social risk domains included in this Technical Brief. We could not identify a description of assessment methods for two tools. All items have yes/no responses or response options to choose from. The only open-ended questions are highest level of school completed in several tools and monthly housing costs in one tool. Twelve tools frame one or more questions in terms of concerns, worries, problems, troubles, or some combination thereof to detect patient-identified social needs. Only five tools (AHC Health-Related Social Needs Screening Tool, Social History Template, Health Leads Social Needs Screening Toolkit, WE CARE, and Your Current Life Situation) ask whether patients/families would like help with needs they have identified. Areas of variation in the assessment of specific domains include the following.

Food Insecurity

The frame of reference for questions about food insecurity ranges from the previous 3 to 12 months, current concerns, or both. Tools inquire whether patients/families have enough food, and three tools also ask about intake of fruits and vegetables or healthy food. Legal tools ask whether respondents are eligible or have previously been denied Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or Supplemental Nutrition Assistance Program (SNAP) benefits.

Housing Instability

Questions regarding housing address current housing status, housing quality, and concerns about future homelessness.

Transportation Needs

Nearly all tools that assess transportation needs do so in the context of people being able to attend medical appointments. Only one tool asks about car ownership.

Utility Needs

All tools addressing utility needs ask about electricity, gas, oil, and water, and three tools include phone access as a utility need. Some tools include utility needs as part of housing questions.

Interpersonal Violence

Tools inquiring about interpersonal violence refer to violence, safety, or both in daily life, from friends, or in the neighborhood.

Education

Several tools ask about continuing education needs (e.g., General Educational Development services), and others focus on education in the context of healthcare (e.g., reading hospital materials such as pharmacy instructions or medical pamphlets) or simply ask respondents to note their highest completed level of education.

Financial Strain

Tools addressing financial strain ask about ability to cover basic necessities (food, housing, medical care, and heat) or make ends meet. Several tools include items on income and work status.

Screening Tools Used in GQ2 Studies

The Henrikson and colleagues review identified and described available multidomain screening tools. Supplemental information about what screening tools are being used in studies comes from the evidence identified in our literature searches. Forty-eight of the 106 studies included for GQ2 had a screening component, with one or more screening tools used.[29-76] The most frequently used screening tool was the 2-item Hunger Vital Sign tool[77,78] (k = 15), followed by the U.S. Department of Agriculture Household Food Security measure[79] (k = 4), Health Leads[80] (k = 4), and WE CARE[30,56] (k = 2). The Homeless Screening Clinical Reminder,[53] the Children's HealthWatch survey,[81] iScreen,[82] Cutt's 3-item Housing Insecurity tool,[83] PRAPARE,[84] and the Legal Health Check-Up survey[85] were each used in one study. Some of these tools only address a single domain so are not included in the Henrikson review or **Appendix B Table 1**. Twenty-one studies used a study-developed screening tool, some of which were developed de novo while

others were modifications of existing tools, supporting the finding in the Henrikson review that the majority of tools were modified when used after development. [31,34,35,37,40,42-45,47,48,52,54,55,57-60,67,70,71]

Key Informant Feedback on Social Risk Screening Tools

Further information about the use of screening tools comes from our Key Informant interviews. We asked Key Informants the following questions about screening tools:

- Which screening tools have you had experience with? Why did you select that tool?
- How have you used the tool? What format or mode of delivery did you use (e.g., in-person interview, patient-completed on paper vs. electronically)? In what settings have you used it?
- What do you like or not like about the tool? Do you have a sense of how [other] clinicians have reacted to the screening instrument?
- What do you think are the most important social needs to identify in healthcare? Why?

Key Informants reported using a wide variety of social risk screening tools, including many of those listed in **Appendix B Table 1**—the CMS AHC tool,[86] Health Leads Social Needs Screening Toolkit,[80] Institute of Medicine domains,[87] PRAPARE,[88] and the tools used by SONNET investigators (i.e., Medicare Total Health Assessment and Your Current Life Situation surveys)[89]—and technologies or platforms through which these tools are administered, such as HelpSteps,[90] Healthify[91] and NowPow.[92] Some reported that their organization developed their own tool for screening. Key Informants reported selecting screening tools for a variety of reasons. Those criteria included tools that were clinically validated, had a limited time burden, would result in nationally comparative data, met organizational needs, and incorporated the most important patient needs.

> "We do customize a little bit for the community based on what we understand from focus groups and community needs assessments to be the key domains of social needs, and then we have a series of questions within each domain that follow a branching logic model.... We pulled from PRAPARE, in various domains we tried to pull from the best of what's out there and then we built a lot of additional steps beyond those based on people's initial responses to those questions."

Screening tools are used in person, electronically, or by telephone, and many have employed screening tools spanning multiple modalities for maximum flexibility and reach. Among the tools used, Key Informants liked electronic-based screening because of its ease of use and flexibility. However, they acknowledged that electronic or telephone-based screening limited opportunities for developing trust between patients and providers. While most Key Informants reported using screening tools in clinic or emergency department settings, some also noted that their organizations were considering future use in community-based settings, such as grocery stores or libraries.

Drawbacks to screening tools mentioned by Key Informants include patients' privacy concerns, the burdensome nature of the tool, production of results that are not actionable, and the idea that screening tools discourage a "whole-person" view of patients. Key Informants reported wide variation in how other clinicians had reacted to screening instruments, which depended greatly on the organizational environment and leadership. Some clinicians were hesitant to share their patients' private information or were skeptical about interventions that would result in a higher clinical burden (e.g., additional paperwork). Many clinicians were also surprised to find high levels of social risks with their patient populations. The acceptability of social risk screening to patients and providers is discussed further in our GQ5 findings below.

Thirteen Key Informants named specific social needs they consider the most important to identify in healthcare. The most frequently cited social needs were food security, housing, and transportation (**Figure 2**). Many noted that these social needs are important because they are the most actionable within the healthcare setting or the most critical to well-being. Key Informants also recognized that patients should define the social needs that are most important to them and that the most important issues differ by community:

> "As a doc, I need to know the context of my patient. If I'm going to prescribe a therapeutic regimen I need to know if they're going to have transportation or food access or other barriers. I'm going to accommodate my plan accordingly. So, the information is valuable in the clinical environment, but it's difficult to gain."

> "Those that are amenable to change are important to identify. It's hard to directly affect poverty, but food and housing insecurity and unemployment are amenable to intervention."

> "What's really tricky about trying to identify the top issues is that it changes so much from community to community. So, I think you want to be cautious about saying food insecurity and housing are the biggest issues. You know, food insecurity might be a bigger issue in [some areas] where there are no grocery stores available, but social isolation might be a bigger issue in rural communities where people might not have access to transportation.... Different people are having issues with different pieces."

GQ2. What Social Risk-Related Interventions Have Been Evaluated? What Are the Characteristics of the Studies That Have Evaluated These Interventions and What Outcomes Do They Report?

Our literature searches identified 106 studies[8,29-76,93-150] (reported in 117 articles) meeting inclusion criteria for GQ2 (**Appendix A Figure 1**). Excluded studies are listed in **Appendix H**. Participant, intervention, and study characteristics for included studies are presented in **Appendix C Tables 1, 2, and 3**. The tables are categorized by social risk domain targeted.

Participant Characteristics

Thirty studies had a pediatric focus and only enrolled children and adolescents younger than age 18 years (and their caregivers).[29,30,32-34,36-38,41,43,47,49-51,56,59,61,64,67-69,72,75,106,124,126,132,139,148,150] Sixty-seven studies enrolled only adults, including older adults (ages 18 years and older),[31,39,40,42,44-46,48,52-54,58,60,62,65,66,70,71,73,74,76,93-101,103,104,107-113,115-117,119-123,125,127-130,133-138,140-147,149,151] five enrolled children and adults,[35,55,57,114,131] three enrolled participants of all ages,[102,105,118] and one enrolled children/adolescents and older adults.[63]

Fifty-four studies recruited a general, nontargeted patient population;[29,32-36,38-41,43-47,49-52,55,56,60,61,63-69,72-76,93,94,96-98,101,103,110,116,121,123,134,137,138,141,142,146-148] all other studies targeted specific patient populations. Participants were most frequently selected based on specific social risk(s) (e.g., homeless, low income) (22 studies).[31,37,48,58,95,100,102,105,114,118-120,122,126-128,130,133,135,136,139,143] **Figure 3** shows the number of studies with targeted recruitment of patients who had particular demographic, medical, or social risk characteristics; age and specific social risk(s) are the most frequent.

Intervention Characteristics

Interventions in 94 studies targeted patients, caregivers, or both[29-38,41-44,46-49,51-55,57,59-76,95,97,99-115,117-143,145-150] and 12 studies targeted physicians or other clinicians.[39,40,45,50,56,58,93,94,96,98,116,144]

Figure 4 shows the percentage of studies targeting each of our included social risk domains (i.e., housing instability, food insecurity, transportation difficulties, utility assistance, interpersonal safety, education, and financial strain). The majority of studies (k = 73 [69%]) targeted multiple social risk domains (range, 2 to 14; mode, 8), including target and nontarget domains.[29-31,35,37,38,40-45,48,49,55-60,62,64,65,67,69-71,73,93,96,98-100,102,105,109,113-115,117,118,120,122,125-131,133,134,136,139-145,149,150] The majority of the studies targeting a single domain address food insecurity (23 studies), followed by financial strain (5 studies), and transportation needs (4 studies). One study each addressed housing instability, utility needs, and education. None of the studies addressed interpersonal violence alone.

To investigate whether social risk interventions that focus on children and their families differ from those targeting adults, a comparison of the social risk domains addressed in pediatric and adult studies was conducted and is presented in **Table 2**. Food insecurity and housing instability were the most frequently addressed domains in both pediatric and adult studies.

Many of the social risk domains addressed in studies with multiple domains are nontarget domains. These are listed in **Table 3** along with their frequency of inclusion.

Figure 5 shows the number of studies addressing each of the target social risk domains, whether alone or along with other domains. The most frequently addressed domains are food insecurity, housing instability, and financial strain.

Twenty-four studies evaluated interventions that focused on addressing one or more social risks but also included one or more other components related to medical management (**Table**

4).[42,48,70,104-107,109,110,113,114,117,118,122,123,125,128-130,134,136,143,145,149] In these studies, it is not possible to know whether outcomes are due to the effects of the social risk component(s) or these other elements. Case management or care coordination, health education, and in-home healthcare are the three most frequently included nonsocial need components.

Study Characteristics

Figure 6 shows the clinical settings for included studies, with the majority taking place in primary care (55%),[30,32-44,46-52,54-56,58-61,64,65,69,73,74,93-98,100,102,103,107,108,110-112,114,118,121,122,124,126,135,137,142,146,149] followed by multiple settings (14%),[29,72,75,76,105,113,120,125,132-134,139,141,145,150] emergency departments (9%),[31,57,68,71,101,109,116,117,128,148] inpatient hospitals (7%),[66,99 ,123,127,130,131,136,145] patients' homes (6%),[104,106,115,119,129,140] outpatient clinics (6%),[45,53,63,138,144,147] telephone or web-based care (2%), [62,70] urgent care (1%),[67] and transitional housing (1%).[143] Studies in the home setting include referral via telephone to community resources. Some studies that recruited participants in primary care and other clinical settings include in-home visits as part of the intervention.

Figure 7 shows that more than a third of studies (k = 38 [36%]) used an observational design with no comparator.[32,33,37,38,41,42,44,46,49-51,53,55,58,60,64-66,68-71,73,75,76,95,98,102,104,107,108,113,118,120,124,132,137,148] Many of these were descriptions of feasibility testing with small cohorts reporting outcomes such as the number of patients screened, the number with one or more social needs, and the number referred to a community resource. The most common study design with a comparator is pre-post (k = 34),[34,39,40,43,45,52,57,59,63,72,74,93,94,96,97,100,101,109,110,115,116,121,122,125,126,133,136,138,140,143,145-147,150] followed by randomized, controlled trials (RCTs) (k = 19),[29,30,35,47,56,67,99,103,106,114,117,123,127-129,134,139,141,144] and cohort studies (k = 15).[31,36,48,54,61,62,105,111,112,119,130,131,135,142,149] **Table 5** shows the number of studies addressing the social risk domains by study design.

Table 6 shows the six categories of outcomes reported in studies, including process, social risk, physiologic and behavioral health, healthcare utilization, cost, and provider outcomes, as well as the frequency that specific outcomes are reported in the 68 studies that include a comparator (i.e., RCTs, pre-post, and cohort studies). These outcome categories are adapted from those used by Gottlieb and colleagues in their 2017 systematic review.[25] Following their categorization, process outcomes include intervention or program activities (e.g., patients screened) or outcomes attributable to intervention activities (e.g., patient use of referrals), while social risk outcomes represent changes in social risks.

Healthcare utilization outcomes are the most commonly reported (k = 38),[31,35,36,48,57,62,97,99,101,105,106,109-112,114,119,122,123,125-131,133-136,138,139,142-145,147,149] especially emergency department visits and inpatient admissions, followed by physiologic and behavioral outcomes (k = 32) such as mental health status and changes in substance use.[29,31,35,36,48,52,54,59,61,67,72,97,99,100,103,105,106,109,114, 117,121,126-128,130,131,133,134,139-141,150] Some of the outcomes in the physiologic and behavioral health outcomes category (e.g., changes in substance use or dietary intake) do not fit the standard USPSTF definition of a health outcome. Twenty-seven studies[29-31,34,35,47,48,57,59,67,72,74,97,103,105,106,109,116,121,126,128,131,133,136,139,140,146] reported social risk outcomes (e.g., resolution of food insecurity), 21 studies[29-31,36,39,40,43,45,47,52,54,56,57,59,63,93,94,97,116,126,129,141] reported process outcomes (e.g., referrals or resources provided), 15 studies[97,105,106,109,110,115,119,125,126,128,133,135,136,143,145] reported cost

outcomes (e.g., return on investment), and six studies[40,57,93,94,96,144] reported clinician outcomes (e.g., confidence in social risks knowledge and screening). Six RCTs[29,30,47, 56,129,141] reported process outcomes, nine RCTs[29,30,35,47,67,103,106,128,139] reported social risk outcomes, 13 RCTs[29,35, 67,99,103,106,114,117,127,128,134,139,141] reported physiologic and behavioral health outcomes, 11 RCTs[35, 99,106,114,123,127-129,134,139,144] reported healthcare use outcomes, two RCTs[106,128] reported cost outcomes, and one RCT[144] reported clinician outcomes.

Healthcare utilization outcomes were reported in 30 of 67 studies (45%) but in only four of 30 pediatric studies (13%), while physiological and behavioral health outcomes were reported in a similar percentage of adult and pediatric studies (21/67 adult studies [31%] and 10/30 pediatric studies [33%]) (**Table 7**).

The study characteristics table (**Appendix C Table 3**) includes a summary of the results copied from the article. In order to provide some indication of effective intervention types, we also categorized the results by outcome category as positive, negative, no effect, or mixed results based on the study authors' results summary. Intervention effects that are in the study's intended or targeted direction are considered positive (e.g., reduced emergency department visits, increased patient use of referrals), and effects that are contrary to the intended direction are considered negative (e.g., increased substance use, increased number of unmet needs). **Figure 8** shows the effects by outcome category in the 68 studies that included a comparator (i.e., RCTs, pre-post, case-control, and cohort studies). Results categorized as "mixed" include those that report a combination of outcomes for that category that are positive and negative, positive and no effect, or negative and no effect. The majority of process, social risk, cost, and provider outcomes reported show positive intervention effects. The plurality of physiologic and behavioral health outcomes and healthcare utilization outcomes are positive, but more than a third of these outcomes show mixed effects. Only one study reported negative outcomes. This study found positive intervention effects on social risk and mental health outcomes but found more frequent primary care appointments in the intervention group, although the intervention was intended to reduce the number of appointments, and an increase in not knowing where to seek help in the intervention group.[97] **Appendix C Table 4** shows the effects by outcome category and domain for the studies including a comparator, but comparison is limited by the small number of studies.

Figure 9 shows the number of studies addressing each social risk domain and the type of outcomes reported in the 68 studies that included a comparator (i.e., RCTs, pre-post, and cohort studies). The largest number of studies addressed housing instability and financial strain with healthcare utilization and physiological and behavioral health outcomes reported, followed by food insecurity with process and physiological and behavioral health outcomes reported and transportation needs with healthcare utilization outcomes reported.

In-Process Studies

ClinicalTrials.gov and the HSRProj database were searched for in-process, active studies addressing one or more of our target social risk domains (food insecurity, housing instability, transportation needs, utility needs, interpersonal violence, education, and financial strain) (**Appendix A**).

The ClinicalTrial.gov search yielded 14 active studies, including three focused on food insecurity, two on financial strain, and nine on multiple social risk domains. Sample sizes range from 120 to 60,000, and completion dates range from July 2018 to July 2023 (**Appendix C Table 5**). The HSRProj search yielded 11 active studies, including two focused on food insecurity, two on housing instability, and two on education, and five addressing multiple social risk domains. Six of these are observational or cross-sectional studies. Most do not report sample size, but one includes 20 health systems. Completion dates range from 2020 to 2023 (**Appendix C Table 6**).

GQ3. What Are the Effects of Improvements in Process Outcomes, Healthcare Utilization Outcomes, or Social Risk Outcomes on Physiologic and Behavioral Health Outcomes?

Although most studies that reported physiologic and behavioral health outcomes also reported other outcomes, only four included studies reported on the effects of *changes* in process outcomes, social risk outcomes, or healthcare utilization outcomes on physiologic and behavioral health outcomes. Two of these studies found an association, and two did not.

Studies Showing Positive Association

- An observational study of 80 low-income adults receiving welfare benefits advice services in primary care practices found statistically significant increases in psychosocial aspects of quality of life, as measured by the 36-Item Short-Form Health Survey (SF-36), in those whose income increased after the intervention but not in those whose income did not increase after the intervention.[108]
- A pre-post study of 901 adults accessing co-located welfare benefits and debt advice services in the primary care setting found that those whose advice resulted in positive outcomes (e.g., reduction in perceived financial strain) demonstrated significantly improved well-being scores compared with controls.[97]

Studies Showing No Association

- One RCT including 1,809 families seen for children's medical services in primary or urgent care evaluated the impact of in-person provision of targeted information related to community, hospital, or government resources addressing needs prioritized by caregivers. An exploratory analysis found that the intervention's effect on children's overall health status as reported by caregivers was not mediated by reductions in social needs.[29]
- A pre-post study of 756 chronically homeless adults receiving case management, supported housing, and facilitated access to healthcare found that increases in number of days in their own housing after the intervention were not significantly associated with improvement in the SF-12 Health-Related Quality of Life Physical Component score or the number of medical problems.[152]

GQ4. What Are the Perceived or Potential Challenges to Implementation of Widespread Screening and Interventions for Social Risk Factors Within Healthcare? What Potential Solutions Have Been Proposed to Address These Challenges?

GQ4 focuses on **perceived or potential barriers** to the implementation of screening or intervention programs in healthcare, and their potential solutions. The included literature for GQ4 comprises eight reviews (narrative reviews, scoping reviews, and technical briefs), 26 case studies, 36 other descriptive research studies (qualitative research, survey research, and observational studies), and 16 opinion articles (commentaries, editorials, and letters to the editor) (**Appendix D**). All reviews and opinion articles were reviewed; however, given the volume of case studies and descriptive research available, evaluation of information from these sources started with the most recently published literature (2019) and continued backward in time until saturation of information was achieved. In qualitative synthesis, saturation refers to the likelihood that sampling additional data will not yield new or useful information.[153] In other words, after 12/26 (46%) case studies and 19/36 (53%) other descriptive research studies had been reviewed, the information presented in the remaining articles became redundant.

Key Informant interviews, including seven interviews with SDH researchers and 10 interviews with implementation experts, also contributed information relevant to these questions. Key Informants were asked:

- What are the major challenges you've experienced in implementing screening for social risk in healthcare settings?
- What are the major challenges from the healthcare delivery perspective in linking patients with community-based resources that can help reduce the burden of social risks?
- What are your thoughts on how these challenges might be addressed?

Recurring themes identified from the literature and Key Informant interviews were summarized according to patient-, provider-, health system-, or community-level factors that pose challenges to implementation of social risk screening or intervention in healthcare settings, and proposed solutions to these challenges. Key themes are summarized in **Appendix D Tables 1 and 2**, with the most commonly referenced challenges at the top of each section and illustrative examples or quotes for each theme and data source provided as applicable. Blank cells indicate a lack of published information or stakeholder input pertinent to that theme and data source. Some of the themes identified (e.g., "leadership buy-in" or "financial sustainability") applied to implementation of both screening and intervention programs but were only summarized in one section of the table.

Perceived Challenges to Implementation of Social Risk Screening and Interventions

Patient-Level Challenges

The most commonly cited patient-level challenges to implementation of **screening** programs in the literature were stigma and privacy concerns. These were also mentioned in five Key Informant interviews. Other challenges to screening included:

- Concerns about the value of screening to patients
- Issues regarding screening form completion

The most commonly cited patient-level challenge to implementation of **intervention** programs was logistical barriers that make it difficult for the patient to follow through with the referral (e.g., transportation issues), which was also described in two Key Informant interviews. Other challenges to interventions included:

- Lack of evidence of impact of social risk interventions on patient outcomes, including social risk outcomes, health outcomes, and harms
- Low utilization of referrals/resources and lack of patient engagement
- Patient dissatisfaction with outcome of referrals/resources

Provider-Level Challenges

The most commonly reported provider-level challenge to implementation of **screening** programs was provider concern about lack of referral resources. This challenge was also reported in seven Key Informant interviews. Other challenges to screening included:

- Provider burden and workflow issues
- Lack of knowledge; inadequate training
- Lack of confidence or comfort with screening
- Lack of support

The only provider-level challenge to implementation of **intervention** programs we identified was lack of provider enthusiasm to sustain the intervention following the conclusion of research-funded interventions. This challenge was reported in one Key Informant interview.

Health System–Level Challenges

The most commonly cited health system–level challenge to implementation of **screening** programs cited in the literature was concerns about collection and management of social risk data by the healthcare organization and partnering organizations that may not have the technical knowledge or resources to do so effectively. This challenge was also discussed in five Key Informant interviews. Other challenges to screening included:

- Coding, documentation, and payment considerations
- Issues related to social risk screening tool selection
- Lack of evidence-based screening recommendations
- Concerns about data privacy and use
- Universal vs. targeted ("high-risk") screening
- Buy-in from health system leadership

The most commonly cited challenge to implementation of **intervention** programs was sustainability of funding. This challenge was also cited in four Key Informant interviews. Other challenges to intervention included:

- Partnership with community resources
- Staffing challenges
- Lack of effective implementation strategies to put social risk interventions into practice
- Lack of evidence of impact of social risk interventions

Community-Level Challenges

We did not identify any community-level challenges for implementation of **screening** programs. The most commonly reported challenge to implementation of **intervention** programs was limited capacity of social resources. This challenge was reported in four Key Informant interviews. Other challenges to intervention included:

- Lack of availability of nutritious food at food banks
- Political uncertainty

Proposed Solutions to Challenges of Implementing Social Risk Screening and Interventions

Our review of literature for proposed solutions to the challenges of implementing social risk screening and interventions in clinical care also included a recently published report by NASEM titled "Integrating Social Care Into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health."[23] NASEM appointed a committee of 18 subject matter experts from foundations, social work associations, educational institutions, and other organizations to "examine the potential for integrating services addressing social needs and the SDOH [SDH] into the delivery of health care with the ultimate goal of achieving better health outcomes." The committee considered multiple sources of information, including peer-reviewed literature, reports from organizations and governmental agencies, gray literature, and invited presentations from experts in the field. The primary recommendations resulting from this committee's work and examples of each are:

- Design healthcare delivery to integrate social care into healthcare.
  - Develop and communicate an organizational commitment to addressing social needs.
  - Recognize that provision of comprehensive healthcare includes an understanding of the individual's social context.

    - Use patient-centered care models to help incorporate social risk data into healthcare decisions.
- Build a workforce to integrate social care into healthcare delivery.
    - Licensing boards, professional associations, and other relevant organizations should better develop and standardize the scopes of practice of social workers and community health workers.
    - Social care workers should be eligible for reimbursement for their services.
    - Organizations that credential healthcare providers should emphasize knowledge about social risk factors in licensing examinations and continuing education requirements.
- Develop a digital infrastructure that is interoperable between healthcare and social care organizations.
    - The federal government should promote and support a digital infrastructure to allow healthcare systems, social care organizations, and consumers to interoperate.
    - The Office of the National Coordinator should be resourced to adopt interoperable data systems and processes that will allow partners to securely share the data necessary to provide comprehensive health and social care services.
- Finance the integration of healthcare and social care.
    - CMS should define social care services that Medicaid can financially cover.
    - CMS should also promote and support pilot programs to better understand how integration of health and social care services can improve health and reduce healthcare costs.
- Fund, conduct, and translate research and evaluation on the effectiveness and implementation of social care practices in healthcare settings.
    - Funding agencies such as the National Institutes of Health, Agency for Healthcare Research and Quality, and Patient-Centered Outcomes Research Institute should encourage new research that incorporates a range of study designs and methods.
    - CMS should finance and support state pilot programs designed to evaluate the integration of social and healthcare and facilitate the dissemination of findings.
- Additional details from the report are in the NASEM column of **Appendix D Table 2**.

Far fewer proposed solutions were identified than barriers and challenges in the reviewed literature and Key Informant interviews; however, most barriers or challenges have at least one proposed solution. Proposed solutions to the most commonly cited challenges and barriers are outlined below and described in greater detail in **Appendix D Table 2**. Solutions to less frequently cited challenges and barriers are also summarized in **Appendix D Table 2**.

Proposed Solutions to Patient-Level Challenges

The most commonly cited patient-level challenges to implementation of **screening** programs were stigma and privacy concerns. Proposed solutions for these challenges included:

- Use of patient-centered care models
- Developing a trusting relationship with patients
- Identification of patient strengths and assets when screening for social risk factors

The most commonly cited patient-level challenge to implementation of **intervention** programs was logistical barriers that may prevent the patient from following through with the referral (e.g., lack of transportation). A proposed solution was to explore alternative delivery models, such as co-located services (e.g., food pantries or WIC services offered in the healthcare setting).

Proposed Solutions to Provider-Level Challenges

The most commonly reported provider-level challenge to implementation of **screening** programs was provider concern about lack of referral resources. Proposed solutions for this challenge included:

- Increasing provider incentives to screen
- Facilitating provider access to referral and support services
- Partnering with organizations that maintain referral lists
- Use of Social Service Resource Locator vendors
- Frequent updating of resource lists or databases

The only provider-level challenge to implementation of **intervention** programs was lack of provider enthusiasm to sustain the intervention. Proposed solutions included:

- Sharing outcomes data with clinicians
- Identification of clinical champions

Proposed Solutions to Health System–Level Challenges

The most commonly cited health system–level challenge to implementation of **screening** programs was concerns about social risk data collection and management by the healthcare organization and partnering organizations. Proposed solutions to this challenge included:

- Developing digital infrastructure that is interoperable between healthcare and social care organizations
- Integrating social risk data into electronic medical record systems
- Partnering with data analytic vendors

The most commonly cited challenge to implementation of **intervention** programs was sustainability of funding. Proposed solutions included:

- Financing the integration of healthcare and social care
- Payment reform (e.g., expanding Medicare coverage for social needs services)
- Exploring novel funding opportunities (e.g., public-private partnerships)

Proposed Solutions to Community-Level Challenges

No community-level challenges were identified for implementation of **screening** programs. The most commonly reported challenge to implementation of **intervention** programs was limited capacity of social resources. Proposed solutions included:

- Supporting community partners with financial and infrastructure needs
- Warm handoffs to community partners to ensure that resources are available for referrals

GQ5. What Are the Challenges or Unintended Consequences of Screening and Interventions for Social Risk Factors to Patients and Clinicians? What Is the Acceptability of Screening for and Intervening on Social Risk Factors for Patients and Clinicians?

GQ5 addresses **data on challenges or barriers reported in studies,** including feedback from patients and providers about satisfaction/acceptability after participation in social risk screening or interventions, so much of the data for this question come from patient and provider surveys, interviews, and focus groups. The articles meeting inclusion criteria for GQ5 were reviewed and information was stratified by patients vs. providers; screening, intervention, or both; and for each type of outcome (i.e., satisfaction/acceptability vs. challenge/unintended consequence) (**Appendix E Table 1**). Fifty-two studies provided data on patient- or clinician-reported satisfaction or challenges after implementation of social risk screening or interventions.[31,33,40,43,44,50,51,55,56,61,65,66,74,93,96,99,101,103,109,123,124,126,132,137,140,141,144,146,148,149,154-175]

Patients

Satisfaction/Acceptability

Thirty-one articles[31,43,55,61,74,93,96,99,101,103,123,126,137,141,146,148,149,154,156-159,161,162,164-166,168,170,173] included positive reports of patient satisfaction with screening and/or interventions and reported improvements in the patient-provider relationship and high comfort levels.

Challenges/Unintended Consequences

Eleven articles[51,65,66,124,126,140,144,158,160,164,171] reported challenges/unintended consequences of screening, interventions, or both for patients, including:

- Discomfort (e.g., shame about social needs)
- Confidentiality issues (e.g., fear of legal repercussions such as being reported for child maltreatment due to food insecurity)
- Paradoxical effects of improvement in social needs (families who participated in SNAP and increased their earned income had their SNAP benefits reduced or cut off; they subsequently faced economic strain that diminished their ability to pay for housing, utilities, healthcare, or food)

Two articles reported that there were no adverse effects from the intervention.[140,144]

Providers

Satisfaction/Acceptability

Eighteen articles reported on provider satisfaction with social risk screening, intervention, or both.[33,50,56,74,93,96,124,132,137,162-164,167,169,172-175] Seventeen of the 18 reports of provider satisfaction with screening and intervention were positive, with providers stating that screening was not overly time consuming and led to improvements in the patient-provider relationship, patient care, and provider knowledge and competence. The one negative report was related to difficulty in incorporating the intervention into clinician schedules.[124]

Challenges/Unintended Consequences

Fifteen articles[33,40,44,50,51,93,109,144,155,164,167,169,172,174,175] reported on challenges/unintended consequences of social risk screening, interventions, or both for providers, including:

- Lack of time (e.g., not enough time to conduct screening or followup on positive results)
- Inability to track success of referrals (because of lack of data-sharing agreements and capacity to call clients back)

GQ6. To What Extent Has the USPSTF Already Addressed Social Risk in Its Recommendations? How Have Health Disparities and Social Risk Been Examined in USPSTF Recommendation Statements?

In December 2019, the recommendation statements for all currently active topics in the USPSTF portfolio were audited for any mention of social risk or health disparities to assess the extent to which the USPSTF has addressed social risk in its recommendations. The text was scanned for any terms related to target or nontarget social risk domains. As described in a recent USPSTF editorial[176] and in **Appendix F Table 1**, the USPSTF has issued recommendations on 14 topics that are included in some definitions of SDH, although many of these are more commonly considered behavioral and mental health factors rather than social risk factors:

- Screening for **Intimate Partner Violence**, Elder Abuse, and Abuse of Vulnerable Adults
- Primary Care Interventions to Prevent **Child Maltreatment**
- Screening for **Depression** in Adults
- Screening for **Depression** in Children and Adolescents
- Interventions to Prevent Perinatal **Depression**
- Screening and Behavioral Counseling Interventions to Reduce Unhealthy **Alcohol Use** in Adolescents and Adults
- Screening for Unhealthy **Drug Use**
- Primary Care–Based Interventions for Illicit **Drug Use** in Children and Adolescents

- Behavioral and Pharmacotherapy Interventions for **Tobacco** Smoking Cessation in Adults, Including Pregnant Women
- Primary Care Interventions to Prevent **Tobacco** and Nicotine Use in Children and Adolescents
- Behavioral Counseling to Promote a **Healthy Diet and Physical Activity** for Cardiovascular Disease Prevention in Adults With Cardiovascular Risk Factors
- Behavioral Counseling to Promote a **Healthy Diet and Physical Activity** for Cardiovascular Disease Prevention in Adults Without Known Risk Factors
- Behavioral Interventions for Weight Loss to Prevent **Obesity**-Related Morbidity and Mortality in Adults
- Screening for **Obesity** in Children and Adolescents

Text pertaining to social risk was abstracted from the recommendation statements and coded by the social risk domain(s) addressed (food insecurity, housing instability, transportation needs, education, utility needs, interpersonal violence, financial strain, and other domains that are not targeted in this Technical Brief) and the section of the recommendation statement in which it was found.

As shown in **Appendix F Table 2**, 85 active topics were audited. Recommendation statements for 57 topics address social risk in some way and 28 do not. Discussion of target social risk domains in the recommendation statements is infrequent. Financial strain is mentioned in 28 recommendation statements, education in nine, interpersonal violence in three, and housing instability in two. Transportation and utility needs and food insecurity are not mentioned in any recommendation statements. In contrast, one or more nontarget social risk domains are discussed in 53 of the 57 recommendation statements addressing social risk. The most commonly referenced nontarget social risk domains are race and ethnicity (in 46 recommendation statements) and substance use (i.e., tobacco, alcohol, or drug use; in 23 recommendation statements).

The recommendation statements describe social risk factors in the context of disparities or inequalities, discuss social risk factors as important research gaps, include social risk factors as elements of risk assessment, or identify social risk factors as potential reasons for differences in prevalence of the condition. Discussion of social risk in the recommendation statements is generally limited to brief references to prevalence or risk factors; however, several recommendation statements include more social risk content. The *risk assessment* or *risk factors* (N = 31) section of the recommendation statement is the most common location for social risk discussion, followed by *burden of disease* (N = 20), *clinical considerations* (N = 17), *research needs and gaps* (N = 16), and *rationale* (10). The *discussion* (N = 4), *implementation* (N = 3), and *abstract* (N = 2) sections are the less common areas of the recommendation statement to contain social risk discussion.

Table 8 presents exemplar text excerpts corresponding to each of the target social risk domains and several selected examples of the most commonly mentioned nontarget domains (i.e., race and ethnicity and substance use).

Topics without any social risk discussion in the recommendation statement:

- Screening for Adolescent Idiopathic Scoliosis (2018)
- Screening for Asymptomatic Bacteriuria in Adults (2019)
- Screening for Bladder Cancer (2011)
- Risk Assessment, Genetic Counseling, and Genetic Testing for BRCA-Related Cancer (2019)
- Screening for Cardiovascular Disease Risk With Electrocardiography (2018)
- Screening for Carotid Artery Stenosis (2014)
- Screening for Celiac Disease (2017)
- Interventions to Prevent Falls in Community-Dwelling Older Adults (2018)
- Ocular Prophylaxis for Gonococcal Ophthalmia Neonatorum (2019)
- Periodic Screening for Gynecological Conditions With the Pelvic Examination (2017)
- Interventions to Promote a Healthful Diet and Physical Activity for Cardiovascular Disease Prevention in Adults With Cardiovascular Disease Risk Factors (2014)
- Interventions to Promote a Healthful Diet and Physical Activity for Cardiovascular Disease Prevention in Adults Without Cardiovascular Disease Risk Factors (2017)
- Hormone Therapy for the Primary Prevention of Chronic Conditions in Postmenopausal Women (2017)
- Screening for Illicit Drug Use in Children, Adolescents, and Young Adults (2019)
- Screening for Lipid Disorders in Children and Adolescents (2016)
- Screening for Obstructive Sleep Apnea (2017)
- Screening for Pancreatic Cancer (2019)
- Screening for Rh (D) Incompatibility (2004)
- Behavioral Counseling to Prevent Skin Cancer (2018)
- Screening for Skin Cancer in Adults (2016)
- Statin Use for the Primary Prevention of Cardiovascular Disease in Adults (2016)
- Screening for Testicular Cancer (2011)
- Screening for Thyroid Cancer (2017)
- Screening for Thyroid Dysfunction (2015)
- Screening for Unhealthy Alcohol Use in Adolescents and Adults (2018)
- Screening for Vitamin D Deficiency (2014)
- Vitamin D, Calcium, or Combined Supplementation for the Primary Prevention of Fractures in Community-Dwelling Adults (2018)
- Vitamin Supplementation to Prevent Cancer and Cardiovascular Disease (2014)

GQ7. How Have Other Professional Organizations Provided Guidance or Resources Related to Social Risk Factors? What Methods From Other Organizations May Be Applicable for USPSTF Considerations?

In October 2019, we conducted an audit of professional medical associations and USPSTF partner organizations to identify any statements, policies, or activities related to SDH or social

risk screening and intervention that they have published or made available on their website. In 2018, Gusoff and colleagues reviewed publicly available policies, position statements, and clinical guidelines from 42 U.S. professional medical associations.[177] We reviewed the websites of these 42 associations, as well as an additional 28 organizations, including 17 USPSTF partners and 11 other organizations that issue guidelines relevant to the USPSTF portfolio. In total, the websites of 70 professional medical associations and organizations were reviewed for SDH or social risk factor content. For organizations that develop guidelines, we also looked for information on the groups' methods for addressing social risk factors in their guidelines by examining their methods/procedures manual, if available. We also reviewed some recent guidelines from these groups on topics of most relevance to the USPSTF (e.g., behavioral interventions, primary care screening) to see whether and how social risk issues were addressed (**Appendix G Table 1**).

Most organizations provide only limited information on SDH or social risk–related activities on their websites, although six explicitly promote clinician engagement in social risk screening and referrals (American Academy of Family Physicians, American Academy of Pediatrics, American College of Obstetricians and Gynecologists, American College of Physicians, American Diabetes Association, and American Osteopathic Association). Three of these organizations (American Academy of Family Physicians, American Academy of Pediatrics, and American College of Obstetricians and Gynecologists) provide suggestions for tools to use for screening. Several organizations, such as the Indian Health Service and the Centers for Disease Control and Prevention, have activity statements expressing current, future, or both social risk–focused research activities and program initiatives.[178,179]

Only two organizations refer to social risk factors or SDH in their methods for guideline development. The Procedure Manual for the Canadian Task Force on Preventive Health Care describes equity issues as an example of a contextual question and outlines equity as one of the six criteria important for formulating recommendations in the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Evidence-to-Decision Framework ("What would be the impact on health inequity?").[180] The article describing the methods of the Community Preventive Services Task Force discusses links among social, environmental, and biological determinants in development of the logic framework for recommendations.[181]

Seven recent guidelines that were reviewed have some mention of SDH or social risk (**Appendix G Table 1**). For example, the American Cancer Society 2015 breast cancer screening guideline mentions barriers to access among low-income or uninsured women and those residing in rural counties.[182] The 2017 guideline from the Canadian Task Force on Preventive Health Care on screening for hepatitis C pilot tested the Feasibility, Acceptability, Cost, and Health Equity (FACE) tool with organizational stakeholders to gain their perspective on the priority, feasibility, acceptability, cost, and equity of the recommendation. The tool defines equity as the answer to "What would the impact on health equity compared to current status be? Would the intervention negatively or positively impact disadvantaged populations?"[183] The 2018 Department of Defense/Department of Veterans Affairs guideline on management of pregnancy recommends screening for social risk domains, indicates that women identified as food insecure may be at risk for nutritional complications in pregnancy, and includes many social risk domains, some with suggested referral to social services, in the initial prenatal risk assessment checklist.[184]

GQ8. What Are the Key Gaps in Social Risk Research and Implementation of Screening and Interventions for Social Risk Factors?

We gathered information on social risk screening and intervention evidence gaps from several sources, including Key Informants, our review of medical association and organization websites, and the body of evidence identified from our published literature searches.

We asked Key Informants for their thoughts on gaps in the research and the kind of research needed to fill these gaps. Key Informants suggested that the USPSTF make a clear call for additional social risk screening and intervention research, particularly to address the following questions that Key Informants noted as important gaps:

- What is the appropriate methodology for future research in this area?
  - Does lack of RCT data imply that screening and intervention are not worthwhile, or are other types of study designs acceptable?
  - What are the appropriate outcomes to be using (short- and long-term) for each social risk domain?
- How can screening and intervention programs best be implemented in healthcare settings?
  - What are the best screening tools to be using?
  - Who should be doing the screening and intervening (primary care providers vs. other clinical or support staff)? How should care be integrated or coordinated within the healthcare setting?
  - What is the appropriate locus of intervention (individual, family, or community)?
  - What are the factors associated with *unsuccessful* screening and intervention programs (lack of funding vs. implementation failure vs. ineffectiveness of the program)?
- What are the benefits and harms of social risk screening and intervention for specific subpopulations, such as individuals with specific diseases (e.g., asthma, hypertension, or diabetes) vs. the general population?

In our audit of professional organizations' websites for GQ7, we looked for any research gaps articulated by these groups and found only one. An AARP policy statement discussing SNAP use states that more research and data are needed on SNAP uptake in the elderly to better understand how to reach this population.[185]

Some research needs seen in our searches of published literature include:

- Our findings for GQ1 on social risk screening tools indicate a lack of validated screening tools and a propensity for researchers to modify existing tools or develop tools de novo rather than testing existing tools in the study population. Repeated studies of existing multidomain screening tools without modification are needed to support their validity in various populations.

- Our findings for GQ2 on social risk interventions show that more than a third of studies lack a comparator, and many of the studies reporting physiologic and behavioral health outcomes found mixed effects of interventions, limiting the ability to draw conclusions about effectiveness. More RCTs and other controlled comparative studies are needed to identify social risk interventions with positive effects on meaningful patient outcomes. However, as one expert reviewer cautioned, focusing on RCTs rather than other evaluative approaches from public health or sociology may medicalize social risks in a way that divorces the provision of healthcare from social services. Although there are likely studies reporting health outcomes in patients with specific diseases (e.g., asthma, diabetes), which are outside the scope of this Technical Brief, more evidence is needed on the effectiveness of social risk interventions in improving health outcomes in the general population.
- Our findings for GQ3 show that few studies evaluate the link between process outcomes, social risk outcomes, or healthcare utilization outcomes and physiologic or behavioral health outcomes. More studies are needed that examine the effect of improvement in process outcomes, social risk outcomes, or healthcare utilization outcomes on physiologic or behavioral health outcomes. As pointed out by an expert reviewer, the lack of studies may in part be due to the common conceptualization of clinical outcomes leading to utilization outcomes, rather than the direction of association between these outcomes represented in GQ3.
- Our findings for GQs 4 and 5 suggest there may be somewhat of a mismatch between *perceived or potential* barriers to implementation of social risk screening and intervention and *actual* challenges encountered. Many of the included studies did not report on unintended consequences of social risk screening or intervention—a shortcoming of social risk research comparable to a lack of reporting on adverse effects in clinical studies. More published data on the actual challenges encountered during implementation of social risk screening and intervention in healthcare settings and ways that these challenges have been addressed successfully would clarify what barriers and solutions need to be considered before future implementation. In addition, many implementation challenges identified by Key Informants and expert reviewers, such as sustainability of funding, provider enthusiasm, and the need to balance configuration of programs to local circumstances with broader dissemination of standardized programs, are not addressed in included studies.
- Although all the studies we identified focus on referral and receipt of community and government resources to address social risks, social risk data can also be used to alter clinical care of patients to accommodate identified social barriers. For example, telehealth appointments could be used to address identified transportation barriers. The 2019 NASEM report on "Integrating Social Care Into Delivery of Health Care" points to existing evidence gaps about how these "adjustment strategies" should affect provider decisions about patient care.[23]
- A 2019 summary of research needs for social risk intervention research identifies key comparative effectiveness evidence gaps, including:
    - Is it more effective to target some social risks than others?
    - Who will benefit most from a given intervention?
    - For a given social risk and population, what intervention strategies are most effective?

Other research needs highlighted relate to technology and capacity-building supports, maximizing patient engagement and participation, and payment and quality incentives.[186]

Chapter 4. Summary and Implications

Many multidomain social risk screening tools are available, but they vary widely, with seven to more than 100 questions. Gold standard methods were rarely used in development of these tools, and few included reliability and validity testing with a representative sample. In subsequent empirical use, nearly three-quarters of the tools had been modified from their original forms through the addition, deletion, or modification of items in studies, making it difficult to draw conclusions about their validity. Key Informants reported using a variety of tools, many of which were developed by their organization. These experts agree that tools should have a limited time burden and address the most important social needs, be validated, and meet organizational needs, which is likely why there is so much variability in and modification of existing tools.

Food security, housing, and transportation were identified by Key Informants as the most important social needs to identify in healthcare. These are also three of the most frequently addressed domains in our included intervention studies, along with financial security. The majority of studies were conducted in primary care and address multiple social risk domains. The largest number of studies address adults of all ages, followed by pediatric studies and studies of adults ages 18 to 64 years. The majority of process, social risk, cost, and provider outcomes reported show positive intervention effects. The plurality of physiologic and behavioral health outcomes and healthcare utilization outcomes are positive, but more than a third of these outcomes show mixed effects. Only one outcome category in one study was categorized as negative.

Patient challenges or unintended consequences encountered in social risk screening and intervention include confidentiality issues, such as fear of being reported for child maltreatment due to food insecurity, and paradoxical effects of improvement in social needs (increases in earned income led to SNAP benefits being reduced or cut off, which resulted in financial strain affecting patients' ability to pay for housing, utilities, healthcare, or food). Provider challenges or unintended consequences encountered include lack of time to conduct screening or followup on positive results and inability to track the success of referrals.

Many perceived or potential barriers to the implementation of social risk screening or intervention programs in healthcare were identified in the published literature and by Key Informants. There were fewer proposed solutions than barriers identified; however, most barriers have at least one proposed solution. For example, proposed solutions to provider concern about lack of referral resources include partnering with organizations that maintain referral lists and use of Social Service Resource Locator vendors. Proposed solutions to patient stigma and privacy concerns include developing a trusting relationship with patients and identification of patient strengths and assets when screening for social risk factors.

Social risk factors are mentioned in two-thirds of USPSTF recommendation statements, although discussion of target social risk domains is limited and mostly focuses on socioeconomic status. Nontarget social risk domains, especially race and ethnicity and substance use, are discussed in more than 50 USPSTF recommendations in the context of disparities or inequalities, research gaps, risk assessment, or differences in condition prevalence. Most other professional

organizations provide only limited information on social risk–related activities on their websites. Although six organizations explicitly promote clinician engagement in social risk screening and referrals, only three provide suggestions for how to address social risk by listing tools for screening, community resource referrals, or both.

Limitations

- Our searches and inclusion criteria were limited to studies with the most relevance to the USPSTF scope and purpose. As such, we focused on studies in the general population and did not include studies conducted in patients with a specific disease. Social risk screening and interventions may have quite different effects in patients with chronic conditions requiring complex management, such as diabetes.
- Following standard USPSTF methods, we also excluded studies conducted in countries that are not rated "very high" on the Human Development Index, which may have left out a considerable amount of research.
- Consistent with methods of a Technical Brief, we did not conduct critical appraisal. Some of the included studies may be of poor quality and would not meet criteria for a USPSTF review and recommendation.
- We abstracted study authors' results summaries, but we did not abstract data from the studies or evaluate the results. To provide some indication of effective intervention types, we categorized the results by outcome category as positive, negative, no effect, or mixed results based on the study's intended or targeted direction of effect. It is important to note that this approach does not take into account study size, heterogeneity, or quality, so the included information on study findings may not accurately represent the effectiveness of interventions.
- Investigations into outcome variation by demographic factors, such as race or socioeconomic status, as well as contextual information about clinical partnerships with community and public health organizations, are important to intervention implementation considerations but were beyond the scope of the Technical Brief.
- We did not abstract information on the duration of included studies, which may be an important characteristic affecting study outcomes. The health effects of social risk factors usually accumulate over years, so it is unlikely that interventions of short duration would have immediate effects on physiological or behavioral health outcomes.

Considerations for the USPSTF Portfolio and Methods

Key Informants, as well as two review articles evaluated for GQ4,[187,188] noted that evidence-based recommendations, clinical guidelines, and best practices for healthcare providers to screen or intervene on social risk factors are lacking. Key Informants suggested that the USPSTF could address this challenge by incorporating information about social risk factors into its existing portfolio of topics; for example, in the clinical considerations. The clinical considerations could address how social risk factors influence risk assessment for targeting preventive services; adherence to screening (and treatment), counseling, and chemoprevention; and implementation of clinical preventive services. Our findings for GQ6 show the ways in which the USPSTF

currently addresses social risk in recommendation statements. The USPSTF could use these findings to inform considerations of potential ways to routinely address the importance and impact of social risk factors in all its recommendation statements.

Key Informants also commented on the impact of USPSTF recommendation statements on coverage of particular services by Medicaid, Medicare, and the Affordable Care Act. While Key Informants recognized that there is not enough evidence currently for the USPSTF to make a recommendation to screen for or intervene on social risks, they noted that a statement of insufficient evidence for a recommendation from the USPSTF could facilitate additional research funding to address research gaps. They also suggested that the USPSTF make a clear call for additional research, raising the question of whether there is utility for a public statement from the USPSTF on research gaps without issuing a formal I statement.

If the USPSTF decides that a next step is to look more closely at studies addressing a social risk domain with the most available evidence, our findings suggest that the best candidates are food insecurity, transportation needs, and housing instability. These domains were also recognized by Key Informants as the most important social risks to identify and as actionable within the healthcare setting. However, the majority of studies address multiple domains, which is not surprising since patients with social risk in one domain often have social risk in other domains. An expert reviewer also cautioned strongly that a USPSTF recommendation supporting screening for a single social risk domain could be detrimental to other social risk screening and interventions in healthcare systems; some healthcare providers may consider screening for this single domain as sufficient and not engage in further conversation with patients about social circumstances that might lead to poor health.

If the USPSTF decides to go forward with a recommendation on screening for social risk factors, flexibility in or development of new methods may be necessary to evaluate the "value" of screening and evidence sufficiency criteria for establishing the surrogacy of intermediate outcomes (i.e., the intermediate health outcome link). Many studies report on intermediate outcomes, such as improvement in social risks or reduction in hospitalizations, and the body of evidence currently includes few RCTs; therefore, a broader set of included outcomes and study designs may be warranted. In addition, process and utilization outcomes may be the outcomes most affected by studies of short duration.

Use of GRADE's Evidence-to-Decision framework would be one way to routinely address equity as a contextual factor in reviews. Given the complexity of the topic, another evidence synthesis product may better address the contextual factors that influence the effectiveness of social risk interventions. For example, realist reviews focus on understanding the mechanisms by which an intervention works and explaining the outcomes of complex programs by examining what about an intervention works, for whom, and in what circumstances.[189,190] The USPSTF might also consider whether there are other evidence-based organizations it could partner with to address this topic.

Conclusions

There are many multidomain social risk screening tools available, but they vary widely and few included reliability and validity testing. Key Informants suggested that food security, housing, and transportation are the most important social needs to identify in healthcare, and these are three of the most frequently addressed domains in included studies. The majority of studies address multiple social risk domains, and most outcomes reported show positive intervention effects. Social risk factors—primarily socioeconomic status, race and ethnicity, and substance use—are mentioned in two-thirds of USPSTF recommendation statements, and six other professional medical organizations explicitly promote clinician engagement in social risk screening and referrals.

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Box. Social Risks and Behaviors Captured in Common Social Risk Screening Tools

- Caregiver responsibilities
- Childcare access and affordability
- Disabilities*
- Discrimination/racism
- Early childhood education and development
- Education*
  - Language and literacy
  - Health literacy
- Financial strain/economic stability*
  - Ability to afford medical care
  - Employment*
  - Income
  - Food insecurity*
  - Housing insecurity/instability/quality/homelessness*
  - Transportation needs*
  - Utility needs*
- Health behaviors/behavioral health
  - Alcohol abuse†
  - Dietary pattern†
  - Drug use*†
  - Physical activity*†
  - Tobacco use†
- Healthcare/medication access and affordability
- Health/functional status
  - Mental health, including depression*†
- Immigration/migrant status/refugee status
- Incarceration
- Interpersonal violence/intimate partner violence†/interpersonal safety*
- Legal needs
- Neighborhood/built environment
  - Walkability
  - Public transportation
  - Access to foods that support healthy eating patterns
  - Air quality
  - Segregation
  - Neighborhood safety
  - Other neighborhood deprivation indices
- Race and ethnicity
- Social support/family and community support*/social cohesion/social isolation/civic engagement
- Trauma (adverse child experiences)
- Veteran status

* Centers for Medicare & Medicaid Services Accountable Health Communities Model (CMS AHC) domain.
† USPSTF recommendation on domain/component.

Figure 1. Analytic Framework

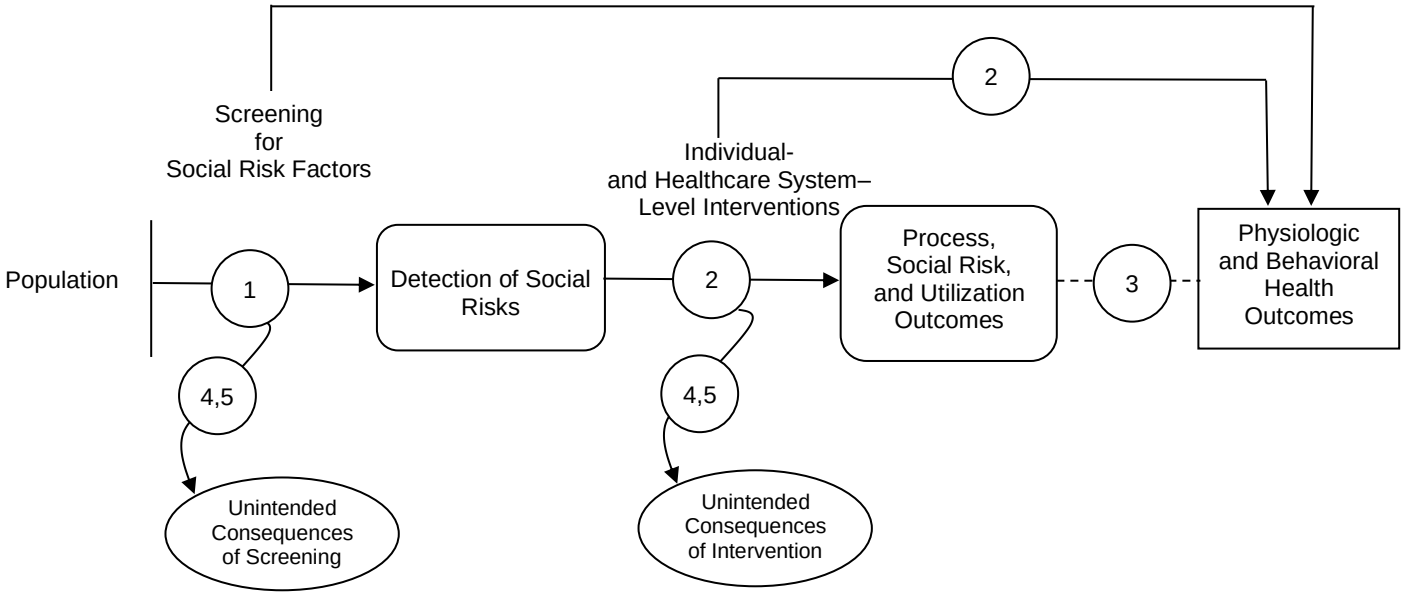


Figure 2. Most Important Social Needs to Identify in Healthcare According to Key Informants

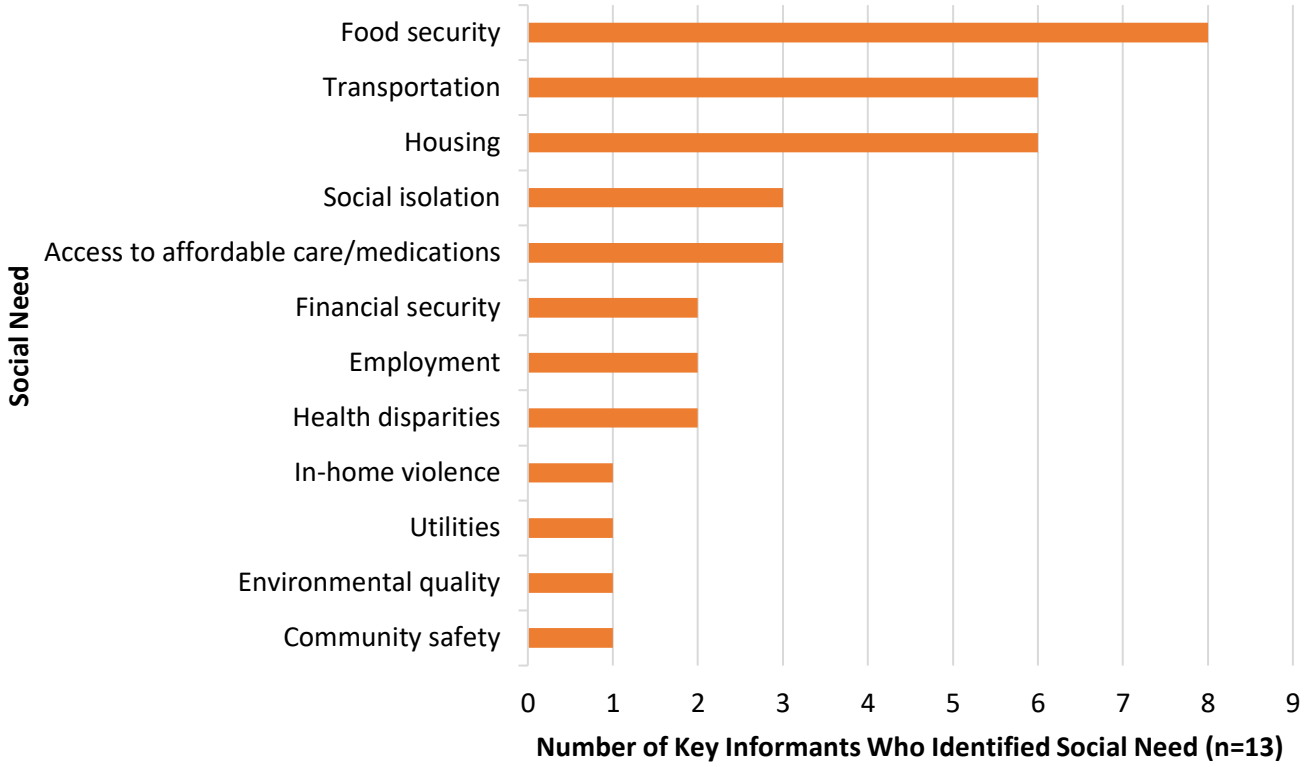
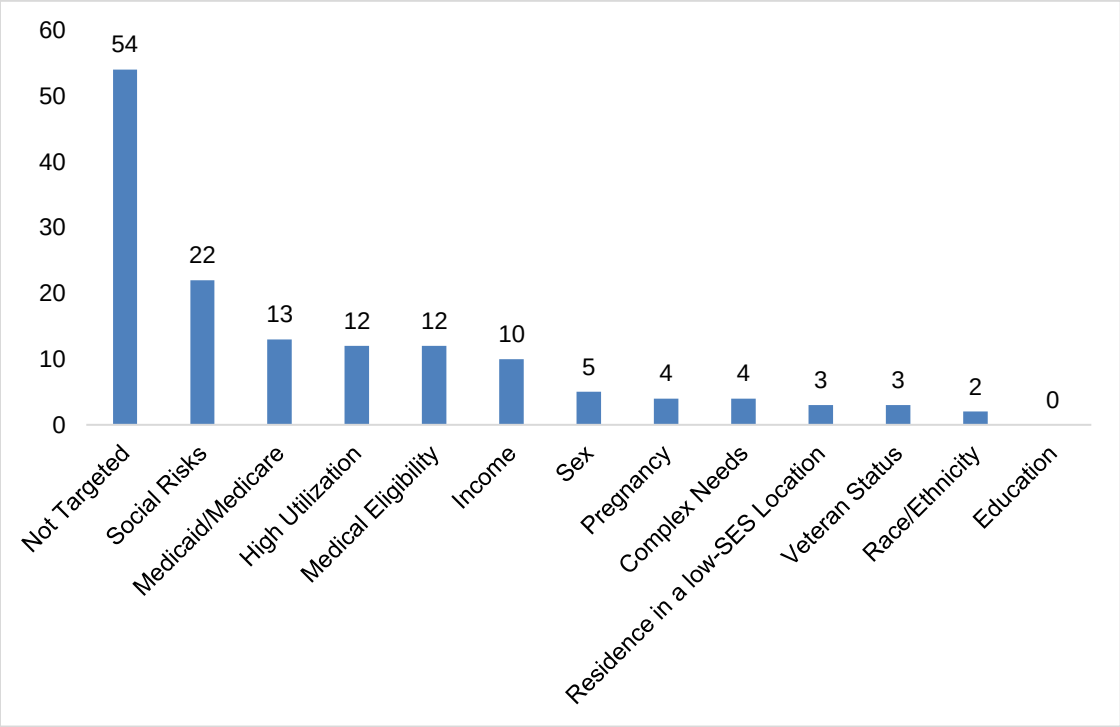
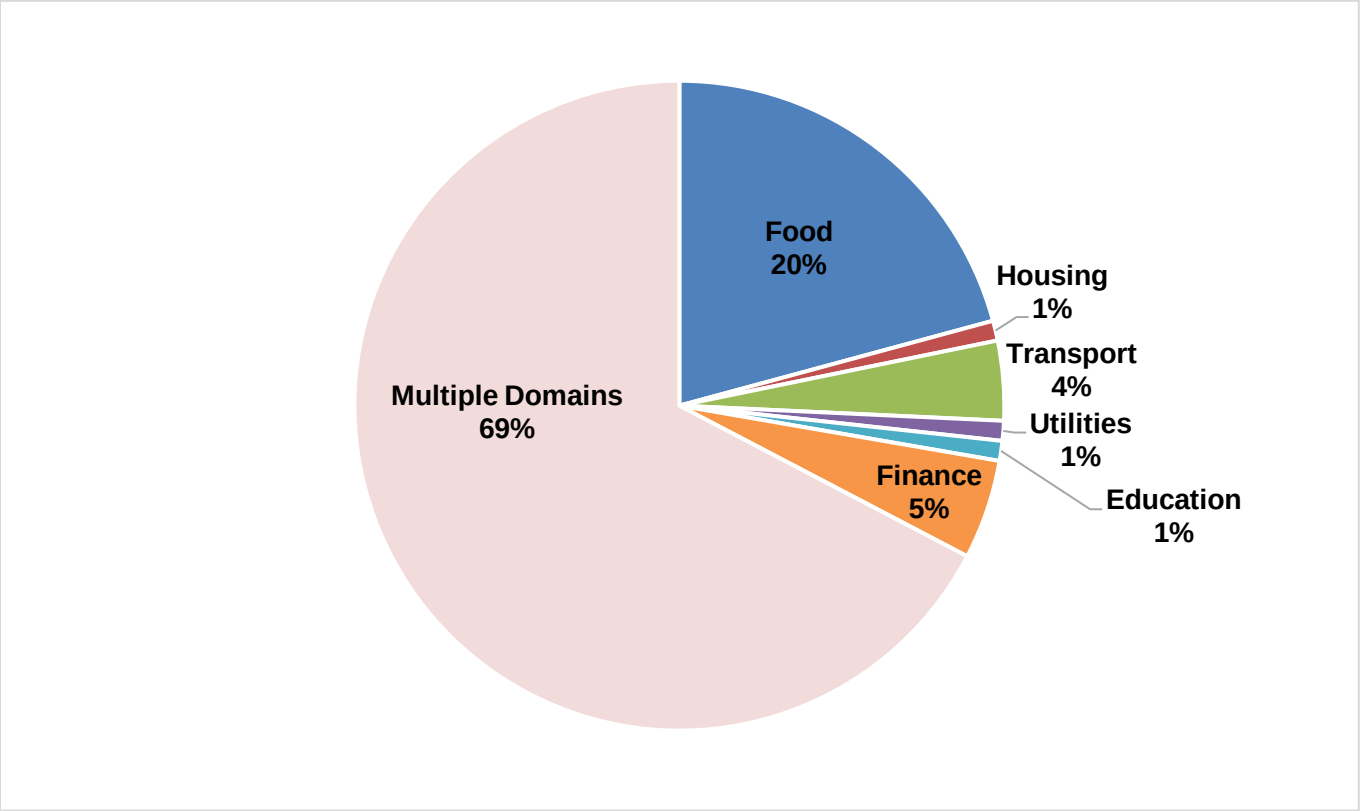


Figure 3. Number of Studies Targeting Certain Populations



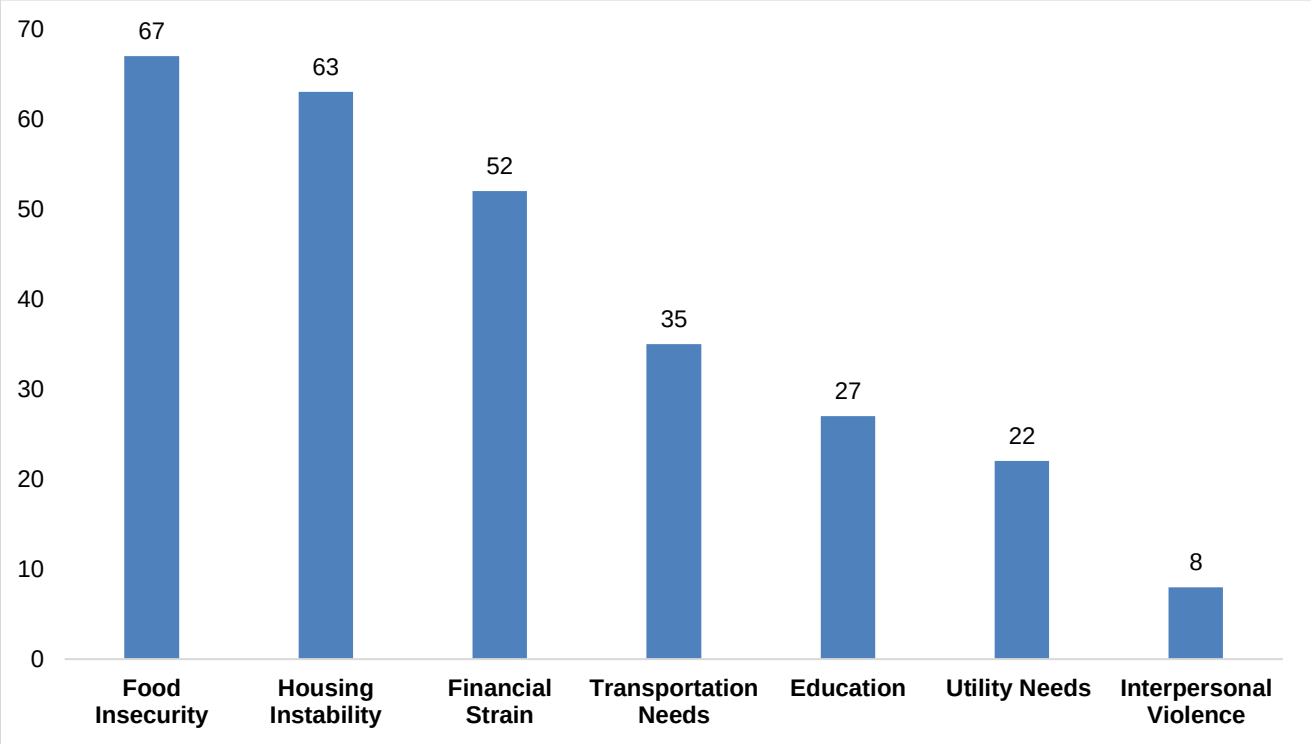
Abbreviation: SES = socioeconomic status.

Figure 4. Social Risk Domains Addressed



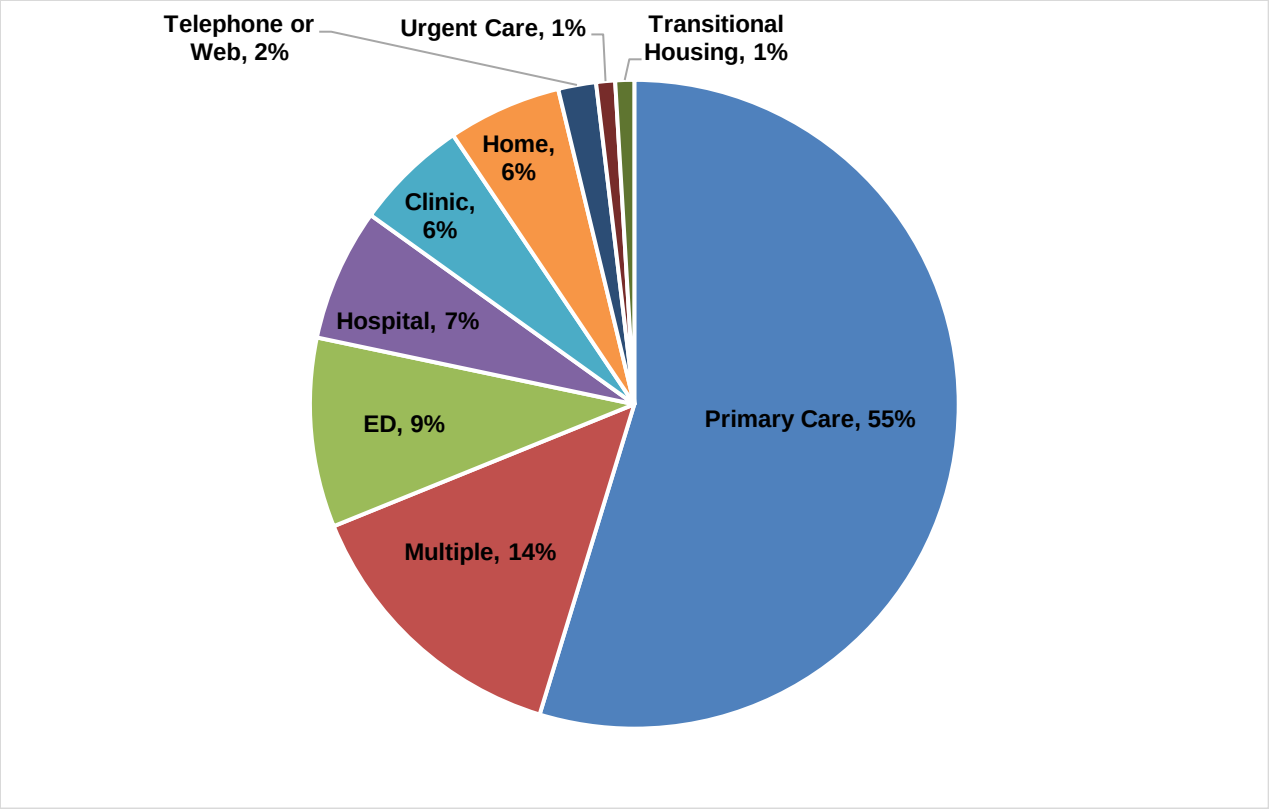
Note: Studies addressing multiple domains may include multiple target domains or a mix of target and nontarget domains.

Figure 5. Number of Studies Addressing Social Risk Domains



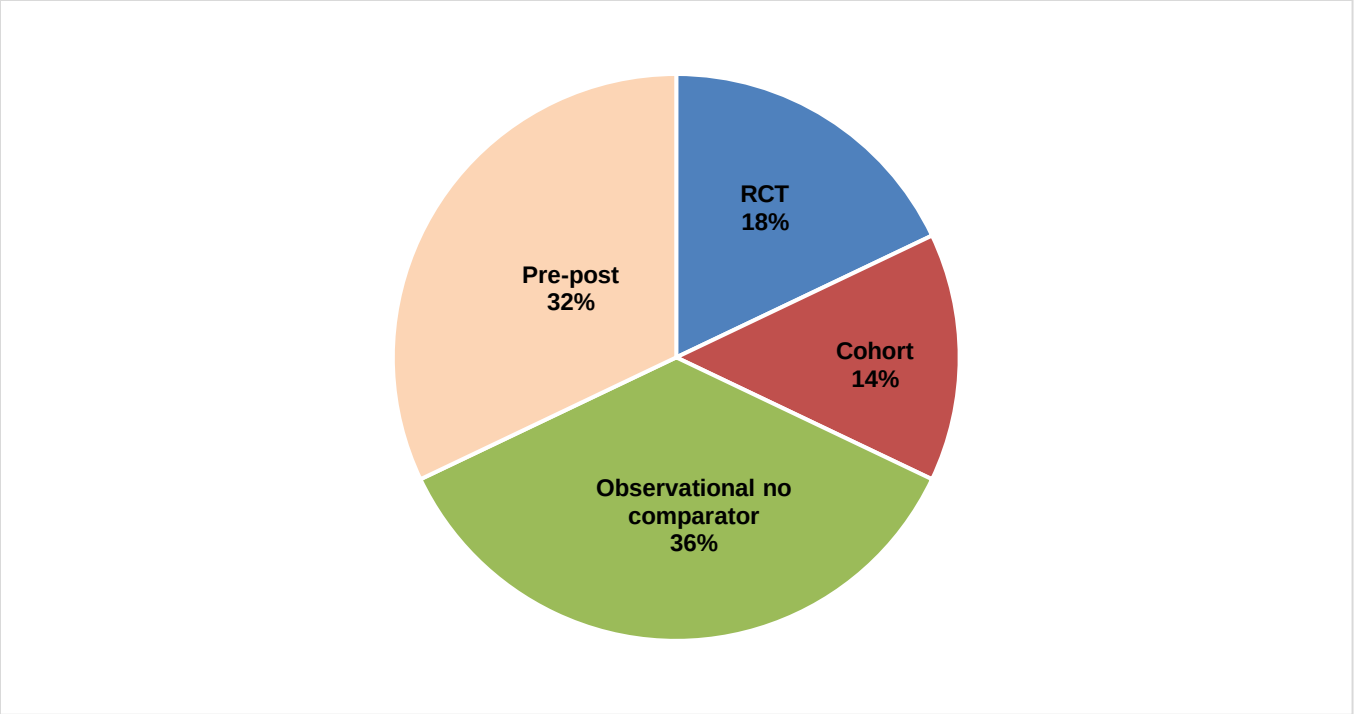
Note: Includes single domain interventions and individual target domains in multidomain interventions.

Figure 6. Study Settings



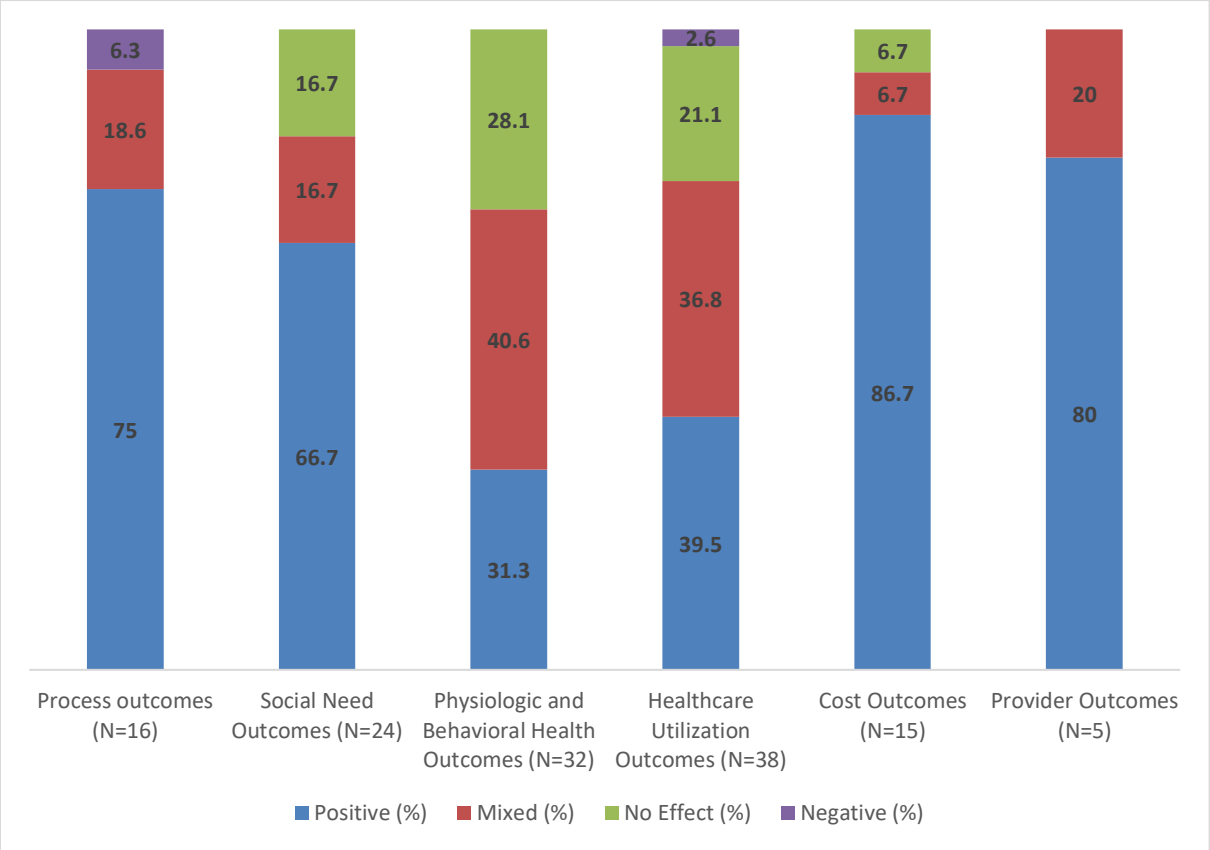
Abbreviation: ED = emergency department.

Figure 7. Study Designs



Abbreviation: RCT=randomized, controlled trial.

Figure 8. Effects by Outcome Category in Studies Including a Comparator



Positive: Effects in study's intended/targeted direction; Negative: Effects contrary to study's intended/targeted direction; Mixed: Combination of effects (positive and negative, positive and no effect, or negative and no effect). Some comparative studies report some outcomes without a comparator; only outcomes with a comparator are included in this figure.

Figure 9. Number of Studies by Social Risk Domain and Outcome Category

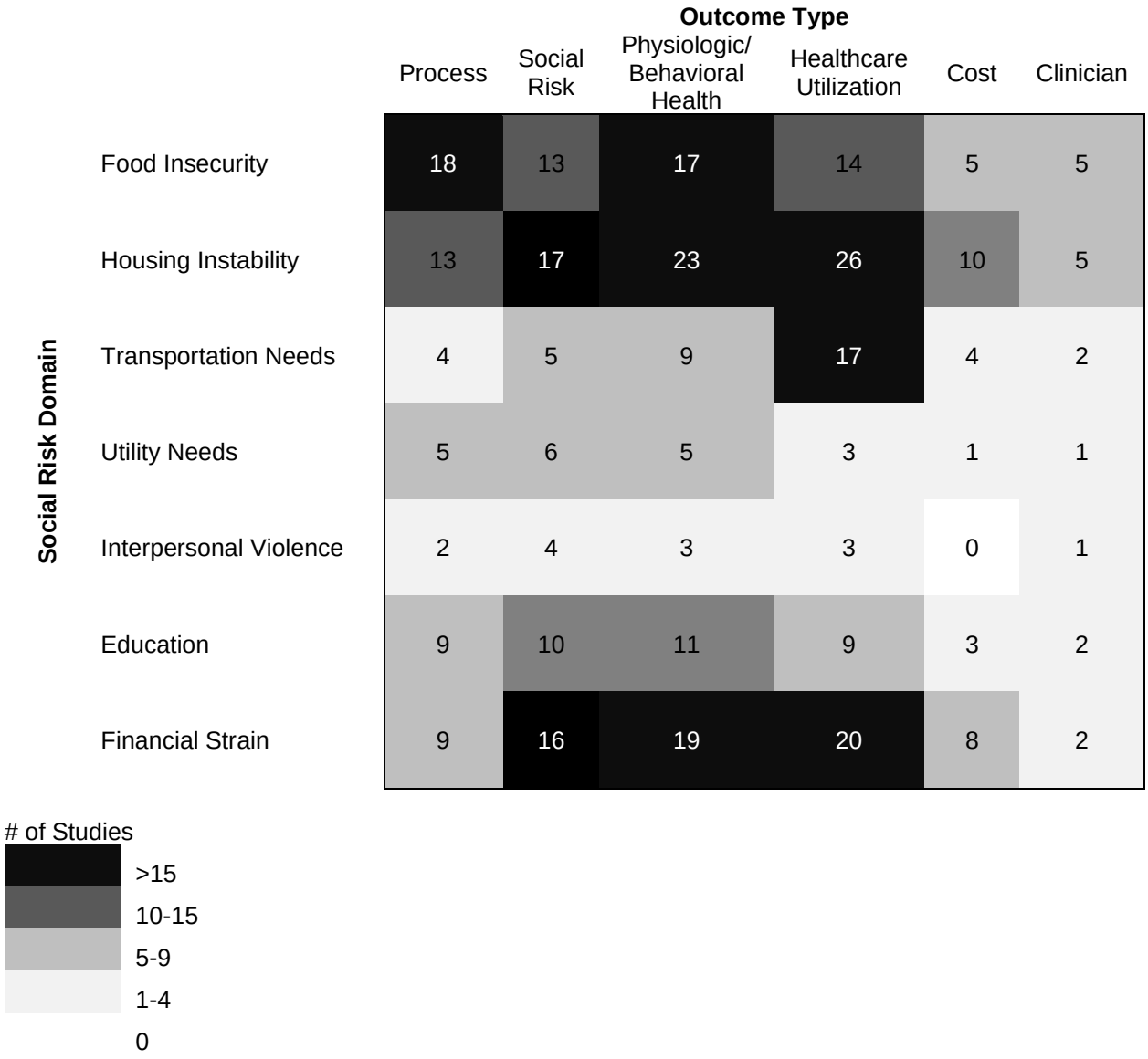


Table 1. Inclusion Criteria

Category	Inclusion	Exclusion
Populations	GQs 1–3: General population; all ages	GQs 1–3: Studies targeting people with specific diseases, including mental illness or substance abuse
Social risk domains/ components	GQs 1–3: Target domains = food insecurity; housing instability; transportation needs; utility needs; interpersonal violence (other than intimate partner violence, elder abuse, and child maltreatment); education (including adult health literacy); financial strain Includes legal needs if focused on one of the above domains Interventions targeting a single or multiple domains; can address excluded domains, as long as one of the included domains above is addressed	GQs 1–3: Nontarget domains = domains already addressed by USPSTF (depression, alcohol abuse, healthy diet, drug use, physical activity, tobacco use, intimate partner violence, elder abuse, child maltreatment); neighborhood and built environment; disabilities; early childhood education and development; health/functional status; race and ethnicity; veteran status; trauma; caregiver responsibilities; childcare access and affordability; discrimination/ racism; employment; immigration/refugee status; incarceration; social support/ isolation; healthcare/medicine access and affordability
Interventions	GQs 1–3: Individual level (e.g., referral to social services, provision of information about resources); referable from primary care; available to most patients Healthcare system–level (e.g., policies, programs, staff training, primary care collaboration with community services)	GQs 1–3: Public health/community-level policies Individual-level interventions that target only medical conditions/ needs
Comparisons	GQs 1–3: No comparator necessary	
Setting	GQs 1–3: Any setting linked with the healthcare system; conducted in countries categorized as “very high” on the Human Development Index (as defined by the United Nations Development Programme)	GQs 1–3: Conducted in countries rated as other than “very high” on the Human Development Index
Study Design	GQ 1: RCTs, nonrandomized controlled trials, cohort studies, case-control studies, observational, pre-post, case series GQ 2: All designs above plus qualitative studies GQ 3: All designs above plus qualitative studies, commentaries, editorials, reviews (systematic, scoping, narrative)	GQs 1–3: Case reports, dissertations, modeling studies, screening tool validation studies
Outcomes	GQs 1, 2: No a priori outcomes; all types of outcomes reported in studies, including process outcomes, social risk outcomes, physiologic and behavioral health outcomes, health utilization outcomes, cost outcomes, and provider outcomes	GQ 1: Costs of program only (e.g., van/car service)

Table 2. Social Risk Domains Addressed in Pediatric and Adult Studies

Population	Social Risk Domain						
	Food Insecurity	Housing Instability	Transportation Needs	Utility Needs	Interpersonal Violence	Education	Financial Strain
	No. studies (No. participants)						
Pediatric (k = 30)	24 (54,587)	15 (25,335)	7 (23,256)	9 (27,087)	2 (7,021)	10 (17,817)	12 (16,103)
Adult (k = 67)	39 (85,844)	40 (5,851,974)	27 (77,418)	12 (48,434)	3 (1,650)	13 (56,047)	34 (82,059)

Table 3. Frequency of Nontarget Social Risk Domains Addressed in Interventions

Nontarget Social Risk Domain	Frequency
Healthcare and medication access/affordability	40
Substance use	26
Employment	31
Mental health	29
Legal services/needs	29
Abuse (intimate partner violence, elder abuse, or child maltreatment)	17
Social support/isolation	11
Childcare access and affordability	18
Healthy diet	10
Immigration/refugee status	8
Language barrier	4
Disabilities	8
General stress	3
Caregiver responsibilities	4
Physical activity	6
Safety equipment	6
Neighborhood/built environment	2
Early child education and development	3
Literacy	3
Incarceration	2
Race and ethnicity	1

Nontarget domains: Social risk domains other than housing instability, food insecurity, transportation difficulties, utility needs, interpersonal safety, education, and financial strain.

Table 4. Nonsocial Need Intervention Components

Nonsocial Need Intervention Component	Frequency
Case management/care coordination	12
Health advice/education	7
In-home healthcare (postbirth nursing care, health checks)	5
Standard medical/emergency care	5
Preventive service scheduling and followup (screening, immunizations)	4
Pharmacy/medication management	4
Therapy (individual or group)	4
Condition-specific wraparound services	3
Referral to disease management program	1
Crisis intervention	1
Laboratory/medical testing	1
Provision of adaptive equipment	1
Motivational interviewing to increase adherence	1

Table 5. Social Risk Domains Addressed by Study Design

Study Design	Food Insecurity	Housing Instability	Transportation Needs	Utility Needs	Interpersonal Violence	Education	Financial Strain
	No. studies (No. participants)						
RCT	10 (10,317)	15 (12,893)	8 (10,888)	7 (8,540)	1 (611)	5 (2,781)	12 (7,677)
Cohort study	9 (49321)	8 (55,671)	6 (41,795)	1 (34,225)	2 (571)	5 (49,627)	6 (55,334)
Pre-post	20 (11,244)	19 (12,051)	10 (23,165)	4 (8,188)	1 (466)	8 (3,761)	13 (22,244)
Observational without comparator	28 (70,915)	21 (5,800,607)	11 (25,561)	10 (24,898)	4 (8,002)	9 (18,791)	20 (26,519)

Note: Studies addressing multiple domains may include multiple target domains or a mix of target and nontarget domains.

Abbreviation: RCT = randomized, controlled trial.

Table 6. Frequency of Outcomes Reported in Studies Including a Comparator

Outcome Category	Outcome	Frequency
Process Outcomes	Referrals/resources provided	14
	Identified unmet needs	7
	Patient use of referrals	6
	Patients screened	5
	Patient awareness of clinical resource	2
	Number of social needs discussed	1
	Patient unmet desires to discuss social needs	1
	Patient satisfaction	1
	Provider documentation of social risk	1
	Patient confidence in finding community resources	1
Social Risk Outcomes	Receipt of public or other benefits	10
	Housing quality and status improved	10
	Reduction of unmet needs	7
	Resolution of food insecurity	7
	Economic security improved	6
	Utility/fuel assistance received	2
	Income changes	2
	Incarceration or re-entry into the criminal justice system	2
	Legal needs resolved	2
	Community integration	1
	Employment status changed	1
Physiologic and Behavioral Health Outcomes	Mental health status	12
	Changes in self-reported health	12
	Changes in substance use	6
	Quality of life	6
	Changes in dietary intake	5
	Child development outcomes	4
	Changes in functional outcomes	4
	Up-to-date immunizations	4
	Mortality	3
	Low birth weight	2
	Changes in physical activity	2
	Changes in stress	1
Healthcare Utilization Outcomes	Emergency department visits	26
	Inpatient admissions	18
	Preventive care utilization (well child visits)	9
	Outpatient visits	9
	Hospital days	6
	Hospital readmissions	5
	Medical home	4
	Missed appointments	3
	Frequency of healthcare use	1
	Adherence to treatment	1
	Clinic attendance rate	1
	Use of emergency transportation	1
	Posthospital primary care visit	1
	Adequacy of prenatal care	1
	Sobering center use	1

Table 6. Frequency of Outcomes Reported in Studies Including a Comparator

Outcome Category	Outcome	Frequency
Cost Outcomes	Return on investment/cost effectiveness	7
	Patient healthcare expenditures	6
	Insurance coverage	4
Provider Outcomes	Provider confidence in social needs knowledge and screening	4
	Provider comfort in administering intervention	4
	Provider awareness of available resources	4
	Time spent on intervention	2

Table 7. Outcomes Reported in Pediatric and Adult Studies

	Outcomes					
Population	**Process**	**Social Risk**	**Physiologic/ Behavioral Health**	**Healthcare Utilization**	**Cost**	**Clinician**
	No. studies (No. participants)					
Pediatric (k = 30)	21 (n=58,975)	14 (n=17,124)	10 (n=10,578)	4 (n=6,790)	3 (n=1,703)	2 (n=7,996)
Adult (k = 67)	26 (n=5,803,598)	22 (n=5,792,661)	21 (n=22,106)	30 (n=102,400)	14 (n=21,781)	7 (n=7,700)

Table 8. Example Recommendation Statement Text by Social Risk Domain

Social Risk Domain	Topic, Year	Example Text
Food Insecurity	Does not appear in recommendation statements	
Housing Instability	Screening for Latent Tuberculosis Infection in Adults, 2016	"Populations at increased risk for LTBI [latent tuberculosis infection] based on increased prevalence of active disease and increased risk of exposure include persons who were born in, or are former residents of, countries with increased tuberculosis prevalence and persons who live in, or have lived in, high-risk congregate settings (e.g., **homeless shelters** and correctional facilities)."
Transportation Needs	Does not appear in recommendation statements	
Education	Screening for Hepatitis B Virus Infection in Pregnant Women, 2019	"Older maternal age, race/ethnicity (non-Hispanic black and Asian populations), **lower education**, higher poverty levels, and lack of insurance coverage are risk factors for HBV [hepatitis B virus] infection among women."
	Screening for Speech and Language Delay Disorders in Children Age 5 Years or Younger, 2015	"...several risk factors have been reported to be associated with speech and language delay and disorders, including male sex, family history of speech and language impairment, **low parental educational level**, and perinatal risk factors."
Utility Needs	Does not appear in recommendation statements	
Interpersonal Violence	Screening for Suicide Risk in Adolescents, Adults, and Older Adults in Primary Care, 2014	"Other important risk factors for suicide attempt include serious adverse childhood events; family history of suicide; prejudice or discrimination associated with being lesbian, gay, bisexual, or transgender; access to lethal means; and possibly a **history of being bullied**, sleep disturbances, and such chronic medical conditions as epilepsy and chronic pain. In males, socioeconomic factors, such as low income, occupation, and unemployment, are also related to suicide risk."
Financial Strain	Screening for Autism Spectrum Disorder in Young Children, 2016	"Disparities have been observed in the frequency and age at which ASD [autism spectrum disorder] is diagnosed among children by race/ethnicity, **socioeconomic status**, and language of origin, creating concern that certain groups of children with ASD may be systematically underdiagnosed."
	Risk Assessment for Cardiovascular Disease With Nontraditional Risk Factors, 2018	"Studies are especially needed in more diverse populations (women, racial/ethnic minorities, persons of **lower socioeconomic status**), in whom assessment of nontraditional risk factors may help address the shortcomings of traditional risk models."

Table 8. Example Recommendation Statement Text by Social Risk Domain

Social Risk Domain	Topic, Year	Example Text
	Vision Screening in Children Ages 6 Months to 5 Years, 2017	"Studies show that screening rates among children vary by race/ethnicity and **family income**. Children whose families earned 200% or more above the federal poverty level were more likely to report vision screening than families with lower incomes."
Nontarget Domains: Race and Ethnicity	Prevention of Dental Caries in Children From Birth Through Age 5 Years, 2014	"**Racial and ethnic minority** children, as well as children living in low socioeconomic conditions, are at significantly increased risk for caries compared with White children and children who live in adequate to high socioeconomic conditions. Future studies on risk assessment and preventive interventions should enroll sufficient numbers of racial and ethnic minority children to understand the benefits and harms of interventions in these specific populations."
	Screening for Colorectal Cancer, 2016	"Male sex and black race are also associated with higher colorectal cancer incidence and mortality. Black adults have the highest incidence and mortality rates compared with other **racial/ethnic subgroups**. The reasons for these disparities are not entirely clear. Studies have documented inequalities in screening, diagnostic followup, and treatment; they also suggest that equal treatment generally seems to produce equal outcomes."
	Screening for Preeclampsia, 2017	"Preeclampsia is more prevalent among **African American women** than among white women. Differences in prevalence may be, in part, due to African American women being disproportionally affected by risk factors for preeclampsia. African American women also have case fatality rates related to preeclampsia 3 times higher than rates among white women. Inequalities in access to adequate prenatal care may contribute to poor outcomes associated with preeclampsia in African American women."
Nontarget Domains: Substance Use	Screening for Hepatitis C Virus Infection in Adults, 2013	"The most important risk factor for HCV [hepatitis C virus] infection is past or current **injection drug use**, with most studies reporting a prevalence of 50% of more."
	Screening for Osteoporosis to Prevent Fractures, 2018	"...clinicians should first consider factors associated with increased risk of osteoporotic fractures. These include parental history of hip fracture, **smoking**, **excessive alcohol consumption**, and low body weight."

Key Informant Interview Guides

Questions for researchers

1. Could you please start by taking a few minutes to **tell us a little about the work you've done** related to social determinants of health? [Probe for details about relevant efforts, collaborations, organizations, projects/research that they mention]

We're conducting a search for published literature for this project, but we know that much of the relevant literature may be difficult to find and may not be identified with standard searching strategies. We're speaking to researchers in the field like you to be sure we capture key articles and research. [Reminder about social determinant domains of interest to USPSTF and focus on healthcare settings, especially primary care]

2. If you were to **pick 1 to 2 studies** that you think provide the highest-quality evidence on how *intervening on* social needs impacts health outcomes, what would they be? What about the best *studies of screening* for health-related social needs? What would be your choice for the best *implementation research*?

We've been thinking about a wide range of outcomes that can be impacted by healthcare activities related to social adversity. They include process measures, like how many people were screened and did they connect with available resources, as well as health outcomes, such as quality of life or mortality.

3. Do you have any **favorite studies that evaluate the effects** of screening or interventions for social needs on **health outcomes**? What about favorite studies that **report process outcomes** like the number of patients screened for social needs or the number who were connected with available resources to address social needs?

4. Are you aware of any studies or other reports that explore the **potential unintended consequences or tradeoffs** of *screening* for social needs to patients or providers? What about potential unintended consequences of *interventions* to address social needs?

5. Are there any **studies currently underway** that you're excited to see the results from that examine the impacts of *interventions* for health-related social needs? [Prompt for who is leading the study and the timing of completion] What about studies that are examining *screening* activities?

6. Do you know of any **recent or upcoming professional conferences** or other proceedings that can guide our exploration of research in this field?

7. Part of our work will involve highlighting **key gaps** in the existing evidence on effectiveness and implementation of both screening and interventions for health-related social needs.

    a. What would you prioritize as the key gaps in this area?
    b. What kind of research do you think is needed to fill these gaps?

8. Are there any **additional articles or other materials you suggest we read**, such as key commentaries or editorials, specific experts we should talk to, or organizations you recommend we look at?

9. Is there anything else you would like to tell us about before we finish?

Thank you!

Appendix A Figure 1. Literature Flow Diagram

Questions for implementation experts

1. Could you please start by taking a few minutes to tell us a little about the **work you've done** related to social determinants of health? [Probe for details about relevant efforts, collaborations, organizations, projects/research that they mention]

This interview will be in two parts. We'd first like to talk to you about **screening** for health-related social needs. The latter half of the interview will focus on interventions to address identified social needs. [Reminder of focus on screening in healthcare setting, such as primary care, or applicable to such settings]

2. Which **screening tools** have you had experience with?

    a. Why did you select that tool?
    b. How have you used the tool? What format or mode of delivery did you use (e.g., in-person interview, patient-completed on paper vs. electronically)? In what settings have you used it?
    c. What do you like or not like about the tool?
    d. Do you have a sense of how [other] clinicians have reacted to the screening instrument?

3. What do you think are the **most important social needs** to identify in healthcare? Why?

4. What are the **major challenges** you've experienced around implementing screening for social needs in healthcare settings? [Prompt for challenges from patient, clinician, and health system perspectives]

    [Possible prompts] lack of guidance on which patients to screen; lack of guidance about which screening tool to use; how to fit screening into clinical workflows; patient lack of comfort with reporting social needs; staff comfort with screening; staff training

5. What are your thoughts on **how these challenges** might be addressed? [Ask about each of the challenges the Key Informant has identified]

We'd like to focus next on **interventions** to address identified social needs.

6. What **interventions** to address social needs have you had experience with?

    a. How did you identify these interventions?
    b. How have you been able to gauge the impacts of these interventions?

7. What are the **major challenges** from the healthcare delivery perspective around linking patients with community-based resources that can help reduce the burden of health-related social needs?

    [Possible prompts] not knowing how to identify interventions/resources for those who screen positive

8. What are your thoughts on **how these challenges might be addressed**? [Ask about each of the challenges the Key Informant has identified]

    [Possible prompts] staffing, strategy/knowledge for keeping local resources lists current, partnerships/relationships with community organizations

9. How might new research, evidence, or guideline groups **help address the challenges** of implementing screening and interventions for health-related social needs care within healthcare?

Appendix A Figure 1. Literature Flow Diagram

10. Are there **any articles or other materials you suggest** we read, such as key commentaries or editorials, specific experts we should talk to, or organizations you recommend we look at that you would consider the best examples of where clinical practice groups are assessing for social risk factors or trying to address social needs?

11. Is there anything else you would like to tell us about before we finish?

Thank you!

Appendix A Figure 1. Literature Flow Diagram

Social Determinants of Health Search Strategies

Date: 12/14/2018

Sources Searched	Number of items
Cochrane Database of Systematic Reviews (Wiley Cochrane Library)	31
Cochrane Central Register of Controlled Trials (Wiley Cochrane Library)	1824
Ovid MEDLINE	13090
Sociological Abstracts and Social Services Abstracts (ProQuest)	4742
Total (without duplicates removed)	19,687

Key:
/ = MeSH subject heading
* = truncation
ab = word in abstract
adj# = adjacent within # number of words
kf = keyword heading word
kw= keyword
near/# = adjacent within x number of words
NEXT = immediately adjacent
su = subject
ti = word in title

Cochrane Library
Cochrane Database of Systematic Reviews
Issue 12 of 12, December 2018
Cochrane Central Register of Controlled Trials
Issue 12 of 12, December 2018

#1 social*:ti,ab,kw near/1 determin*:ti,ab,kw
#2 (determinant* or determinate*):ti,ab,kw near/2 health:ti,ab,kw
#3 (social* or socio*):ti,ab,kw near/1 condition*:ti,ab,kw
#4 (social* or socio*):ti,ab,kw near/1 environment*:ti,ab,kw
#5 (social* or socio*):ti,ab,kw near/1 (factor* or gradient*):ti,ab,kw
#6 (social* or socio*):ti,ab,kw near/1 (need* or require*):ti,ab,kw
#7 (social* or socio*):ti,ab,kw near/1 (equit* or inequit* or disparit* or equal* or inequal*):ti,ab,kw
#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
#9 (social* or socio*):ti,ab,kw near/1 risk*:ti,ab,kw
#10 (social* or socio*):ti,ab,kw near/1 (status* or circumstance* or position* or class*):ti,ab,kw
#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
#12 food:ti,ab,kw next desert*:ti,ab,kw
#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
#14 (homeless* or houseless*):ti,ab,kw
#15 Transportation*:ti,ab,kw
#16 commut*:ti,ab,kw
#17 (literacy or literate or illitera*):ti,ab,kw
#18 read*:ti,ab,kw near/2 (proficien* or skill* or comprehension or level*):ti,ab,kw
#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
#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

Appendix A Figure 1. Literature Flow Diagram

#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
#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
#23 (poverty or indigent* or indigency or impoverish*):ti,
#24 unemployment:ti,ab,kw
#25 unemployed:ti,ab,kw
#26 underemployed:ti,ab,kw
#27 (occupation* or job):ti,ab,kw near/2 (status or level or class):ti,ab,kw
#28 jobless*:ti,ab,kw
#29 workless*:ti,ab,kw
#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
#31 {or #1-#30}
#32 screen*:ti,ab,kw
#33 (instrument* or tool*):ti
#34 #32 OR #33
#35 intervention*:ti,ab,kw
#36 need*:ti,ab,kw near/2 (assessment* or evaluat* or determin*):ti,ab,kw
#37 program*:ti,ab,kw near/2 develop*:ti,ab,kw
#38 pilot:ti,ab,kw next project*:ti,ab,kw
#39 food:ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#40 (hous* or home):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#41 transportation*:ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#42 (education* or academic* or schola* or school*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#43 (employment or occupation* or job*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#44 (economic* or income* or financ*):ti,ab,kw near/2 (assist* or aid or help*):ti,ab,kw
#45 patient*:ti,ab,kw near/1 navigat*:ti,ab,kw
#46 patient*:ti,ab,kw near/2 advoca*:ti,ab,kw
#47 (staff or employee*):ti,ab,kw near/2 (develop* or train* or educat* or curricul*):ti,ab,kw
#48 (social* or socio* or communit* or neighbor* or neighbour*):ti,ab,kw near/3 (refer* or partner*):ti,ab,kw
#49 {or #35-#48}
#50 #34 or #49
#51 #31 AND #50
#52 primary:ti,ab,kw next care:ti,ab,kw
#53 comprehensive:ti,ab,kw next care:ti,ab,kw
#54 "primary health care":ti,ab,kw
#55 "comprehensive health care":ti,ab,kw
#56 comprehensive:ti,ab,kw next healthcare:ti,ab,kw
#57 primary:ti,ab,kw next healthcare:ti,ab,kw
#58 (safety-net:ti,ab,kw or "safety net":ti,ab,kw) next clinic*:ti,ab,kw
#59 "community health center":ti,ab,kw
#60 "community health centers":ti,ab,kw
#61 "federally qualified health center":ti,ab,kw
#62 "federally qualified health centers":ti,ab,kw
#63 fqhc:ti,ab,kw
#64 (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
#65 {or #52-#64}
#66 #51 AND #65

Appendix A Figure 1. Literature Flow Diagram

Ovid MEDLINE

Database: Ovid MEDLINE(R) <1946 to December Week 1 2018>, Ovid MEDLINE(R) Epub Ahead of Print <December 13, 2018>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <December 13, 2018>, Ovid MEDLINE(R) Daily Update <December 13, 2018>

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1 "Social Determinants of Health"/
2 Social Conditions/
3 Social Environment/
4 Social Class/
5 Socioeconomic Factors/
6 (social* adj1 determin*).ti,ab,kf.
7 ((determinant* or determinate*) adj2 health).ti,ab,kf.
8 ((social* or socio*) adj1 condition*).ti,ab,kf.
9 ((social* or socio*) adj1 environment*).ti,ab,kf.
10 ((social* or socio*) adj1 (factor* or gradient*)).ti,ab,kf.
11 ((social* or socio*) adj1 (need* or require*)).ti,ab,kf.
12 ((social* or socio*) adj1 (equit* or inequit* or disparit* or equal* or inequal*)).ti,ab,kf.
13 ((social* or socio*) adj1 (hardship* or depriv* or challeng* or difficult* or barrier* or vulnerab* or disadvantag*)).ti,ab,kf.
14 ((social* or socio*) adj1 risk*).ti,ab,kf.
15 ((social* or socio*) adj1 (status* or circumstance* or position* or class*)).ti,ab,kf.
16 Food Supply/
17 Hunger/
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.
19 food desert*.ti,ab,kf.
20 HOUSING/
21 Almshouses/
22 Public Housing/
23 ((hous* 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.
24 Homeless Persons/
25 Homeless Youth/
26 (homeless* or houseless*).ti,ab,kf.
27 TRANSPORTATION/
28 Transportation Facilities/
29 Parking Facilities/
30 transportation*.ti.
31 commut*.ti,ab,kf.
32 Educational Status/
33 Academic Failure/
34 Literacy/
35 READING/
36 (literacy or literate or illitera*).ti,ab,kf.
37 (read* adj2 (proficien* or skill* or comprehension or level*)).ti,ab,kf.
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.
39 ((education* or academic* or schola* or school*) adj2 (opportunit* or disadvantage* or advantage* or marginal* or disenfranchis* or vulnerab*)).ti,ab,kf.
40 Poverty/
41 poverty areas/
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.
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.
44 (poverty or indigent* or indigency or impoverish*).ti.
45 Employment/

46 UNEMPLOYMENT/
47 unemployment.ti,ab,kf.
48 unemployed.ti,ab,kf.
49 underemploy*.ti,ab,kf.
50 (occupation* adj2 (status or level or class)).ti,ab,kf.
51 jobless*.ti,ab,kf.
52 workless*.ti,ab,kf.
53 (employment adj2 (status or securit* or insecurit* or marginal* or precarious* or terminat*)).ti,ab,kf.
54 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
55 Mass Screening/
56 "Surveys and Questionnaires"/
57 screen*.ti,ab,kf.
58 (instrument* or tool*).ti.
59 55 or 56 or 57 or 58
60 Needs Assessment/
61 Program Development/
62 "Referral and Consultation"/
63 Pilot Projects/
64 Social Welfare/
65 Food Assistance/
66 Patient Navigation/
67 Patient Advocacy/
68 Inservice Training/
69 Staff Development/
70 intervention*.ti,ab,kf.
71 (need* adj2 (assessment* or evaluat* or determin*)).ti,ab,kf.
72 (food adj2 (assist* or aid or help*)).ti,ab,kf.
73 ((hous* or home) adj2 (assist* or aid or help*)).ti,ab,kf.
74 (transportation adj2 (assist* or aid or help*)).ti,ab,kf.
75 ((education* or academic* or schola* or school*) adj2 (assist* or aid or help*)).ti,ab,kf.
76 ((employment or occupation* or job*) adj2 (assist* or aid or help*)).ti,ab,kf.
77 ((economic* or income* or financ*) adj2 (assist* or aid or help*)).ti,ab,kf.
78 patient navigat*.ti,ab,kf.
79 patient advoca*.ti,ab,kf.
80 ((staff or employee*) adj2 (develop* or train* or educat* or curricul*)).ti,ab,kf.
81 ((social* or socio* or communit* or neighbor* or neighbour*) adj3 (refer* or partner*)).ti,ab,kf.
82 60 or 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 or 75 or 76 or 77 or 78 or 79 or 80 or 81
83 59 or 82
84 Primary Health Care/
85 Comprehensive Health Care/
86 General Practice/
87 General Practitioners/
88 Family Practice/
89 Physicians, Family/
90 Physicians, Primary Care/
91 Primary Care Nursing/
92 Nurse Practitioners/
93 Family Nurse Practitioners/
94 Pediatric Nurse Practitioners/
95 Physician Assistants/
96 Family Nursing/
97 Community Health Nursing/

98 Community Health Centers/
99 Community Mental Health Centers/
100 Community Health Services/
101 Community Mental Health Services/
102 Community Health Workers/
103 Safety-net Providers/
104 primary care.ti,ab,kf.
105 primary health care.ti,ab,kf.
106 ((family or general or primary) adj1 (medicine or practice or practitioner* or physician* or doctor* or provider* or clinic* or clinician*)).ti,ab,kf.
107 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106
108 54 and 83 and 107
109 limit 108 to case reports
110 108 not 109
111 limit 110 to english language

Sociological Abstracts and Social Services Abstracts via ProQuest

General Social Concepts |Screening | Interventions | Health Concepts
((SU.EXACT("Social Conditions") OR SU.EXACT("Socioeconomic Factors") OR SU.EXACT("Socioeconomic Status") OR SU.EXACT("Sociocultural Factors") OR SU.EXACT("Sociodemographic Factors") OR SU.EXACT("Social Factors") OR SU.EXACT("Social Problems") OR SU.EXACT("Social Background") OR SU.EXACT("Social Inequality") OR SU.EXACT("Opportunity Structures") OR AB,TI(social NEAR/1 determinant*)) AND ((SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("Referral") OR SU.EXACT("treatment outcomes")) OR (SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Food Insecurity Concepts |Screening | Interventions | Health Concepts
(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND (((SU.EXACT("Food Security") OR SU.EXACT("hunger")) OR (AB,TI(food) NEAR/2 AB,TI(secur* OR insecur* OR unstable OR stable OR stabilit* OR instabilit* OR uncertain* OR vulnerab* OR hardship* OR insufficien* OR stress*))) OR AB,TI(food desert*))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Housing Concepts |Screening | Interventions | Health Concepts
(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND (SU.EXACT("Housing") OR SU.EXACT("Home Environment") OR

SU.EXACT("Homelessness") OR SU.EXACT("Public Housing") OR SU.EXACT("Residential Segregation") OR SU.EXACT("Living Conditions") OR (AB,TI(hous* OR home) NEAR/2 AB,TI(secur* OR insecur* OR unstable OR stable OR stabilit* OR instabilit* OR uncertain* OR vulnerab* OR hardship* OR insufficien* OR stress*)) OR AB,TI(homeless*))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Education Concepts |Screening | Interventions | Health Concepts

(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND (SU.EXACT("Education") OR SU.EXACT("Academic Achievement") OR SU.EXACT("Educational Attainment") OR SU.EXACT("Educational Inequality") OR SU.EXACT("Educational Opportunities") OR SU.EXACT("Literacy") OR SU.EXACT("Reading") OR (AB,TI(education* OR academic* OR schola* OR school*) NEAR/2 AB,TI(opportunit* OR disadvantage* OR advantage* OR marginal* OR disenfranchis* OR vulnerab*)))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Transportation Concepts |Screening | Interventions | Health Concepts

(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND (SU.EXACT("Transportation") OR SU.EXACT("Public Transportation") OR SU.EXACT("Commuting (Travel)") OR (TI(Transportation*) OR AB,TI(commut*)))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Employment Concepts |Screening | Interventions | Health Concepts

(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND ((SU.EXACT("Employment") OR SU.EXACT("Occupational Status") OR SU.EXACT("Employment Opportunities") OR SU.EXACT("Dislocated Workers") OR SU.EXACT("Unemployment") OR (SU.EXACT("Underemployment") AND OP AND SU.EXACT("Unemployment Rates"))) OR SU.EXACT("Youth Unemployment") OR (AB,TI(employment) NEAR/2 AB,TI(status OR securit* OR insecurit* OR marginal* OR precarious* OR terminat*)))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Appendix A Figure 1. Literature Flow Diagram

Economic Concepts |Screening | Interventions | Health Concepts

(((SU.EXACT("Diagnosis") OR SU.EXACT("Medical Diagnosis") OR SU.EXACT("Psychiatric Diagnosis") OR AB,TI(screen*)) OR (SU.EXACT("Intervention") OR SU.EXACT("Treatment") OR SU.EXACT("Treatment Methods") OR SU.EXACT("Treatment Programs") OR SU.EXACT("Program Implementation") OR SU.EXACT("Program Evaluation") OR SU.EXACT("treatment outcomes") OR SU.EXACT("Referral"))) AND ((((SU.EXACT("Economic Factors") OR (SU.EXACT("Economic Problems") AND OR61)) OR SU.EXACT("Low Income Groups") OR SU.EXACT("Poverty") OR SU.EXACT("Rural Poverty") OR SU.EXACT("Urban Poverty") OR SU.EXACT("Depression Economics") OR (SU.EXACT("Income Inequality") AND OR68)) OR SU.EXACT("Child Poverty") OR SU.EXACT("Welfare Recipients") OR SU.EXACT("Lower Class") OR SU.EXACT("Under Class") OR SU.EXACT("Underclass") OR SU.EXACT("Disadvantaged")) OR (TI(economic* OR income* OR financ*) NEAR/2 TI(achieve* OR status OR attain* OR equit* OR inequit* OR disparit* OR equal* OR inequalit* OR level* OR background*)) OR (TI(economic* OR income* OR financ*) NEAR/2 TI(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 TI(poverty OR indigent* OR indigency OR impoverish*))) AND (TI,AB(health* OR medicine OR medical OR illness OR wellness OR clinic* OR hospital* OR physician* OR doctor* OR nurs*) OR (SU.EXACT("Health") OR SU.EXACT("Health Care") OR SU.EXACT("Medicine") OR SU.EXACT("Mental Illness") OR SU.EXACT("diseases") OR SU.EXACT("primary health care") OR SU.EXACT("clinics") OR SU.EXACT("delivery systems") OR SU.EXACT("illness") OR SU.EXACT("Health Care Services")))

Appendix A Figure 1. Literature Flow Diagram

In-Process Studies Searches
Searches conducted in October 2019; results limited to studies conducted in very high HDI countries; studies of any design and/or methodology included.

Clinicaltrials.gov Search
((((social determinant*)) OR(social need*)) AND(food OR hous* OR transportation OR utilit* OR violen* OR educat* OR financ*))

HSRProj Searches
Food insecurity:
((((social determinant*)) OR(social need*)) AND(food insecurit*)

Housing instability:
((((social determinant*)) OR(social need*)) AND(hous* OR homeless* OR insecurit*)

Transportation:
((((social determinant*)) OR(social need*)) AND(transport*)

Utilities:
((((social determinant*)) OR(social need*)) AND(utilit*)

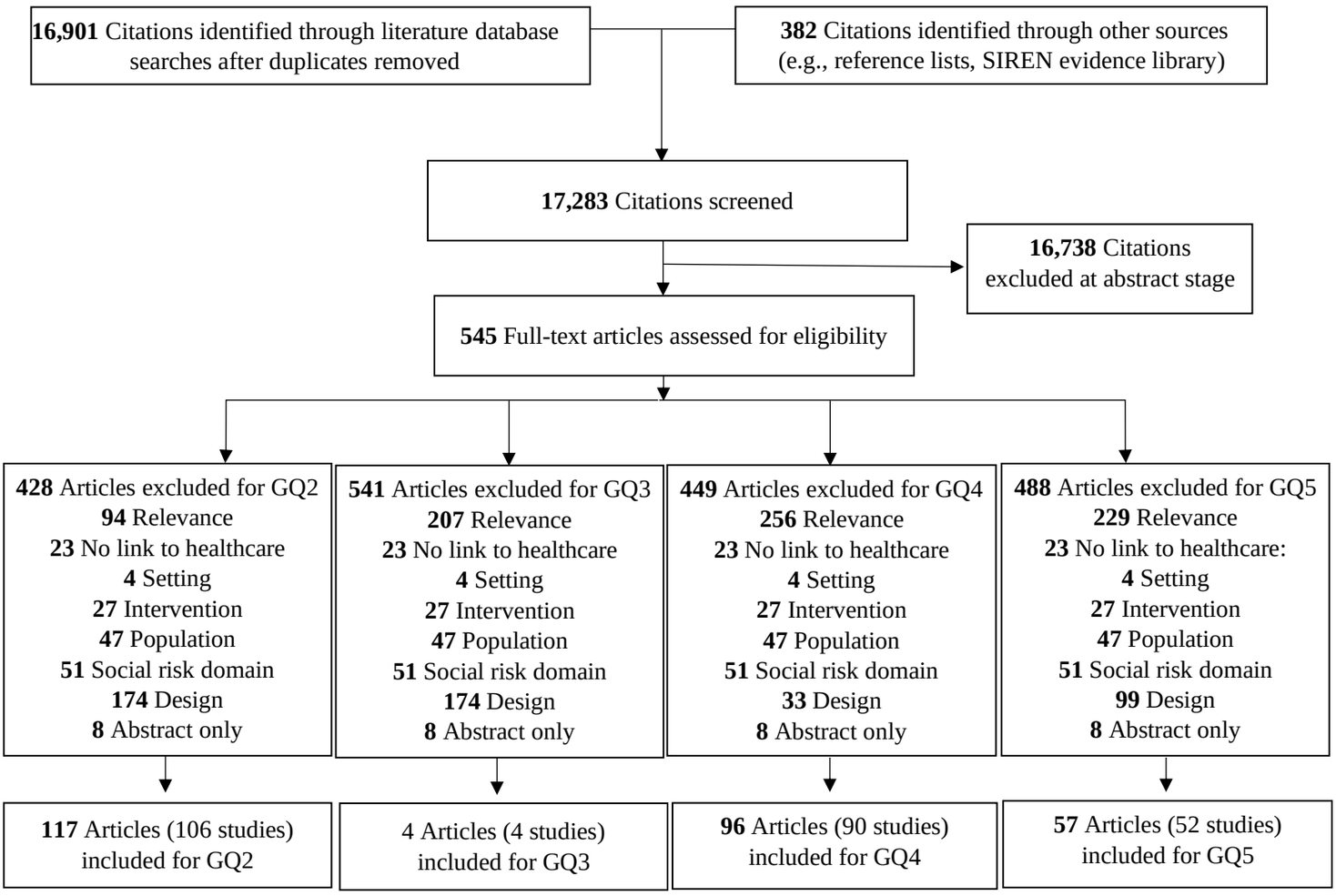
Interpersonal violence:
((((social determinant*)) OR(social need*)) AND(violen*)

Education:
((((social determinant*)) OR(social need*)) AND (adult) AND (educat* OR literac*)
"adult health literacy"

Financial strain:
((((social determinant*)) OR(social need*)) AND(povert* OR financ* OR mone*)
"social determinant of health, poverty"

Legal assistance:
((((social determinant*)) OR(social need*)) AND(legal)

Appendix A Figure 1. Literature Flow Diagram



Appendix B Table 1. Multidomain Social Risk Screening Tools Included in Henrikson Review*

Tool Name	Format	# of Items	Domains Included																														
			Socio-demographic			Economic Stability							Education		Housing	Neighborhood and Built Environment/Social and Community Context							Health Status				Health Behaviors					Healthcare Access
			Race and ethnicity	Veteran status	Immigration	Income	Financial strain	Food insecurity	Transportation needs	Utility needs	Employment	Childcare	Education	Language	Housing instability	Civic engagement	Migrant farm work	Interpersonal safety	Public safety	Incarceration history	Social isolation	Intimate partner violence	General health/QOL	Behavioral/mental health	Need help with ADLs	Stress	Diet	Tobacco use	Alcohol and/or drug use	Physical activity	Depression	
Accountable Health Communities Health-Related Social Needs Screening Tool[1]	Paper or electronic	10 + 16 supplemental					✓	✓	✓	✓	✓		✓	✓	✓			✓			✓	✓		✓	✓	✓		✓	✓	✓	✓	
IHELP Social History[2]†	Paper	10			✓		✓	✓							✓							✓										✓
Institute of Medicine[3]	EHR	11	✓				✓	✓		✓			✓		✓						✓	✓				✓		✓	✓	✓	✓	
Health Leads Social Needs Screening Toolkit[4]	Paper or electronic	13 + 7 optional	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	
WE CARE Survey[5]†	Paper	6						✓		✓	✓	✓	✓		✓																	
WellRx Questionnaire[6]	Paper	11						✓	✓	✓	✓	✓	✓		✓			✓				✓							✓			
Health Begins[7]†	Paper or verbal	28			✓		✓	✓			✓		✓		✓	✓					✓	✓				✓				✓		

Appendix B Table 1. Multidomain Social Risk Screening Tools Included in Henrikson Review*

PRAPARE[8]†	EHR	17 + 4 optional	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓				✓					✓
Medical-Legal Partnership (MLP)[9]	Paper	10			✓	✓		✓		✓					✓								✓									✓
Total Health Assessment Questionnaire for Medicare Members[10]	Paper, verbal, or electronic	36						✓					✓							✓		✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Social History Template[11,12]	NR	7				✓	✓	✓		✓					✓								✓									✓	
Legal Checkup[13]	NR	18			✓		✓	✓		✓	✓	✓	✓		✓								✓	✓	✓								✓
SEEK: Safe Environment for Every Kid[14]†	Paper, verbal, or electronic	20						✓				✓							✓		✓	✓	✓			✓		✓				✓	
Social Needs Checklist[15]†	NR	NR				✓	✓		✓		✓										✓		✓		✓	✓							
Urban Life Stressors Scale[16]	Electronic or verbal	21	✓				✓		✓			✓	✓						✓	✓			✓	✓						✓				
Partners in Health Survey[17]†	Verbal	118				✓			✓				✓		✓	✓			✓		✓	✓	✓	✓				✓		✓	✓		✓
Survey of Well-Being of Young Children[18]	Electronic or paper	10						✓													✓	✓				✓		✓	✓			✓
Your Current Life Situation[19]	Paper	9 + 21 optional					✓	✓	✓	✓		✓	✓	✓		✓			✓	✓		✓	✓	✓		✓	✓			✓			✓
Totals			4	1	6	5	11	15	8	10	8	8	12	3	13	2	1	5	6	1	11	16	7	3	4	9	4	6	9	6	6	7

* Limited to tools intended for the primary care setting (i.e., not inpatient-oriented tools) and that address at least one of the social risk domains targeted in this Technical Brief.
† Performed reliability and validity tests. **Abbreviations:** NR=not reported; EHR=electronic health record; ✓=essential domain, ✓=supplemental/optional domain (as defined by tool developers).

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
Accountable Health Communities (AHCs) Health-Related Social Needs Screening Tool*[1]	1. Within the past 12 months, you worried that your food would run out before you got money to buy more: *(Often true; sometimes true; never true)* 2. Within the past 12 months, the food you bought just didn't last and you didn't have money to get more: *(Often true; sometimes true; never true)*	1. What is your living situation today? *(I have a steady place to live; I have a steady place to live but I am worried about losing it in the future; I do not have a steady place to live)* 2. Think about the place you live. Do you have any problems with the following? Choose ALL that apply *(pests, mold, lead paint/pipes, lack of heat, oven or stove not working, smoke detectors missing or not working, water leaks, N/A)*	1. In the past 12 months, has lack of reliable transportation kept you from medical appointments, meetings, work, or from getting things needed for daily living?	1. In the past 12 months, has the electric, gas, oil, or water company threatened to shut off services in your home? *(Yes; no; already shut off)*	1. How often does anyone, including family and friends, physically hurt you? *(Never; rarely; sometimes; fairly often; frequently)* 2. How often does anyone, including family and friends, insult or talk down to you? *(Never; rarely; sometimes; fairly often; frequently)* 3. How often does anyone, including family and friends, threaten you with harm? *(Never; rarely; sometimes; fairly often; frequently)* 4. How often does anyone, including family and friends, scream or curse at you? *(Never; rarely; sometimes; fairly often; frequently)*	1. Do you want help with school or training? For example, starting or completing job training or getting a high school diploma, GED, or equivalent.	1. How hard is it for you to pay for the very basics like food, housing, medical care, and heating? Would you say it is: *(very hard; somewhat hard; not hard at all)?*
Health Begins[20]	1. Which of the following describes the amount of food your household has to eat: *(Enough to eat; sometimes not enough; often not enough)* 2. How many pieces of fruit, of any sort, do you eat on a typical day? *(#/day)*	1. In the last month, have you slept outside, in a shelter, or in a place not meant for sleeping? 2. In the last month, have you had concerns about the quality of your housing?	1. How often is it difficult to get transportation to or from your medical or followup appointments? *(N/A; never; sometimes; often; always)*	N/A	N/A	1. What is the highest level of school you have completed? 2. What is the highest degree you earned?	1. Do you ever have problems making ends meet at the end of the month? 2. How hard is it for you to pay for the very basics

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
	3. How many portions of vegetables, excluding potatoes, do you eat on a typical day? *(#/day)*	3. In the last 12 months, how many times have you or your family moved from one home to another? *(Report #)*					like food, housing, medical care, and heating? Would you say it is:*(Very hard; somewhat hard; not hard at all)?*
IHELP Social History Tool[2]	1. Do you have any concerns about having enough food? 2. Have you ever been worried whether your food would run out before you got money to buy more? 3. Within the past year, has the food you bought ever not lasted and you didn't have money to get more?	1. Do you have any concerns about poor housing conditions like mice, mold, or cockroaches? 2. Do you have any concerns about being evicted or not being able to pay the rent? 3. Do you have any concerns about not being able to pay your mortgage?	N/A	N/A	N/A	N/A	1. Do you have any concerns about making ends meet?
Institute of Medicine (IOM)[3]	1. Which of the following describes the amount of food your household has to eat? *(Enough to eat; sometimes not enough to eat; often not enough to eat)*	(IOM considers this covered with the financial strain item)	N/A	(IOM considers this covered with the financial strain item)	N/A	1. How often do you have someone (like a family member, friend, hospital/ clinic worker or caregiver) help you read hospital materials? (*Always; often; sometimes; occasionally; never*) 2. How often do you have	1. How hard is it for you to pay for the very basics like food, housing, medical care, and heating? Would you say it is: *(Hard; Somewhat hard; not hard at all)?*

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
						problems learning about your medical condition because of difficulty understanding written information? *(All of the time, most of the time, some of the time, a little of the time, none of the time)* 3. How confident are you filling out forms by yourself? *(All of the time, most of the time, some of the time, a little of the time, none of the time)*	
Legal Checkup[21]	1. Check all that apply: (*Food stamps; WIC; food pantry; other*)	1. Check all that apply: (*Accommodations; arrearages; conditions; eviction; foreclosure; voucher transfer; shelter; other*)	N/A	1. Check all that apply: (*Electric; gas; phone; water*)	N/A	1. Check all that apply: *(Accommodations; discipline; evaluation; enrollment; homebound; special education; retention; qualified personnel; other)*	1. Check all that apply: (*Bankruptcy; collections; garnishment; lawsuit pending; other)*

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
Medical-Legal Partnership (MLP)[9]	1. Within the past 12 months we worried whether our food would run out before we got money to buy more. 2. Within the past 12 months the food we bought just didn't last and we didn't have money to get more. 3. Have your food stamps, WIC, or cash assistance stopped or been reduced and you don't know why?	1. Do you have problems with your LANDLORD getting home repairs (mold, rodents, leaks)?	N/A	1. In the past 30 days, has your LANDLORD threatened to evict you or turn off utilities? 2. Have you received a shutoff notice from any utility (gas, electric, water) in the past 30 days?	N/A	N/A	N/A
Partners in Health Survey[17]	N/A	1. Housing status *(Rent; own; other)* 2. Monthly housing costs *($/month)* 3. Rate house *(Excellent; very good; good; fair; poor)*	1. Own car? 2. Easy or hard to get around *(Very easy – very hard)*	N/A	N/A	1. Education *(Never-college+; 6 levels)*	1. Income *(<10,000 – 75,000+)* 2. Currently work for pay? 3. When did you last work? *(> or < year ago)*
PRAPARE Tool[8]	1. In the past year, have you or any of your family members you live with been unable to get food when it was really needed?	1. What is your housing situation today? *(I have housing; I do not have housing; I choose not to answer this question)* 2. Are you worried about losing your housing? *(Yes; no; I choose not to answer this question)*	1. Has lack of transportation kept you from medical appointments, meetings, work, or from getting things needed for daily living? Check all that apply: *(Yes, it has kept me from medical appointments or*	1. In the past year, have you or any of your family members you live with been unable to get utilities when they were really needed?	1. Do you feel physically and emotionally safe where you currently live? *(Yes; no; unsure; choose not to answer)*	1. What is the highest level of school that you have finished?	1. What is your current work situation? *(Unemployed and seeking work; part- time or temporary work; full-time work; otherwise unemployed but not seeking*

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
			from getting my medications; yes, it has kept me from nonmedical meetings, appointments, work, or from getting things that I need; no; choose not to answer)	2. In the past year, have you or any of your family members you live with been unable to get phone access when it was really needed?			*work; choose not to answer)* 2. During the past year, what was the total combined income for you and your family members you live with? This will help us determine if you are eligible for any benefits.
Safe Environment for Every Kid (SEEK)[14]	1. In the past 12 months, did you worry that your food would run out before you could buy more? 2. In the past 12 months, did the food you bought just not last and you didn't have money to get more?	N/A	N/A	N/A	N/A	N/A	N/A
Social History Template*[11,12]	1. In the past month, did anyone in your family go hungry because there was not enough money?	1. Problems with housing conditions (overcrowding, evictions, lead, utilities, mold, rodents)?	N/A	Addressed in housing question	N/A	N/A	1. Are you doing okay to make ends meet?
Social Needs Checklist[15] (measurement not described)	N/A	N/A	Transportation	N/A	N/A	N/A	Finances
Health Leads Social Needs Screening Toolkit*[4]	1. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	1. Are you worried that in the next 2 months, you may not have stable housing?	1. In the last 12 months, have you ever had to go without healthcare because you didn't	1. In the last 12 months, has the electric, gas, oil, or water company	N/A	1. Do you ever need help reading hospital materials?	1. In the last 12 months, was there a time when you needed to see a

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
			have a way to get there?	threated to shut off your services in your home?			doctor but could not because of cost?
Survey of Well-Being of Young Children (SWYC)[18]	1. Within the past 12 months, we worried about whether our food would run out before we got money to buy more: *(Never true; sometimes true; often true)*	N/A	N/A	N/A	N/A	N/A	N/A
Total Health Assessment Questionnaire for Medicare Members[10]	1. How many servings of fruits and vegetables do you eat in a typical day? *(None; 1; 2; 3; 4; 5+)* 2. Do you eat fewer than 2 meals a day? 3. Do you always have enough money to buy the food you need?	N/A	N/A	N/A	N/A	1. What is the highest grade or level of school that you have completed?	N/A
Urban Life Stressors Scale[16] (measurement not described)	N/A	N/A	Transportation	N/A	Exposure to violence; your neighborhood environment; other family problems; family violence; marriage or romantic relationships	Your education	Money or finances
WE CARE Survey*[5]	1. Do you always have enough food for your family? 1a. If No, **would you like help** with this? *(Yes; no; maybe later)*	1. Do you think you are at risk of becoming homeless? 1a. If Yes, **would you like help** with this? *(Yes; no; maybe later).*	N/A	1. Do you have trouble paying your heating bill for the winter? 1a. If Yes, **would you like help** with this? *(Yes; no; maybe later).*	N/A	1. Do you have a high school degree? 1a. If No, **would you like help** to get a GED? *(Yes; no; maybe later).*	N/A

Appendix B Table 2. Assessment of Social Risk Domains in Screening Tools

Social Risk Screening Tool	Social Risk Domain						
	Food	Housing	Transportation	Utilities	Interpersonal Violence	Education	Financial Strain
	Method of Assessment						
WellRx Questionnaire[6]	1. In the past 2 months, did you or others you live with eat smaller meals or skip meals because you didn't have enough money for food?	1. Are you homeless or worried that you might be in the future?	1. Do you have trouble finding or paying for a ride? *(Yes; no)*	1. Do you have trouble paying for your utilities (gas, electricity, phone)?	1. Do you feel unsafe in your daily life?	1. Do you need help getting more education?	N/A
Your Current Life Situation*[19]	1. In the past 3 months, how often have you worried that your food would run out before you had money to buy more? *(Never; sometimes; often; very often)* 2. Are you easily able to get enough healthy food to eat?	1. Which of the following best describes your current living situation? *(Live alone in my own home; live in a household with other people; live in a residential facility where meals and household help are routinely provided by staff; live in a facility such as a nursing home which provides meals and 24-hour nursing care; temporarily staying with a relative or friend; temporarily staying in a shelter or homeless; other)* 2. Do you have any concerns about your current living situation, like housing conditions, safety, and costs? *(Yes; no)* If YES: *(Condition of housing; lack of more permanent housing; ability to pay for housing or utilities; feeling safe; other)*	1. Has lack of transportation kept you from medical appointments or from doing things needed for daily living? Select all that apply: *(Kept me from medical appointments or from getting medications; kept me from doing things needed for daily living; not a problem for me)*	1. Do you have any concerns about your current living situation, like housing conditions, safety, and costs? (*Condition of housing, lack of more permanent housing, ability to pay for housing or utilities, feeling safe, other)*	1. During the past 12 months, have you been physically or emotionally hurt or felt threatened by a current or former spouse/partner, a caregiver, or someone else you know? *(Yes; no).* If YES: *(Current spouse/partner; former spouse/partner; caregiver; someone else)* 2. Has a spouse/partner, family member, or friend ever been financially abusive towards you? That is, stolen money from you, not paid back a loan, etc.?	1. How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy? *(Never; rarely; sometimes; often; always)*	1. In the past 3 months, did you have trouble paying for any of the following: *(Food; childcare; housing; debts; heat and electricity; medical needs; transportation; other; none of these)*

*Includes question(s) about desire for help with identified social need(s).

Abbreviations: GED = General Educational Development; N/A = not applicable; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Food Insecurity			
Aiyer, 2019[22]	Age 18 and over and resides in one of three targeted zip codes.	Not Targeted	Adults, Older Adults
Beck, 2014[23] Keeping Infants Nourished and Developing (KIND)	Families were eligible for KIND at each of their well or ill visits with their infant at the study site. If an infant's caregiver answered "yes" [to either of two screening questions addressing food insecurity] they were automatically eligible for KIND. The clinical provider was given latitude to deem families KIND-eligible should they identify food insecurity, stretching formula, or barriers to obtaining nutrition separate from the 2-question screen. Other reasons for eligibility include failure to thrive or need for formula supplementation, and complications with public benefit programs.	Not Targeted	Pediatrics
Berkowitz, 2018[24]	All Commonwealth Care Alliance members with at least 6 months of continuous meal program enrollment were eligible for this study. Enrollment in meal programs was determined by an authorizing physician and required a determination that the member was at nutritional risk (e.g., significant weight change, food scarcity, medical issues that require a specific diet). All study participants were dually eligible for Medicaid-Medicare.	Social Risks, Medicare/Medicaid Enrollment or Eligibility	Adults, Older Adults
Berkowitz, 2019[25]	Individuals had to be 18 years or older with a home address within 100 km of Community Servings (approximately the delivery radius for the program) and be captured in the Massachusetts All-Payer Claims Database at least 360 days before the enrollment date. Enrollment in the program was contingent on a clinician referral based on nutritional or social risk.	Social Risks	Adults, Older Adults
Bottino, 2017[26]	Eligibility criteria included: 1) routine visit for 3- to 10-year old's well-child care, 2) caregiver living with the child at least 5 days/week, 3) caregiver was comfortable taking a survey in English on a computer. Exclusion criteria included children with special healthcare needs and previous use of the assessment tool.	Not Targeted	Pediatrics
Burkhardt, 2012[27]	Second-year pediatric residents at a large pediatric primary care center.	Not Targeted	Adults
Cohen, 2017[28]	Adults age 18 years or older, currently enrolled in the Supplemental Nutrition Assistance Program (SNAP), English or Spanish speaking, and self-identified as a primary food shopper for the household.	Not Targeted	Adults, Older Adults
Cullen, 2019[29] Complete Eats	All Children's Hospital of Philadelphia ED patients and their siblings 2 to 18 years of age were eligible to receive a meal.	Not Targeted	Pediatrics
Cullen, 2021[30]	English-speaking caregivers who brought patients age <18 years to the ED, excluding those in critical condition.	Not Targeted	Pediatrics
Fritz, 2021[31]	English- or Spanish-speaking families of patients aged 0 to 18 screened for FI in the acute or primary care settings.	Not Targeted	Pediatrics
Hager, 2020[32]	All patients at Senior Care and Pediatrics outpatient clinics at Hennepin County Medical Center.	Not Targeted	Pediatrics, Older Adults
Hickey, 2020[33] Food As Medicine in Low-Income Youth (FAMILY)	Families who either self-disclosed food insecurity and/or who were identified by clinic staff as needing an emergency food supply (intervention cohort); age-matched patients in the clinic registry who had been seen within the preceding 2 years and did not utilize the FAMILY pantry.	Not Targeted	Pediatrics
Jones, 2020[34]	Families must have a pregnant woman or a child <6 years of age. Teams were allowed to further narrow their site-specific enrollment criteria; for instance, some sites enrolled families experiencing food insecurity.	Not Targeted	Pediatrics

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Navajo Fruit and Vegetable Prescription Program			
Kelly, 2020[35]	Adults 18 and over.	Not Targeted	Adults, Older Adults
Knowles, 2018[36]	English- and Spanish-speaking caregivers of children younger than age 5 years presenting for a well-child visit, 2-month, or 15-month well-visit.	Not Targeted	Pediatrics
Lane, 2014[37] Safe Environment for Every Kid (SEEK)	Parents of children younger than age 6 years seeking care at the study site (urban pediatric clinic).	Not Targeted	Pediatrics
Martel, 2018[38]	Emergency medicine residents.	Not Targeted	Adults
Morales, 2016[39]	Pregnant adult women age 18 years or older who visited the obstetric clinic at the Chelsea Healthcare Center.	Sex, Pregnancy	Adults
Palakshappa, 2017[40,41]	All children presenting for 2-, 15-, or 36-month well-child visit.	Not Targeted	Pediatrics
Smith, 2017[42]	Family medicine residents or faculty from three residencies in San Diego County, medical students from the University of California San Diego (UCSD), and medical students from the preclinical elective course associated with the UCSD Student-Run Free Clinic Project. Participants had to be present during protected resident or medical student didactic educational sessions.	Not Targeted	Adults
Smith, 2017[43]	All patients older than age 18 years seen for a medical visit at the study sites (student-run free clinics) were screened. In order to be eligible to be seen at study site, patients must be uninsured and unable to access care through the traditional safety net.	Not Targeted	Adults, Older Adults
Stenmark, 2018[44]	Parents at two pediatric clinic sites.	Not Targeted	Pediatrics
Swavely, 2019[45] Temple Food Insecurity Program (TFIP)	Adult patients age 18 years or older who were contacted within 48 to 72 hours following discharge from an inpatient stay.	Not Targeted	Adults, Older Adults
Housing Instability			
Beck, 2012[46] Cincinnati Child Health-Law Partnership (Child HeLP)	A case was any rented housing unit within a defined 19-building complex portfolio owned and managed by the same firm in which at least one patient ages 0 to 18 years lived who: 1) received outpatient primary care at [the study sites]; 2) had at least one clinically relevant housing risk reported during [study period] that was confirmed by a trained legal advocate, and 3) the landlord and/or building manager was not addressing the housing risk adequately. A clinically relevant housing risk was defined as a potentially remediable risk with a known association with adverse health outcomes, such as cockroach or rodent infestation, water damage, or poor ventilation.	Social Risks	Pediatrics
Fargo, 2017[47]	Veterans who presented for outpatient care and are not already engaged with Veterans Health Administration homeless programs.	Veteran Status	Adults, Older Adults
Mares, 2010[48-51] Collaborative Initiative to Help	Chronically homeless participants, self-reported physical or mental health problems, enrolled in the Collaborative Initiative to Help End Chronic Homelessness (CIHC) initiative, volunteered to participate in evaluation. No clinical exclusion criteria.	Social Risks	Adults, Older Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
End Chronic Homelessness (CICH)			
Sadowski, 2009[52,53]	Patients were eligible for inclusion if they were referred at least 24 hours before hospital discharge, were at least age 18 years, were fluent in English or Spanish, were without stable housing during the 30 days prior to hospitalization, were not the guardian of minor children needing housing, and had at least one of the following chronic medical illnesses documented in the medical record: hypertension or diabetes requiring medication, thromboembolic disease, renal failure, cirrhosis, congestive heart failure, myocardial infarction, atrial or ventricular arrhythmias, seizures within the previous year or requiring medication for control, asthma or emphysema requiring at least one emergency department visit or hospitalization in the previous 3 years, cancer, gastrointestinal tract bleeding (other than from peptic ulcer disease), chronic pancreatitis, and HIV.	Social Risks, Medical Eligibility	Adults, Older Adults
Smith, 2020[54] Frequent User System Engagement (FUSE) pilot program	Frequent ED use, homelessness, and chronic pain.	Social Risks, High Utilization, Medical Eligibility	Adults, Older Adults
Transportation Help Needs			
Bove, 2019[55]	Patients residing within a 5-mile radius of clinic.	Not Targeted	Pediatrics, Adults, Older Adults
Chaiyachati, 2018[56]	Patients eligible for study inclusion were 1) adults age 18 years or older, 2) insured by Medicaid, 3) established primary care patients, 4) not scheduled for an urgent care visit, 5) residing in the study area, 6) scheduled to see a physician or nurse practitioner.	Medicare/Medicaid Enrollment or Eligibility	Adults, Older Adults
Chaiyachati, 2018[57]	Patients eligible for study inclusion were 1) adults age 18 years or older; 2) insured by Medicaid, 3) established primary care patients at study site, 4) residents of a high poverty neighborhood in study site city, 5) scheduled to see a physician or nurse practitioner.	Medicare/Medicaid Enrollment or Eligibility, Residence in a low-SES neighborhood	Adults, Older Adults
Whorms, 2021[58]	All patients scheduled for an imaging examination appointment at the outpatient center	Not Targeted	Adults, Older Adults
Utility Help Needs			
Taylor, 2015[9]	Families attending primary care office visit.	Not Targeted	Pediatrics
Interpersonal Violence			
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Education			
Herman, 2009[59]	Potential study participants were identified based on the triage nurse's categorization of the degree of urgency of their medical needs. Patients brought to the pediatric emergency department for obviously emergent medical conditions were excluded. Children deemed as needing emergent or medical attention were also excluded. Parents, legal guardians, and primary caretakers were eligible for the health literacy intervention. If the child was accompanied by an adult not meeting this criterion, the child was excluded. Parents who did not speak English or Spanish and parents who could not read at all were excluded.	Not Targeted	Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Financial Strain			
Abbott, 2000[60] Health and Advice Project (HAP)	All service users receiving income maximization advice from the Health and Advice Project at study centers between study dates.	Income	Adults, Older Adults
Jones, 2017[61]	Any individual who could benefit from financial advice and services was eligible for the intervention. Included in the study were any patients who utilized the intervention within the study period and had not requested that their chart be made private.	Social Risks	Adults
Parthasarathy, 2014[62] Building Economic Security Today (BEST)	Participants were enrolled in: 1) the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (at 185% of poverty line or below) with children ages 1 to 5, or 2) the Medically Vulnerable Infant Program with infants at risk for neurological problems and developmental delays because of prematurity, low birth weight, or other medical conditions experienced at birth, and discharged neonatally from a California Children's Services approved neonatal intensive care unit.	Complex Needs, Income	Pediatrics
Pettignano, 2012[63] Health Law Partnership (HeLP)	Patients receiving care at Children's Healthcare of Atlanta and their families with incomes at or below 200% of the federal poverty level.	Income	Pediatrics
Pinto, 2020[64]	Participants living in Toronto who could anticipate attending all sessions, were age 19–64 years old and could converse in English. Exclusion criteria were being unable to work or attend school for more than 1 year due to a health concern, receiving welfare (Ontario Works) or disability support payments from the government (Ontario Disability Support Program), dealing with an acute financial crisis or emergency (e.g., facing eviction), or being a patient of a member of the study team.	Not Targeted	Adult
Sherratt, 2000[65]	NR	Not Targeted	Adults, Older Adults
Vest, 2018[66]	Adults age 18 years or older who received care at one of the health system's sites. Patients had to have had at least one primary care visit before and one visit after the study period.	Not Targeted	Adults, Older Adults
Woodhead, 2017[67]	All individuals age 18 years or older accessing co-located welfare advice services in study sites were eligible.	Not Targeted	Adults, Older Adults
Multiple Social Risk Domains			
Agarwal, 2020[68]	Patients 18 years and older.	Not Targeted	Adults, Older Adults
Becker, 2004[69] Caught in the Crossfire	Youth ages 12-20 years old hospitalized for a violent injury under a “trauma admit” status who had three contacts with a Crisis Intervention Specialist within 6 months of injury. Control group participants were selected randomly from youth ages 12-20 years who were hospitalized for a violent injury and survived the previous year. The youth did not receive services from [the intervention program] and were carefully matched by age and injury severity to members of the treatment group.	Medical Eligibility	Pediatrics, Adults
Berkowitz, 2018[70]	English- and Spanish-speaking patients who enrolled in the intervention and were able to complete the assessment.	Not Targeted	Adults, Older Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Bovell-Ammon, 2020[71] Housing Prescriptions as Health Care	Eligibility criteria for families included experiencing one or more adverse housing circumstances: being homeless in the previous year, having moved two or more times in the previous year (multiple moves), having been behind on rent in the previous year, and paying more than 50 percent of the family income on rent. Other eligibility criteria included having at least one child younger than age eleven who received primary care at Boston Medical Center (BMC), meeting the income eligibility requirement for Medicaid, having at least one family member who had used ED services three or more times in the previous year, and fluency in English or Spanish. Because of low enrollment, having a child with a chronic condition that required two or more specialist providers and enrolled in BMC's patient-centered medical home was added as an eligibility criterion in addition to or in lieu of having a family member with three or more ED visits in a year.	Social Risks, High Utilization, Income, Medical Eligibility	Pediatrics
Bronstein, 2015[72]	Adults aged 50 or older admitted to inpatient units of hospital with moderate or high risk of readmission post-discharge.	Not Targeted	Adults, Older Adults
Buchanan, 2006[73]	Homeless adult patients with an identified acute illness, ability to perform activities of daily living with minimal assistance, ability to function in a group living environment that is drug- and alcohol-free.	Social Risks, Medical Eligibility	Adults, Older Adults
Buitron de la Vega, 2019[74] THRIVE	New adult patients who spoke English, Spanish, Portuguese, or Haitian Creole.	Not Targeted	Adults, Older Adults
Clark, 2009[75] Women's Health Demonstration Project (WHDP)	Eligible participants included women aged 18-75 who were not pregnant at the time of enrollment and who self-identified as Black or of African descent. Women who received their care or were interested in initiating care at one of the six study sites were eligible. Women with any known cancer or suspected breast cancer for enrollment were not considered eligible for screening and were excluded from analysis.	Sex, Race and ethnicity	Adults, Older Adults
Costich, 2019[76] Special Kids Achieving Their Everything (SKATE)	Patients with at least one chronic medical condition who are either "medically or socially unstable" (i.e., exposure to domestic violence, uncontrolled asthma with frequent hospitalizations) or had the highest level of medical complexity, defined as having four or more sub-specialists involved in care, or two or more life-sustaining devices (e.g., gastronomy tube, tracheostomy).	Complex Needs, Medical Eligibility	Pediatrics
Fiori, 2019[77] Community Linkage to Care (CLC)	Children and caregivers attending well-child visits.	Not Targeted	Pediatrics
Forti, 2002[78]	Older African Americans whose primary source of healthcare was a study site and who met any of the following criteria: 1) 55 or older, 2) hospital, home health, or short-term nursing home admission during the previous year, 3) one or more chronic diseases, 4) one or more serious injuries within the previous year, 5) frequent callers to the clinic, 6) special referral from healthcare provider, or 7) illiteracy.	Race and ethnicity, Medical Eligibility, Residence in a low-SES neighborhood	Adults, Older Adults
Freeman, 2020[79] Health + Housing Project	All adult residents of two subsidized housing buildings in New York City. Additional emphasis was placed on engaging "frequent users," defined as three or more emergency department visits or one or more hospitalizations in the past year.	High Utilization	Adults, Older Adults
Garg, 2007[80,81]	Parents (or other legal guardians) of children aged 2 months to 10 years who presented for a well-child care visit with an enrolled resident provider; English speaking; access to working telephone; not foster parents.	Not Targeted	Pediatrics

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Well-child Care Visit, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE)	Pediatric residents.		
Garg, 2010[82]	All parents who brought their child to the clinic for a scheduled clinic visit (nonsick visit) with a pediatric provider during the 6-week study period were eligible.	Not Targeted	Pediatrics
Garg, 2012[83] Health Leads (HL)	Families using or referred to the Health Leads desk at a primary health clinic at a large, urban academic healthcare institution.	Not Targeted	Pediatrics
Garg, 2015[5] Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE)	Families of infants at least 6 months old who presented for well-child care, with an English- or Spanish-speaking non-foster mother at least 18 years old as the primary caregiver, who anticipated continuing their infant's site for care. Included infants had to be born after at least 32 weeks of gestational age, with no chronic cardiac or respiratory illness and no previous hospitalization or other special healthcare needs.	Sex	Pediatrics
Gold, 2018[84]	Adult patients 18 years or over who had SDH data documented in the electronic medical record or had one or more ambulatory visit at a pilot site during the study period.	Not Targeted	Adults, Older Adults
Gottlieb, 2016[85,86]	English- or Spanish-speaking caregivers 18 years or older who were familiar with the child's household environment, living in the county where enrollment took place, and not seeking care for a child with a severe illness.	Not Targeted	Pediatrics
Gottlieb, 2020[87]	Eligible participants were caregiver-child dyads with English- or Spanish-speaking caregivers 18 years or older who were familiar with the child's household environment and residing in the county of enrollment. Eligible children were aged 0 to 17 years. Families enrolled in a similar primary care-based hospital social services navigation initiative in the 6 months prior or subsequent to recruitment, children in foster care, or those being seen for physical abuse evaluations were excluded.	Not Targeted	Pediatrics
Graham-Jones, 2004[88,89]	Homeless people in hostels or other temporary accommodation in the Liverpool 8 area of the UK. All homeless patients registering on a temporary basis at Princes Park Health Centre, Liverpool, between 1993 and 1995 were entered into the trial.	Social Risks	Pediatrics, Adults, Older Adults
Gunderson, 2018[90]	Children (birth to age 20) enrolled in Medicaid, adults with complex medical needs who were leaving a hospital or skilled nursing facility, homebound elders with late-stage life-limiting illness, and patients in need of additional support referred by social workers.	Social Risks, Complex Needs, Medicare/Medicaid Enrollment or Eligibility	Pediatrics, Adults, Older Adults
Hassan, 2015[91,92]	English-speaking patients ages 15-25 years presenting for a visit with a medical provider who were not significantly distressed at the time of visit and were able to comprehend the intervention.	Not Targeted	Pediatrics, Adults
Higginbotham, 2019[93]	Families of children between the ages of 1 week and 5 years old presenting for well-child appointments at a rural health clinic.	Not Targeted	Pediatrics

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Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Iglesias, 2018[94]	Eligible participants were frequent emergency department users, defined as visiting an emergency department five or more times per year; at least 18 years old; able to communicate in French, German, Italian, English, or Spanish or through a community interpreter; able to provide informed consent; not incarcerated; projected life expectancy not lower than 18 months.	High Utilization	Adults, Older Adults
Juillard, 2016[95-97]	Patients were eligible if they were 1) 10-35 years old, 2) presented to the emergency department with intentional injury (gunshot wound, stab wound, or blunt assault injury), 3) lived or were injured in study site city, 4) were determined to be at "high risk" of reinjury based on case-manager screening assessment. Patients were excluded if their injury was due to domestic violence, child abuse, or self-inflicted.	Medical Eligibility	Pediatrics, Adults
Kangovi, 2014[98] Individualized Management for Patient-Centered Target (IMPaCT)	Eligible patients were 1) ages 18-64 years; 2) observation patients or inpatients on the general medicine service [during the study period]; 3) uninsured or insured by Medicaid; 4) English speaking; 5) on the day of admission, expected to be discharged to home as opposed to a post-acute care facility, and; 6) residents of five Philadelphia zip codes in which more than 30% of the residents lived below the federal poverty level and which accounted for 35% of all readmissions to study hospitals.	Medicare/Medicaid Enrollment or Eligibility	Adults
Kenyon, 2016[99]	Nulliparous women aged 16 and older under 28 weeks' gestation, with social risk factors, were eligible.	Social Risks, Sex, Pregnancy	Pediatrics, Adults
Khidir, 2021[100]	Patients discharged from a large, urban academic ED after undergoing exposure and symptom-based testing for COVID-19, including those testing positive or negative.	Medical Eligibility	Adults, Older Adults
Klein, 2011[101]	All pediatric interns working at the study site were included as the study was integrated into their curriculum.	Not Targeted	Adults
Klein, 2014[102]	Postgraduate level 2 and 3 pediatric residents with continuity clinic at the Pediatric Primary Care Center who already completed an advocacy rotation that included basic training on SDH and local resources.	Not Targeted	Adults
Kulie, 2021[103]	To be eligible for the study, patients had to be 18 years or older, have a non- life-threatening emergency severity index (ESI) score, be insured solely by DC Medicaid, and approved for ED discharge. Patients were excluded if they were unable to understand consent, were non-English speaking, were also insured by Medicare, or did not have access to a phone.	Medicare/Medicaid Enrollment or Eligibility	Adults, Older Adults
Kwan, 2018[104] Better Health through Social and Healthcare Linkages beyond the Emergency Department (HealthiER)	Eligible participants were 18 years or older, lived in the study site city, had (or were eligible for) Medicare or Medicaid, had two or more emergency department visits in the previous 12 months, and did not live in a long-term institution. Exclusion criteria included serious mental illness and substance abuse.	High Utilization, Medicare/Medicaid Enrollment or Eligibility	Adults, Older Adults
Lindau, 2019[105,106] CommunityRx	Patients aged 45 to 74 years seeking care were eligible if they were beneficiaries of Medicare, Medicaid, or both, and resided in the 16-zipcode study region (inclusive of the medical center's primary service area). Those who recalled previously receiving a HealtheRx, did not speak English, or lacked capacity to provide informed consent because of cognitive status or medical acuity were ineligible.	Not Targeted	Adults, Older Adults
Liss, 2019[107]	Patients were eligible for inclusion if they were discharged from a hospital index visit (i.e., emergency department visit, observation stay, or inpatient admission) and were engaged by the hospital's discharge referral team; age ≥18 years, and meeting one of the following referral criteria: no usual source of care or	Not Targeted	Adults, Older Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
	expressed that they were unwilling or unable to return to their usual source of care, or their usual care source was insufficient to manage their needs. Patients with a new cancer diagnosis were excluded.		
Losonczy, 2017[108] Highland Health Advocates (HHA)	Individuals who: 1) were at least 18 years of age; 2) had at least one social need identified by screening tool; 3) presented to the Highland emergency department. Participants could not be under acute intoxication or psychosis, severely ill, or in law enforcement custody.	Social Risks	Adults, Older Adults
Mackintosh, 2006[109,110]	Community-dwelling adults aged 60 years or older who had not received full welfare assessments.	Not Targeted	Adults, Older Adults
Moreno, 2021[111] Connecting Home to Provider	Patients were eligible if they were referred by their medical group's case management team (frequent hospitalizations or ED visits and needs were too intense for usual medical group or health plan case management), were community dwelling, and had an initial home assessment conducted by the social worker and CHW. Patients in nursing homes or assisted living facilities were not eligible for participation.	Complex Needs, High Utilization	Older Adults
Nguyen, 2021[112]	Nonelderly adult CHC patients aged 18–64 years.	Not Targeted	Adults
O'Toole, 2016[113] Homeless Patient Aligned Care Team (H-PACT) program	Homeless veterans who were enrolled in the H-PACT program as of a prespecified cutoff date.	Social Risks, Veteran Status	Adults, Older Adults
Okin, 2000[114]	Patients who had made five or more visits to the San Francisco General Hospital Emergency Department during the previous 12 months, were 18 years of age or older, were able to give informed consent and willingness to receive case management services, and were not already receiving case management services.	High Utilization	Adults, Older Adults
Olds, 2002[115]	Adolescent pregnant women who had no previous births, were low-income, and unmarried.	Sex, Income, Pregnancy	Pediatrics
Onyekere, 2016[116]	All patients with at least one identified need were referred into the program. Second-year osteopathic medicine students were selected through an application process.	Social Risks	Adults, Older Adults
Patel, 2018[117]	Second- and third-year pediatric residents.	Not Targeted	Adults
Polk, 2020[118] Health Leads	All families attending participating pediatric practices.	Not Targeted	Pediatrics
Pruitt, 2018[119] HealthConnections	The study sample included participants insured through Medicare Advantage or Medicaid managed care in 14 states who called WellCare's HealthConnections program seeking referrals to a broad array of community-based public assistance programs.	Medicare/Medicaid Enrollment or Eligibility	Adults, Older Adults
Raven, 2011[120]	Medicaid fee-for-service patients aged 18-64; current admission into any inpatient unit at Bellevue Hospital Center; an algorithm risk score for readmission of greater than or equal to 50; the ability to speak either English or Spanish; not covered by both Medicaid and Medicare; not institutionalized in nursing homes or prisons prior to admission.	Medicare/Medicaid Enrollment or Eligibility	Adults
Real, 2016[121]	Postgraduate level 2 and 3 residents who had continuity clinic at the Pediatric Primary Care Center who had completed a 2-week advocacy curriculum which included introductory training on the SDH.	Not Targeted	Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
Rosen Valverde, 2018[122] H.E.A.L. collaborative	To be eligible for assistance from H.E.A.L., families must have a household income at or below 200% of the federal poverty level; reside in the greater Newark area; have a child with a disability, and receive medical, behavioral health or dental care from Rutgers-NJMS or University Hospital (UH). Families are referred to H.E.A.L. Collaborative by Rutgers-NJMS or UH healthcare professionals for legal and/or social work case management assistance, or are self-referred.	Income, Medical Eligibility	Pediatrics
Ryan, 2012[123]	Participants were low-income (yearly household income below 200% of federal poverty level), adult patients (18 years or older) or adult parents of minor patients referred by healthcare providers for legal assistance.	Social Risks, Income	Adults, Older Adults
Sandhu, 2021[124]	All patients at Lincoln Community Health Center.	Not Targeted	Adults, Older Adults
Schickedanz, 2019 [125] Health Leads	18 years or older and predicted to be in the top 1% utilizers of healthcare at Kaiser Permanente Southern California for the 12 months following November 2015.	High Utilization	Adults, Older Adults
Sege, 2015[126] Developmental Understanding and Legal Collaboration for Everyone (DULCE)	Parents of all eligible newborns younger than 10 weeks of age who presented for pediatric primary care at the clinic were recruited. Families were excluded if the parents were younger than 18, received medical care in a language other than English or Spanish, intended to change their primary care provider from the study site within the first 6 months of life, or if the infant had been hospitalized for >1 week after birth.	Not Targeted	Pediatrics, Adults
Selvaraj, 2018[127] Addressing Social Key Questions for Health Study (ASK)	Participants were English- and Spanish-speaking parents or guardians of 2-week to 17-year-old children attending well child visits at study sites.	Not Targeted	Pediatrics
Shannon, 2006[128,129] The Care Advocate Program	Health plan members aged 66 years and older, enrolled for a minimum of 1 year in the Medicare-risk health plan, who did not reside in nursing homes and met risk criteria using a healthcare utilization algorithm that indicated significant, positive associations with future healthcare service utilization, older age, and past healthcare service utilization.	High Utilization, Medicare/Medicaid Enrollment or Eligibility	Older Adults
Shumway, 2008[130]	Patients who made five or more visits to the emergency department in the prior 12 months, were San Francisco residents, were at least 18 years old, and had psychosocial problems that could be addressed with case management (e.g., problems with housing, medical care, substance abuse, mental health disorders, or financial entitlements).	Social Risks, High Utilization	Adults, Older Adults
Srebnik, 2013[131]	1) aged 18 years or older; 2) meet the federal definition of individuals who are chronically homeless, including 12 consecutive months of homelessness or 4 homeless episodes in the prior 3 years with significant disabling physical or psychiatric conditions; and 3) be referred either from Seattle-King County Public Health's REACH homeless outreach team with 60 or more sobering sleep-off center visits within the prior year or from medical respite with incurred inpatient paid claims of at least $10,000 within the prior year.	Social Risks, High Utilization	Adults, Older Adults
Tessaro, 1997[132] The Maternal Outreach Worker (MOW) Program	Medicaid-eligible pregnant women who are at high risk for poor birth outcomes. Referrals for the services come from social workers and nurses who determine through a psychosocial/resources assessment which pregnant women could benefit from enhanced support and home visitation. Local agencies have the flexibility	Social Risks, Medicare/Medicaid Enrollment or Eligibility, Pregnancy	Adults

Appendix C Table 1. Participant Characteristics

Author, Year Study Name	Inclusion Criteria	Target Population	Age Group
	to determine the criteria for referral. Frequently used criteria include social and/or geographic isolation, teenager, substance use, family violence, and unstable housing.		
Teufel, 2009[133,134]	Underserved and economically disadvantaged individuals in seven economically impoverished rural counties who meet specific criteria for economic disadvantage and type of case.	Social Risks, Income, Residence in a low-SES neighborhood	Pediatrics, Adults, Older Adults
Tsai, 2017[135]	Veterans with mental illness, homelessness, or both who received services from two medical-legal partnerships.	Social Risks, Veteran Status	Adults, Older Adults
Weintraub, 2010[136] The Peninsula Family Advocacy Program (FAP)	All families who were referred from healthcare providers, met income and county eligibility criteria for services, and had an identifiable social or legal issue were eligible for the study.	Social Risks, Income	Pediatrics
Wilder, 2016[137]	Family medicine residents.	Not Targeted	Adults
Wu, 2019[138] Baltimore Community-based Organizations Neighborhood Network: Enhancing Capacity Together (CONNECT)	Patients were enrolled in Johns Hopkins Community Health Partnership (J-CHiP) outpatient intervention, which focused on high-risk Medicaid and Medicare patients aged ≥18 years with at least one chronic condition, at least one visit to a J-CHiP clinic site, identified as being high risk for future hospitalization through risk prediction models or referred directly into the program by their providers, and had monthly healthcare utilization data, including ED visits and days hospitalized, during both pre- and post-intervention periods.	Medicare/Medicaid Enrollment or Eligibility, Medical Eligibility	Adults, Older Adults
Xiang, 2019[139] Bridge Model for Super Utilizers (Bridge-SU)	Patients were eligible for inclusion into the present study if they: 1) received the intervention between 2014 and 2016 based on the program record, 2) had five or more hospital admissions within 12 months prior to receiving the intervention based on EMR data, 3) aged 18 years or older at the time of intervention.	High Utilization	Adults, Older Adults
Yaggy, 2006[140] Just for Us	Because of Medicare-reimbursement policies, only those who have an "access impediment," that is, are unable to get to a primary care provider, are eligible. Only low-income seniors and disabled adults living independently in clustered housing are eligible.	Medicare/Medicaid Enrollment or Eligibility, Income, Medical Eligibility	Adults, Older Adults

Abbreviations: CHC = community health center; CHW = community health worker; ED = emergency department; EMR = electronic medical record; FI = food insecurity; HIV = human immunodeficiency virus; NJMS = New Jersey Medical School; NR = not reported; SDH = social determinants of health; SES = socioeconomic status; SNAP = Supplemental Nutrition Assistance Program; UCSD = University of California, San Diego; UK = United Kingdom; WIC = women, infants, children.

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Food Insecurity					
Aiyer, 2019[22]	Patient	Food Insecurity	No	Eligible participants were screened by designated clinic staff, who subsequently described the Food Rx program verbally and using visual aids to the participants who screened as being food insecure and invited them to participate in the program. The medical provider issued a "Food Rx" card to interested participants detailing their food prescription for them to bring to their first visit to the food pantry; the prescription was eligible for redemption every 2 weeks for up to 6 months for a total of 12 redemptions. Upon arrival at the food pantry for redemption, the participants underwent an orientation walk-through of the pantry, where volunteers described the food prescription components, reinforced with nudges, labeling, and messaging around the pantry. Food prescriptions were redeemed at a local food pantry that was open every Thursday and two Saturdays a month. Nutrition guidelines were designed to encourage healthy eating with an emphasis on fresh produce. A "client choice model" was used, where participants could choose two or more varieties of both fruits and vegetables up to 30 pounds as well as four nonperishable "Food Rx-friendly" items identified with nutritional callout labeling that reinforced basic nutrition messages by food group about various topics, including healthfulness of the food and ease of preparation. Nutrition education booklets in English and Spanish provided easy to read, tailored information on general nutrition, healthy recipes, easy food storage, and basic food safety.	No
Beck, 2014[23] Keeping Infants Nourished and Developing (KIND)	Caregiver	Food Insecurity	No	Families attending well-infant visits at a large, urban, academic pediatric primary care clinic were screened for food insecurity (and other additional risks). If the food insecurity screen was positive, families were offered enrollment in the KIND program, which provided supplemental infant formula, tailored education, and connection to clinic and community resources or public benefit programs. In addition to clinical support, families enrolled in KIND also had access (by referral) to social workers, registered dietitians, and legal advocates as part of a medical-legal partnership.	No
Berkowitz, 2018[24]	Patient	Food Insecurity	No	Two meal programs were studied. The first was a MTM program that provided meals customized to participants' medical needs. The MTM program delivered to the participant's home, weekly, 5 days of lunches, dinners, and snacks. A registered dietitian tailored the meals to the participant's medical needs spanning 17 dietary "tracks" (e.g., diabetes, renal, soft), with combinations of up to three "tracks" permitted. The second program was a "Meals on Wheels"-	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				type NTF program that also delivered nutritious meals, but without tailoring to medical needs. The NTF program provided 5 days of prepared lunches and dinners each week, usually delivered daily.	
Berkowitz, 2019[25]	Patient	Food Insecurity	No	Weekly delivery of 10 ready-to-consume meals tailored to the specific medical needs of the individual under the supervision of a registered dietitian nutritionist.	No
Bottino, 2017[26]	Caregiver	Food Insecurity	No	Caregivers were screened for food insecurity with a screening tool embedded in a web-based, self-administered assessment and referral tool for health-related social problems (HelpSteps). After the screen, system-provided user feedback was provided in the form of suggested referrals based on questionnaire responses, and users could also self-select referrals for any agency. Referral options were offered regardless of food insecurity status, eligibility status, or current receipt of services.	No
Burkhardt, 2012[27]	Doctor or other clinical staff	Food Insecurity	No	The quality improvement intervention included implementation of an evidence-based electronic screen for food insecurity, educational interventions to improve understanding of food insecurity, empowerment exercises targeting clinicians and families, and gaining buy-in support from ancillary personnel.	No
Cohen, 2017[28]	Patient	Food Insecurity	Yes	Participants received a brief explanation of DUFB—a statewide healthy food incentive that doubles SNAP dollars when spent at farmers markets—written program materials, a map highlighting market locations and hours, and an initial $10 market voucher.	No
Cullen, 2019[29] Complete Eats	Caregiver	Food Insecurity	No	In this 7-week pilot, we partnered with a community agency to provide free lunch to all children ages 2 to 18 during their ED visit at an urban, freestanding children's hospital. After patient rooming and clarification of nil per os status, boxed meals were delivered to patients and siblings along with information regarding the Summer Food Service Program (SFSP) and how to access community program sites.	No
Cullen, 2021[30]	Caregiver	Food Insecurity	No	Participants completed a 2-question validated food insecurity screen either by face-to-face interview or via tablet-based self-completed questionnaire with an optional audio assist by text-to-voice functionality. Those randomized to the tablet-based group were given a brief tutorial regarding use of the tablet and text-to-voice functionality. All respondents were provided with a paper-based list of food resources including information about federal programs, local emergency food assistance, and free and reduced-price produce by the research assistant following the questionnaire. Those who reported food insecurity were additionally offered direct telephone-contact within 2 weeks	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				after the ED visit by the Philadelphia Coalition Against Hunger, a food resource agency that assists with enrollment in federal programs and provides navigation to emergency food assistance; this option was provided at the time of positive screen in the same modality as the remainder of the questionnaire.	
Fritz, 2021[31]	Caregiver	Food Insecurity	No	Patients who screen positive for food insecurity are offered referral to Hunger Free Colorado (HFC), the primary CBO addressing FI in the state that connects families to federal food assistance programs and local food resources. If a family desires referral to HFC, a referral form is faxed to HFC and the organization makes 3 attempts to contact the family by phone. Upon reaching a family, English- and Spanish-speaking HFC staff provide families with navigation of federal food programs (i.e., SNAP, Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]) for eligible families and provide information for emergency food resources (food pantries, etc.).	No
Hager, 2020[32]	Patient, Caregiver	Food Insecurity	No	The Hunger Vital Sign is used to identify patients with food insecurity. Patients who screen positive are offered an electronic referral to the food bank. Food bank staff provide individualized, over-the-phone application assistance for federal nutrition programs, plus information about community resources including food pantries, meal programs, and produce distributions.	No
Hickey, 2020[33] Food As Medicine in Low-Income Youth (FAMILY)	Caregiver	Food Insecurity	Yes	After identification of food allergies and preferences, the family received a 3-day supply of shelf-stable food from the FAMILY pantry, with the amount determined by family size.	No
Jones, 2020[34] Navajo Fruit and Vegetable Prescription Program	Patient	Food Insecurity	No	Families attend monthly health coaching sessions where they receive vouchers redeemable for fruits, vegetables, and healthy traditional foods at retailers participating in the program.	No
Kelly, 2020[35]	Patient	Food Insecurity	No	The 5-step care cascade included screening for food insecurity, assessing whether an individual who reports food insecurity was interested in receiving assistance to apply for SNAP benefits, providing assistance if an individual expressed interest, either through referral to a partner organization or through working with a SNAP specialist on-site immediately, tracking whether a client or patient submitted the completed application, and following up to confirm enrollment in SNAP.	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Knowles, 2018[36]	Caregiver	Food Insecurity	No	If families screened positive for food insecurity, the research team followed up by phone to obtain consent to share contact information with Benefits Data Trust (BDT) using a secured platform. Once BDT received contact information, trained benefits outreach specialists conducted outreach via phone, screened families for public benefits eligibility, and provided application assistance for eligible families. BDT also provided interested caregivers a referral to a partner agency that provided free financial counseling, and to community-based resources (such as food banks or food pantries) if they were found to be ineligible for public benefits or to supplement those benefits.	No
Lane, 2014[37] Safe Environment for Every Kid (SEEK)	Caregiver	Food Insecurity	No	Residents assigned clinics on randomly assigned SEEK days were trained to screen for, assess, and provide initial management of food insecurity. All parents of children under 6 years assigned to SEEK clinic days were asked to complete the study survey while waiting for their child's checkup. Parents recruited from both SEEK and control clinics were scheduled for a 2-week follow up interview, with another interview 6 months afterwards.	No
Martel, 2018[38]	Doctor or other clinical staff	Food Insecurity	No	This was a focused resident education for integrated EMR order for food resources. Information sessions were added to the emergency medicine resident educational conferences and to the new resident orientation. In addition, semi-annual updates were integrated into the resident conferences, and the details of the referral patterns were distributed to faculty. Laminated placards were distributed in the ED to encourage discussions with patients about food security. All ED personnel were encouraged to use the referral order, including ED faculty physicians, residents, physician assistants, nursing staff, social workers, ED registration, and financial support staff.	No
Morales, 2016[39]	Patient	Food Insecurity	No	Food for Families is an interventional program that identifies food insecure patients and connects them with food resources, such as SNAP, the Special Supplemental Nutrition Program for WIC, and food pantries. Participants were identified via screening or referral from a provider. Once patients were referred to Food for Families, those who chose to enroll completed a standardized enrollment interview. Patients were then assisted with obtaining food resources tailored to their specific situation, considering patient preferences, cultural appropriateness, where patients lived, and program eligibility.	No
Palakshappa, 2017[40,41]	Caregiver	Food Insecurity	No	The intervention consisted of implementing a food insecurity screen in the EMR. Families who screened positive were eligible for referral to our community partner for assistance with applying for SNAP benefits.	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Smith, 2017[42]	Doctor or other clinical staff	Food Insecurity	No	30-50-minute educational presentations on food insecurity and its impact on health were conducted in 2015 at three family medicine residency programs and one medical school. Attendees were encouraged to identify and implement individual and system-based changes to integrate food insecurity screening and referrals into their clinical practices.	No
Smith, 2017[43]	Patient	Food Insecurity	No	All patients visiting the study clinic were given the food insecurity screener. After the surveys were complete, study coordinators provided all patients with information regarding local food pantries. Resources were provided even if participants were not currently food insecure. Study coordinators also asked patients about concerns, explored barriers to accessing food resources, and assessed patients to see if they were eligible for SNAP, and helped them apply for SNAP, if eligible. Patients with diabetes were offered a food delivery program specific for diabetic-appropriate foods.	No
Stenmark, 2018[44]	Doctor or other clinical staff, Caregiver	Food Insecurity	No	The intervention consisted of clinician and staff training on food insecurity including educational handouts, communication skill-building exercises, and provision of written scripts. Patients were screened using the Hunger Vital Sign screening tool. Patients who screened positive and agreed to have a representative call them were contacted by Hunger Free Colorado, which coordinates referrals and enrollment in SNAP, WIC, and community-based nutrition programs.	No
Swavely, 2019[45] Temple Food Insecurity Program (TFIP)	Patient	Food Insecurity	No	Patients were contacted within 48–72 hours following discharge from an inpatient hospital stay at Temple University Hospital as part of the routine care for post-discharge patients. The post-discharge calls included screening for food insecurity using the 2-item Hunger Vital Sign tool. Patients who reported food insecurity were asked a probing question to determine if they were already receiving food benefits through the Supplemental Nutrition Assistance Program (SNAP). Their response to this question determined which of the community resources they would be referred to: The Greater Philadelphia Coalition Against Hunger (CAH) for those who needed to apply for SNAP benefits, and 2-1-1 South Eastern Pennsylvania (SEPA) if additional food resources were needed.	No
Housing Instability					
Beck, 2012[46] Cincinnati Child Health-	Caregiver	Housing Instability	Yes	Potential cases of poor-quality housing were defined during the primary care visit, and an on-site medical-legal partnership offered affected families legal services and initiated portfolio-wide advocacy.	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Law Partnership (Child HeLP)					
Fargo, 2017[47]	Patient	Housing Instability	No	Veterans who screened positive for housing instability were asked whether they want to be referred for services.	No
Mares, 2010[48-51] Collaborative Initiative to Help End Chronic Homelessness (CICH)	Patient	Housing Instability	Yes	Chronically homeless adults were provided with case management (derived from the Assertive Community Treatment model), supported housing (derived from the "Housing First" model of supported housing), and facilitated access to primary healthcare, mental health, and substance abuse treatment in a service package intended to improve the integration of services at the client level and maximize continuity of care.	No
Sadowski, 2009[52,53]	Patient	Housing Instability	Yes	The intervention had three integrated components: provision of transitional housing at respite care centers, subsequent placement in stable housing, and case management. Case management for the intervention was provided on site at the primary study sites, the respite care facilities, and the stable housing sites. Hospital case managers facilitated discharge planning during subsequent hospitalizations and placement in respite care or back in stable housing sites. Respite and housing case managers facilitated participants' housing placements and coordinated appropriate medical care, with substance abuse and mental health treatment referrals coordinated as needed. Each intervention participant had contact, at least biweekly, with his or her on-site case manager.	No
Smith, 2020[54] Frequent User System Engagement (FUSE) pilot program	Patient	Housing Instability	Yes	The program sought to provide comprehensive medical care, stable housing, and extensive social and mental health support services to participants with poorly managed chronic health conditions. The team assisted with peer support, life skills coaching, daily home management, attending appointments, and completing tasks necessary to transition the participant to permanent housing like securing identification and obtaining an income. Lastly, the Assertive Community Treatment (ACT) team intervened and assisted each participant with securing medical or mental healthcare in the most appropriate setting when the patient wanted to be seen by a provider.	Yes
Transportation Help Needs					
Bove, 2019[55]	Patient	Transportation Help	No	Outpatient physical therapy clinic offered door-to-door van transport at no cost to patients seeking care.	No
Chaiyachati, 2018[56]	Patient	Transportation Help	No	Patients were offered a rideshare service (Uber or Lyft) during their 2-day reminder call before their care appointment. If they accepted and had no barriers (e.g., needed wheelchair-accessible ride), study staff scheduled their	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				pickup and provided information on how to schedule ride home from the appointment.	
Chaiyachati, 2018[57]	Patient	Transportation Help	No	When research assistants made verbal contact with patients confirming their upcoming appointments at study clinics, those allocated to the intervention arm were offered free transportation to and from their appointment using Lyft.	No
Whorms, 2021[58]	Patient	Transportation Help	No	Each patient scheduled for an imaging examination appointment at the outpatient center receives an appointment reminder call several days in advance to confirm his or her upcoming appointment. Patients were offered the rideshare program if they spontaneously expressed a desire to cancel or reschedule their MRI appointments because of transportation difficulties during their reminder calls.	No
Utility Help Needs					
Taylor, 2015[9]	Caregiver	Utilities Help	No	This three-part intervention included 1) educating providers on the medical effects of energy insecurity and the laws surrounding utility certifications, 2) a screener for utility insecurity, 3) and development of standardized criteria for certifications of medical need approvals. Families who requested a certification of medical need (COMN) (regardless of whether the provider approves or declines) or screen positive for energy insecurity on the waiting-room questionnaire received a packet of information on community resources such as the low-income energy assistance program (LIHEAP), utility services emergency funds, weatherization, Federal Emergency Management Administration (FEMA) grants, and how to prevent utility shutoffs, as well as information about free budgeting and financial counseling services. All families who requested a COMN were offered an opportunity to speak with a social worker.	No
Interpersonal Violence					
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Education					
Herman, 2009[59]	Caregiver	Education	No	A 10-minute questionnaire was given to parents, and responses served as the study's comparison data. The questions aimed to identify the child's primary source of healthcare and frequency with which parents used healthcare resources for their child. They also assessed parent confidence in managing common low-acuity pediatric conditions. Parents then underwent an educational intervention during which they were instructed how to use the book, "What to Do When Your Child Gets Sick," and	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				then were quizzed on how to use this health reference book as an aid for managing their children's healthcare needs. Study participants were given a free copy of the book. After 6 months, participants were contacted by telephone and asked to complete a second 10-minute questionnaire.	
Financial Strain					
Abbott, 2000[60] Health and Advice Project (HAP)	Patient	Financial Strain	No	The intervention consisted of two advice workers offering welfare benefits advice services in seven primary care practices and was an "income maximization scheme."	No
Jones, 2017[61]	Patient	Financial Strain	Yes	The income security health promoter (ISHP) provides advocacy and case management services that are like those of a social worker, but with a specialized knowledge of income support systems and financial issues and a practice dedicated specifically to helping patients with income security. The ISHP is supported by a manager, staff physicians, social workers, and a community engagement specialist, who meet biweekly as an advisory group. Patients are referred to the Income Security Health Promotion service by any member of the primary care team, at their discretion.	No
Parthasarathy, 2014[62] Building Economic Security Today (BEST)	Caregiver	Financial Strain	No	The project offered (1) one-on-one support to families in home visiting programs, (2) financial education classes for WIC clients, and (3) asset-development educational materials and referrals for all clients. Staff guided clients as they managed financial concerns, such as applying for public benefits for which they were eligible, repairing credit, opening a bank account or prepaid debit card, and obtaining free tax preparation assistance.	No
Pettignano, 2012[63] Health Law Partnership (HeLP)	Caregiver	Financial Strain	Yes	Health Law Partnership (HeLP) is a medical-legal partnership among three nonprofit organizations that serves low-income and minority children by addressing the social, environmental, and economic factors that adversely impact access to care and their health and well-being.	No
Pinto, 2020[64]	Patient	Financial Strain	No	Three groups of patients met weekly for in-person sessions lasting two hours each for 10 consecutive weeks. Participants were grouped into: (i) millennials (age 19–29) who are no longer in school; (ii) adults who self-identify as precariously employed (age 30–55 years); and (iii) older adults nearing retirement (age 55–64 years). A trained facilitator guided each group through a curriculum designed to address enablers of financial success: (i) having personal goals and using them as a guide to decision making; (ii) understanding personal finance, how it works and how it is used by others; (iii) having an ability to problem solve through individual challenges; (iv)	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				establishing an openness to collaborate with others; and (v) making a commitment to ongoing financial management and learning. The 10 sessions covered a range of subjects, including budgeting, credit basics, understanding risks and building resiliency, and strategies to increase income. Participants were encouraged to set goals, and weekly sessions provided space for everyone to report back on their progress, successes, and challenges.	
Sherratt, 2000[65]	Patient	Financial Strain	No	A full-time Citizens' Advice Bureau Welfare Officer was initially based in seven general practices to accept referrals from the primary healthcare team. After 1 year, a dedicated telephone line was provided for the four least-referring practices.	No
Vest, 2018[66]	Patient	Financial Strain	Yes	Repeat patients at participating federally qualified health centers were referred to wraparound services (e.g., patient navigation, financial counseling, legal help) co-located at outpatient clinic sites based on need. Referrals to these services were initiated through multiple pathways: 1) primary care providers could make referrals to any wraparound service based on a patient's reported needs, 2) service providers (such as social workers and dietitians) reviewed the records of patients with scheduled appointments for potential referrals, and 3) wraparound service providers were able to refer patients to other wraparound services.	Yes
Woodhead, 2017[67]	Patient	Financial Strain	No	This study compared the impact of co-located welfare benefits and debt advice services in the primary care setting and prospectively compared individuals accessing co-located advice with propensity score weighted comparators.	No
Multiple Social Risk Domains					
Agarwal, 2020[68]	Patient	Food Insecurity, Housing Instability, Financial Strain	Yes	Patients were screened to identify areas of possible concern and to initiate a conversation with participants about legal problem areas. The screening tool contained questions about stability of income and housing, benefit status, existence of a will, pending legal worries and discrimination or human rights issues, etc. Legal needs were those housing, financial, employment, social assistance, immigration, benefit needs, and other concerns that involved legal processes that either the patient did not have access to or did not understand. Patients deemed to have a legal problem were offered an appointment at the Legal Health Clinic (LHC), where lawyers provided legal advice, referrals, and services for patients of the physicians. Patients wanting to pursue legal help were matched to a lawyer in the LHC with experience in the appropriate legal domain (e.g., housing).	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Becker, 2004[69] Caught in the Crossfire	Patient	Housing Instability, Interpersonal Violence, Education	Yes	The intervention was predicated on intervening "at the right time and with the right person." The peer mentors were young adults from the same or similar communities as the youth which they served and who had experienced violence in their own lives. Crisis Intervention Specialists met with the youth and their family and friends immediately after, or very soon after, the youth had been hospitalized for a violent injury. The peer mentors conducted initial visits at the hospital bedside whenever possible and provided ongoing intensive follow-up services to the youth and their family members, including home visits, referrals to community services, and assistance with job placement, court and probation hearings, school enrollment, and housing.	No
Berkowitz, 2018[70]	Patient	Food Insecurity, Transportation Help	Yes	Patient advocates worked with patients who screened positive for social needs to determine their individual needs and resources available to help meet those needs, according to the specifics of the individual's situation and preferences. The advocate maintained contact with the individual, either in person or by telephone, until resolution of the needs, until it was determined the needs could not be resolved, or until the individual chose to discontinue the program.	No
Bovell-Ammon, 2020[71] Housing Prescriptions as Health Care	Caregiver	Housing Instability, Financial Strain	Yes	Families received services as needed—including housing search, eviction prevention, legal services, financial services, and a public housing unit—if they were eligible.	No
Bronstein, 2015[72]	Patient	Transportation Help, Financial Strain	Yes	The intervention consisted of follow-up care coordination by MSW interns after discharge designed to assess, identify, and alleviate barriers to patients remaining at home; individualized needs assessment, identifying medication concerns, transportation issues, home care needs, home safety concerns, and behavioral barriers to follow-up care and activities post-discharge conducted during two phone calls and home visit	Yes
Buchanan, 2006[73]	Patient	Food Insecurity, Housing Instability	Yes	Patients who met criteria for respite care bed received services including interim housing, acute care health services by volunteer health providers, facilities to organize medications, substance abuse counseling, case management, and referrals to permanent housing.	Yes
Buitron de la Vega, 2019[74] THRIVE	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education	Yes	The intervention consisted of paper screener given at check-in, medical assistant input responses to screener in patient's electronic health record, if the patient screened positive for an SDH domain, the EMR automatically generated an order set which applies appropriate ICD-10 codes to the encounter visit diagnoses. If the patient asked to be connected to resources, the EMR automatically queued up an order set to print out the relevant patient	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				resource referral guides. When providers logged into the patient's chart, the pending SDH orders could be found in the orders section of the visit and the ICD-10 codes were found in the visit diagnoses section. Providers signed the orders which generated printouts of the relevant prewritten resource referral guides. Upon review of the positive SDH screening responses, the provider could also refer the patient to a care coordinator/patient navigator (specialists in connecting patients with social needs).	
Clark, 2009[75] Women's Health Demonstration Project (WHDP)	Patient	Food Insecurity, Housing Instability, Transportation Help	Yes	The multipronged case management intervention provided tailored services designed to help address: 1) potential social, logistic, and other health status barriers to seeking healthcare; 2) patient-clinician communication barriers, including culturally inadequate communication about screening recommendations and abnormal results; and 3) health system barriers, including navigation needs to help prompt and schedule screening and track and report abnormal test results, to help clinicians provide appropriate follow-up for abnormal results. At the initial study visit, case managers administered the study assessment questionnaire to ascertain women's medical and social concerns. Case managers then provided social intervention through referrals to connect women to tailored medical and social services within their health centers and local public service environments to help resolve these concerns. In addition, case managers provided navigation services for clients by tracking and contacting women who were due for screening or follow-up for abnormal results and communicating steps for completing screening or follow-up to patients. Case managers accompanied clients to medical examinations as needed to provide social support. Additionally, case managers communicated with providers of their clients to prompt providers to schedule screening and communicate follow-up needed for abnormal results to clients.	Yes

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Costich, 2019[76] Special Kids Achieving Their Everything (SKATE)	Caregiver	Food Insecurity, Housing Instability, Education	Yes	Enrolled families participated in a 3- to 6-month intervention that included home visits, needs assessments, and goal-setting sessions during which caregivers and/or patients had the opportunity to develop their own goals. CHWs attended weekly interdisciplinary medical home meetings at the practices and provided updates to providers, nurse care managers, nursing staff, and social workers. CHWs served as points of contact for families and assisted with navigation of resources available in both the community and in the medical home.	No
Fiori, 2019[77] Community Linkage to Care (CLC)	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Interpersonal Violence	Yes	The Community Linkage to Care (CLC) pilot program integrates social needs screening and referral support using community health workers as part of routine primary care visits.	No
Forti, 2002[78]	Patient	Transportation Help, Financial Strain	Yes	The rural care management program provided outreach and linkage to social services for the target population. Coordinators queried eligible clients about their use of Medicare services and encouraged them to engage with these services, providing scheduling or transportation where needed. All enrolled clients also received home visits that included home safety checks, medication reviews, and health/social assessments, the results of which were communicated clinicians at participating clinics. Clients also attended six 2-hour health promotion sessions delivered over a period of 3 years. Topics for the six sessions included: (a) diabetes and hypertension care; (b) medication and polypharmacy education; (c) functional status and exercise; (d) management of depression; (e) dementia; and (g) nutrition education.	Yes
Freeman, 2020[79] Health + Housing Project	Patient	Food Insecurity, Housing Instability, Transportation Help, Education, Financial Strain	Yes	CHWs engaged residents with an initial intake visit, followed by a goal setting activity and the creation of an individualized action plan. CHWs used motivational interviewing and referrals to case managers and services and other community resources to assist with goal completion.	No
Garg, 2007[80,81] Well-child Care Visit, Evaluation, Community Resources, Advocacy,	Doctor or other clinical staff, Caregiver	Food Insecurity, Housing Instability, Education	Yes	This was provider training. Parents given WE CARE survey to complete before their children's encounter with a resident; the resident reviewed the survey with parents during visit and referral using resource book with 1-page sheets listing available community resources for each of the psychosocial problems in screening tool.	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Referral, Education (WE CARE)					
Garg, 2010[82]	Caregiver	Food Insecurity, Housing Instability, Utilities Help, Education, Financial Strain	Yes	Providers were instructed to contact the Family Help Desk for families who might have psychosocial problems. At the Family Help Desk, a survey was given to the caregiver to assist in identifying SDH needs. Once needs were identified, students educated parents regarding available community resources, and families given a referral were assigned to a student to serve as their advocate for a 6-month period. Students contacted the parent on a regular basis (at least bi-monthly), and patients were queried on their satisfaction with the services or resources they enrolled in.	No
Garg, 2012[83] Health Leads (HL)	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education, Financial Strain	Yes	Parents completed a brief pre-visit screening survey for social issues at well-child care visits, providers were referred to the HL desk located in the clinic, and HL students connected families to community-based resources through in-person meetings and telephone followup. HL students then updated referring providers about outcomes.	No
Garg, 2015[5] Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE)	Caregiver	Food Insecurity, Housing Instability, Utilities Help, Education	Yes	In the four WE CARE clinics, mothers completed a self-report screening instrument that assessed needs for childcare, education, employment, food security, household heat, and housing. Providers made referrals for families (in the form of 1-page information sheets from a resource book); staff provided requisite applications and telephoned referred mothers within 1 month.	No
Gold, 2018[84]	Patient	Food Insecurity, Housing Instability, Interpersonal Violence, Education, Financial Strain	Yes	A suite of EMR-based SDH data tools, including 14 screening questions and preference lists of local resources for addressing specific SDH needs, was provided.	No
Gottlieb, 2016[85,86]	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Financial Strain	Yes	Intervention caregivers were offered a meeting with a navigator immediately after the child's clinic visit or by telephone if the caregiver needed to leave. Navigators used algorithms to provide targeted information related to community, hospital, or government resources addressing needs that participants had prioritized. Follow-up meetings were offered every 2 weeks for up to 3 months, until identified needs were met, or when caregivers declined further assistance.	No

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Gottlieb, 2020[87]	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Interpersonal Violence, Financial Strain	Yes	Following standardized social risk assessment, caregivers were randomly assigned to receive either written information regarding relevant government and community social services resources or comparable written information plus in-person assistance and follow-up focused on service access.	No
Graham-Jones, 2004[88,89]	Patient	Housing Instability, Education, Financial Strain	Yes	Receptionists registering temporary patients from homeless families at the health center put patients in touch with the health advocate before or soon after their first consultation with a physician. The casework was needs-led, emphasizing provision of information, shared decision making, empowerment, and the promotion of health, social and emotional well-being. Health advocates informed participants of the primary healthcare services in the area and how to access other services effectively; provided initial health checks, family planning information and advice; and acted as a liaison with the housing department and other public agencies.	Yes
Gunderson, 2018[90]	Patient	Food Insecurity, Housing Instability, Transportation Help, Financial Strain	Yes	CHWs serve multiple roles including helping patients navigate the healthcare system, being a liaison for healthcare appointments and communication, directing patients to services and helping them access community resources, and advocating for community needs. They serve as health educators, provide and reinforce basic health education on disease prevention and management of chronic disease, and gather patient self-reported health data for the clinical care team.	Yes
Hassan, 2015[91,92]	Patient	Food Insecurity, Housing Instability, Interpersonal Violence, Education, Financial Strain	Yes	Participants completed a self-administered, web-based questionnaire, received feedback about identified problems, selected problems for assistance, identified their top-priority problem, and selected referral agencies. Each participant met briefly with the resource specialist to review referrals and then received a customized printout of the agencies. If questionnaire responses indicated acute concerns regarding domestic violence, homelessness, or severe food insecurity, the results were immediately shared with the provider and social worker to facilitate urgent intervention. Followup phone calls 1-2 months later determined if patients had contacted recommended agencies and resolved their top-priority problem.	No
Higginbotham, 2019[93]	Caregiver	Food Insecurity, Housing Instability	No	The intervention consisted of screening for food and housing insecurity and providing a one-page community resource guide.	No

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Iglesias, 2018[94]	Patient	Housing Instability, Education, Financial Strain	Yes	In the intervention group, in addition to standard emergency care, participants received a case management intervention (coordination of care, not only focused on acute care) at baseline and 1, 3, and 5 months by a nurse (a member of the case management team). Furthermore, the participants had the opportunity to contact, at any moment, one of the members of the case management team in an "open-door policy perspective." It provided concrete assistance in obtaining income entitlements, better health insurance coverage, stable housing, and educational opportunities for the participants. The team referred patients to a mental health department, substance abuse services, or a new general care provider if necessary.	Yes
Juillard, 2016[95-97]	Patient	Housing Instability, Interpersonal Violence, Education	Yes	Clients are provided with up to 1 year of intensive case management, including mentorship, advocacy, and shepherding community resources. Ongoing case notes and updates were recorded throughout the case management process. Case management included crisis management, home visits, phone contacts, escorts to risk reduction resources, and recommendations for family therapy if necessary. Based on the needs assessment, the mentorship provided was coupled with other risk reduction resources.	No
Kangovi, 2014[98] Individualized Management for Patient-Centered Target (IMPaCT)	Patient	Food Insecurity, Housing Instability, Transportation Help, Financial Strain	Yes	In addition to routine hospital care and discharge procedures (control condition), the intervention group worked with CHWs to create individualized action plans for achieving patients' stated goals for recovery. Using text, phone calls, and home visits, the CHWs provided support tailored to patient goals for a minimum of 2 weeks and communicated patients' action plans to their providers at their first post hospital discharge appointment.	No
Kenyon, 2016[99]	Patient	Housing Instability, Financial Strain	Yes	Outreach workers provided individual case management, including home visits and integration into community midwifery teams, provided support for women to attend antenatal visits and make healthy lifestyle choices, provided social/emotional support, and helped ensure benefits, housing difficulties, and mental health problems were managed.	Yes
Khidir, 2021[100]	Patient	Food Insecurity, Housing Instability, Utilities Help	Yes	The program screens and provides referral for unmet social needs, identifies patients with worsening clinical symptoms who require in-person reevaluation, and reinforces self-isolation counseling and risk-reduction strategies for vulnerable people. Patients tested for COVID-19 are called by an ED navigator 2 days after discharge and screened for unmet social needs using open- and closed-ended questions. ED navigators assess patients for needs relevant to	Yes

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				the context of home isolation, including food security, housing stability, access to medications and primary care, and paying for utilities. Patients who have unmet social needs are referred to local community programs and social services that can meet these needs.	
Klein, 2011[101]	Doctor or other clinical staff	Food Insecurity, Housing Instability, Education, Financial Strain	Yes	An SDH curriculum was developed and implemented for the residents at the study site and was the educational intervention for this study. The interns shadowed social workers as they obtained social histories, and interns subsequently began asking about social history and received feedback from the social workers. They experienced a half-day guided immersion activity that involved visits to the public benefits agency and food bank and attended a 3.5-hour didactic program that was co-taught by the existing SDH help team affiliated with the hospital. All residents (including both intervention and control) were offered several conferences on SDH issues, and were exposed to the bedside, patient-centered teaching of the on-site lawyer and paralegal and invited to observe the legal interview.	No
Klein, 2014[102]	Doctor or other clinical staff	Food Insecurity, Housing Instability, Financial Strain	Yes	Phase 1: Residents and families completed pre-surveys. Phase 2: Intervention group received new training curriculum, consisting of simulated video vignettes depicting residents screening for SDH and two 90-minute conferences. Phase 3: Residents and families completed post-surveys.	No
Kulie, 2021[103]	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Financial Strain	Yes	Social needs screening and referral to community-based organizations.	No
Kwan, 2018[104] Better Health through Social and Healthcare Linkages beyond the Emergency Department (HealthiER)	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education, Financial Strain	Yes	Following recruitment, CHWs scheduled home visits to complete assessments and create service plans and objectives, driven by client needs, goals, assets, and priorities. CHWs were expected to complete a comprehensive assessment and then establish two to four objectives with each client, each of which should be presumed achievable within 6 weeks. Community health workers were to prioritize access to primary care and health insurance if needed. CHWs provided individualized services to help clients achieve their objectives.	Yes
Lindau, 2019[105,106] CommunityRx	Patient	Food Insecurity, Housing Instability,	Yes	By making meaningful use of electronic medical record data and integrating with existing clinical workflows, CommunityRx addresses the full range of resource needs for all people seeking healthcare. At each visit, for every	No

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
		Utilities Help, Education		person, a HealtheRx is generated, including resources for basic needs such as food and housing, physical and mental wellness, and disease management including smoking cessation, weight loss, and counseling.	
Liss, 2019[107]	Patient	Food Insecurity, Housing Instability, Transportation Help	Yes	The Transitional Care (TC) intervention included a scheduled post-discharge appointment at the TC practice, where a multidisciplinary team comprehensively assessed patients' medical and psychosocial needs and addressed modifiable barriers, and subsequent linkage to a new primary care source.	Yes
Losonczy, 2017[108] Highland Health Advocates (HHA)	Patient	Housing Instability, Transportation Help, Interpersonal Violence, Education, Financial Strain	Yes	HHA volunteers followed resource referral protocols based on the type of need in order to match patient need to available community resources. Volunteers made biweekly followup telephone calls or appointments with patients to continue helping them with their needs until the need was met or the patient no longer wanted or was able to be contacted.	No
Mackintosh, 2006[109,110]	Patient	Utilities Help, Financial Strain	Yes	Intervention recipients received an immediate welfare rights assessment, advice and active assistance with claims over a 24-month period. The control group also received this intervention after a 6-month delay. Following a baseline assessment, participants were contacted by telephone for repeat welfare assessments at 6, 12 and 24 (intervention) or 6 and 18 months (control) from the initial welfare assessment.	No
Moreno, 2021[111] Connecting Home to Provider	Patient, Caregiver	Food Insecurity, Housing Instability, Transportation Help, Financial Strain	Yes	Home-based social program that tightly links a team of a social worker and a CHW to older adults in their homes and connects them to social services and supports primary care. Both the social worker and the CHW conduct an initial home visit with a standardized comprehensive assessment used to identify social needs and create a care plan and recommendations. After the initial home assessment, the team connects patients to community resources or social services (e.g., food, income support, housing, or transportation) in an individualized process that may take up to 6 months to address all of the social issues. While addressing social barriers, the team connects with the patient's PCP to clarify issues or deliver support such as teaching patients to use inhalers, diabetes education, addressing barriers to polypharmacy and medication adherence, and facilitating the delivery and use of durable medical equipment, and provide other health services like assistance with referrals or accessing specialists. In addition to patient social needs, the program supports the efforts of the PCP and healthcare care teams by conducting an initial in-home assessment; initiating a plan of care based on the patient's social needs	Yes

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Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				and the outcome of the in-home assessment; helping identify issues impacting patient health early, before they escalate; escalating issues that might otherwise get missed; participating in interdisciplinary care team meetings within partner medical groups and communicating findings and progress; identifying and helping remove barriers to care plan adherence and patient safety; attending scheduled doctors' appointments (primary care and specialty physicians) as needed to improve patient self-efficacy during doctor visits and enhance understanding of treatment plan; and helping patients to adhere to care and treatment plans. The most common interventions were referrals to community resources, care coordination among multiple providers, and addressing issues related to medications and polypharmacy. Follow-up visits to the home depend on the individual needs of the patient and may include only the CHW. Once urgent social or medical issues are addressed, the CHW follows up through periodic telephone calls at least once a month. The teams used the telephone to communicate with the doctor's office any urgent clinical needs identified during home assessments or followup calls. The primary care offices address urgent clinical issues.	
Nguyen, 2021[112]	Patient	Food Insecurity, Housing Instability, Transportation Help, Financial Strain	Yes	Exposure was defined based on whether a patient received any community health center assistance (yes/no) with accessing social programs (e.g., applying for government benefits) or basic needs (e.g., transportation, housing, employment, obtaining food, and obtaining clothes). This group is referred to as having "received social needs assistance."	No
O'Toole, 2016[113] Homeless Patient Aligned Care Team (H-PACT) program	Patient	Food Insecurity, Housing Instability, Transportation Help, Financial Strain	Yes	The H-PACT program aimed to integrate and coordinate health and social services care for homeless veterans with a focus on the highest-risk, highest-need veterans unable or unwilling to access traditional healthcare. The goals were to engage the patient in healthcare, stabilize them clinically, provide them with needed social services and programs, and expedite their placement in housing. Services included at H-PACT locations include hygiene support, transportation assistance, clothes pantry, meals or food assistance, assistance with benefit applications, cooking classes, peer mentors for care navigation, vocational programs, and legal aid.	Yes
Okin, 2000[114]	Patient	Housing Instability, Financial Strain	Yes	Once enrolled, subjects were assigned to a master's-level psychiatric social worker who used a comprehensive, intensive case management model. The case manager was responsible for providing and coordinating all needed services, including: crisis intervention, individual and group supportive therapy, arrangement of stable housing and financial entitlements (i.e., Medicaid and	Yes

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				Social Security Income), linkages to primary care providers, harm reduction services and referral to substance abuse treatment, liaising with other community agencies and extensive, persistent outreach (e.g., home visits, "tracking" and finding patients, accompanying patients to medical appointments, etc.).	
Olds, 2002[115]	Patient	Transportation Help, Education, Financial Strain	Yes	The intervention utilized home visitation by nurses as a means of improving parental behaviors and environmental conditions early in the life cycle in an effort to prevent a host of maternal and child health problems. Visits extended the first 2 years of their children's lives and, depending on random group assignment, could include childhood development screenings, prenatal appointment coordination, post-birth care, and transportation assistance to all obstetrical and pediatric appointments.	Yes
Onyekere, 2016[116]	Doctor or other clinical staff, Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education	Yes	The Medical Student Advocate (MSA) program place volunteer second-year osteopathic medical students in care coordination teams at Lankenau Medical Associates, a primary care practice serving a diverse patient population in the Philadelphia, PA, region. As active members of the team, MSAs are referred high-risk patients who have resource needs such as food, employment, childcare, and transportation. MSAs work collaboratively with patients and the multidisciplinary team to address patients' nonmedical needs.	No
Patel, 2018[117]	Doctor or other clinical staff	Food Insecurity, Housing Instability, Utilities Help, Financial Strain	Yes	The intervention assessed the use of a formal social history taking tool after a 2-phase intervention. The first phase was a teaching module describing SDH and community resources, and the second phase consisted of visual reminders to use the tool.	No
Polk, 2020[118] Health Leads	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education, Financial Strain	Yes	At participating pediatric practices, families are screened for social needs as part of routine care using a standardized survey. In all sites, clinicians review survey results with families during the encounter and connect the families to Health Leads advocates as appropriate. Typically, advocates meet in-person with the family on the day of the visit to conduct a more in-depth assessment based on needs identified on the screening tool. The household's assigned advocate follows up with the head of household via telephone calls or text messages to confirm that the need has been met or to provide additional assistance.	No
Pruitt, 2018[119] HealthConnections	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help	No	Participants with unmet social needs contacted the call center-based program to obtain free referrals to a nationwide network of local, community-based public assistance programs. The program matched participant needs to available social services. This retrospective program evaluation linked social	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				service referral data with healthcare claims to analyze expenditures in two annual periods, before and after the first social service referral.	
Raven, 2011[120]	Patient	Housing Instability, Transportation Help	Yes	During hospitalization, patients underwent interviews to identify SDH needs. Study staff coordinated with inpatient providers to facilitate appropriate discharge planning and follow-up including housing. Services continued after hospital discharge into the community and were tailored to the needs of each patient. The Community-Based Care Manager facilitated transportation to appointments, assisted with entitlements enrollment, conducted home visits, and connected patients to other needed medical and non-medical services. Pre-paid cellular phones were provided to patients to allow close contact with study staff for reminder calls and crisis management. Patients were provided with expedited medical appointments through cooperation with the hospital's outpatient clinics, and Care Managers would accompany patients and advocate for them during appointments when necessary. For patients in the ED, Care Managers assisted ED staff by providing collateral information and helping to ensure follow-up for enrolled patients who were treated and released. Reminder calls for appointments were needed for most patients.	Yes
Real, 2016[121]	Doctor or other clinical staff	Food Insecurity, Housing Instability, Transportation Help	Yes	A neighborhood-based curriculum, developed de novo, included three 30-min small group teaching modules that occurred just prior to the start of a continuity clinic session with no more than 6 residents undergoing education at a time.	No
Rosen Valverde, 2018[122] H.E.A.L. Collaborative	Caregiver	Food Insecurity, Housing Instability, Transportation Help, Education, Financial Strain	Yes	H.E.A.L. Collaborative provides free legal advice, consultation, direct representation, and social work case management services	No
Ryan, 2012[123]	Patient, Caregiver	Housing Instability, Financial Strain	Yes	Medical-legal partnership that provides free legal services to referred low-income patients.	No
Sandhu, 2021[124]	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Interpersonal Violence, Education, Financial Strain	Yes	Screening for unmet social needs, referral to community resources, followup.	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
Schickedanz, 2019[125] Health Leads	Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help, Education, Financial Strain	Yes	Social needs screening and navigation over the phone. If a patient screened positive for one or more unmet social need and was interested in help, a full intake assessment was performed for enrollment in social needs navigation including provision of social resources information immediately over the phone or during a follow-up call.	No
Sege, 2015[126] Developmental Understanding and Legal Collaboration for Everyone (DULCE)	Caregiver	Food Insecurity, Housing Instability, Utilities Help, Financial Strain	Yes	Families assigned to the intervention group were assigned to a DULCE family specialist (FS), who had specialist training in child development or a related field. The intervention consisted of 3 types of patient contact: 1) collaborative routine visits with the family, the medical provider, and the FS; 2) home visits by the FS; and 3) contact with the FS by telephone, email, text, or in person. DULCE leveraged support from a medical-legal partnership to address food, housing, and utilities hardships, and to identify and support other family legal needs. This intervention was designed to reduce overall family economic pressure	No
Selvaraj, 2018[127] Addressing Social Key Questions for Health Study (ASK)	Caregiver	Food Insecurity, Housing Instability, Utilities Help, Education, Financial Strain	Yes	Eligible parents and guardians were given the ASK tool upon arrival to the well child visit. Caregivers were asked to complete the ASK tool, after which clinicians discussed the results during the encounter and initialed the form to document the discussion had occurred. If unmet needs were identified, the physician was to refer to community resources using the developed resource lists. Consultation with the on-site social worker was available for families with multiple needs identified and/or significant social complexity.	No
Shannon, 2006[128,129] The Care Advocate (CA) Program	Patient	Housing Instability, Transportation Help, Financial Strain	Yes	The CA intervention began with a comprehensive 83-question psychosocial/functional telephone assessment to determine short-term, immediate care needs, and recommend supportive services that could address these needs. After assessment, members received a letter detailing the resources discussed and providing information about follow-up procedures if a link to the service had already been made. In addition, to monitor referrals and provide additional information as needed, CAs made a follow-up call within 1 week of the assessment and thereafter every month for 12 months. When necessary, CAs helped interested members access referred services.	Yes
Shumway, 2008[130]	Patient	Housing Instability, Financial Strain	Yes	Patients randomized to case management received long-term clinical case management that included assessment, crisis intervention, individual and group supportive therapy, assistance in obtaining stable housing and income entitlements, linkage to medical care providers, referral to substance abuse	Yes

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				services when needed, and ongoing assertive community outreach to maintain continuity of care.	
Srebnik, 2013[131]	Patient	Food Insecurity, Housing Instability, Financial Strain	Yes	Housing First is characterized by rapid placement from homelessness directly into permanent (rather than transitional) housing, supported by assertive on-site engagement and services but no requirement to participate or to achieve or maintain sobriety. This program, called Begin at Home, provides on-site medical care and connections to ancillary services, with the goal of reducing the use of high-cost emergency and inpatient care, jail, and sobering services.	Yes
Tessaro, 1997[132] The Maternal Outreach Worker (MOW) Program	Patient	Housing Instability, Education, Financial Strain	Yes	Through home visits, maternal outreach workers reinforce positive health behaviors, the need for prenatal care, immunizations, and family planning. They model ways mothers and fathers can interact with their infants and demonstrate concrete ways to help infants learn. They also provide assistance in helping families apply for government benefits, housing, employment, and educational programs and generally advocate for families.	Yes
Teufel, 2009[133,134]	Patient	Housing Instability, Financial Strain	Yes	Primary care practitioners referred patients they identified as experiencing legal challenges to legal staff who assisted clients in addressing health-related issues, such as Medicaid reimbursement, Social Security benefits, medication coverage, and divorce.	No
Tsai, 2017[135]	Patient	Housing Instability, Financial Strain	Yes	Veterans were assessed for housing status, income, mental health, substance abuse, physical health, citizenship, and quality of life. Legal staff members worked with clients to create shared legal goals at intake and then determined whether legal goals had been achieved at the end of the case. The sample of 148 veterans had a need for full legal representation for one of four legal problems: housing, consumer debt, child support payments, and disability benefits.	No
Weintraub, 2010[136] The Peninsula Family Advocacy Program (FAP)	Caregiver	Food Insecurity, Housing Instability, Education, Financial Strain	Yes	The FAP provided legal services directly to participants to address problems including denials or discontinuances of government health insurance and other government benefits including Food Stamps and Welfare (CalWORKs in California); erroneous medical billing; family law and domestic violence issues including restraining orders, divorce, adoption, and immigration; access to special education services; and housing issues including habitability violations and evictions. Participants received referrals from FAP for legal services in areas in which Legal Aid Society of San Mateo County did not have expertise (such as employment or consumer law issues). Additionally, participants received information and referrals for many social services, including childcare	No

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				programs, free and low-cost health services, food and clothing programs, and adult education programs.	
Wilder, 2016[137]	Doctor or other clinical staff	Food Insecurity, Housing Instability, Financial Strain	Yes	During their month-long community medicine rotation, residents were taught research concepts to prepare them for different aspects of the CHNA. They were then divided into four teams responsible for different aspects of the CHNA. Residents then formulated recommendations to improve health access and outcomes in the community.	No
Wu, 2019[138] Baltimore Community-based Organizations Neighborhood Network: Enhancing Capacity Together (CONNECT)	Doctor or other clinical staff, Patient	Food Insecurity, Housing Instability, Transportation Help, Utilities Help	Yes	Set of interventions to link a local health system and surrounding community-based organizations (CBOs). The overarching aim was to enhance the capacity of both CBO staff and frontline hospital workers to address client needs by strengthening the bidirectional flow of information about health and social services and building networks that span both entities. Multicomponent intervention included an online tool to help refer clients to community resources, meet-and-greet sessions between CBO staff and healthcare staff, and research assistants. The study provided CBOs with a paid subscription to Healthify (www.healthify.us/), a search engine designed to assist case managers and other CBO staff with referring clients to appropriate social services and community resources. Research assistants provided technical assistance with using Healthify and served as liaisons between the study team and CBO. Meet-and-greet sessions were organized between CBO leaders and health system frontline staff to increase awareness of services, establish personal contacts, and promote referrals.	No
Xiang, 2019[139] Bridge Model for Super Utilizers (Bridge-SU)	Patient	Housing Instability, Transportation Help	Yes	Predischarge, eligible patients are referred to the program. After receiving patient reports, the care coordinator meets with patients and caregivers before discharge to build rapport and understand patients' goals. Within 3 days of discharge, care coordinators conduct a comprehensive needs assessment to identify psychosocial and medical issues and develop a care plan. During the post-discharge period, care coordinators perform a variety of tasks either in person or over the phone, including care coordination, working with other health professionals and social service providers, brief counseling, arranging services and referrals, and follow-up with patients and caregivers. Focuses on addressing the psychosocial causes of readmissions, such as low health literacy, lack of social support, living alone, inadequate access to community long-term care, and unstable or unsafe home environment that are beyond the influence of clinical care and physiological parameters of medical conditions. There are three core intervention components, including (a) a thorough	Yes

Appendix C Table 2. Intervention Characteristics

Author, Year Study Name	Target of Intervention	Target Social Risk Domains	Nontarget Social Risk Domains	Intervention Description	Intervention Includes Nonsocial Risk Component(s)
				biopsychosocial needs assessment, (b) the integration of psychotherapeutic methods (e.g., motivational interviewing and behavioral activation) into care coordination and case management activities, and (c) a standardized approach in working with community-based social service providers and forming hospital-community-aging services network collaboration. The challenges include healthcare behaviors, access to community resources (e.g., housing and transportation), substance use, and proper utilization of primary and preventive care.	
Yaggy, 2006[140] Just for Us	Patient	Food Insecurity, Financial Strain	Yes	Just for Us is a voluntary, fee-for-service care model that organizes multiple agencies under one administrative umbrella to provide innovative, in-home care to poor seniors and disabled adults living independently in clustered housing. Delivers three core services in enrollees' homes: primary care, mental health, and case management. Social workers enroll all patients in the local federally qualified community health centers, obtain demographic or insurance information, and ascertain social needs and potential eligibility for Medicaid, food stamps, Meals on Wheels, and other services. After patients are enrolled, social workers provide ongoing case management, arranging and coordinating nonmedical services and advocating for patients. Services include protective services (i.e., when abuse is identified), in-home assistance, post-hospitalization follow-up, and assistance in obtaining durable medical equipment.	Yes

Abbreviations: BDT = benefits data trust; CHNA = community health needs assessment; CHW = community health worker; COMN = certificate of medical need; DUFB = double up food bucks; ED = emergency department; EMR = electronic medical records; FEMA = Federal Emergency Management Agency; ISHP = income security health promotor; LIHEAP = low-income energy assistance program; MSA = medical student advocate; MSW = master of social work; MTM = medically tailored meal; NTF = nontailored food; PCP = primary care provider; SDH = social determinants of health; SNAP = Supplemental Nutrition Assistance Program, TC = transitional care; WIC = women, infants, children.

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Food Insecurity					
Aiyer, 2019[22]	Pre-post	549 patients	Primary care	The pilot food prescription program implementation and evaluation demonstrated successful feasibility, acceptability, and a significant decrease in prevalence of food insecurity among food prescription participants for the 6-month duration of the program.	Social Risk Outcomes: Positive
Beck, 2014[23] Keeping Infants Nourished and Developing (KIND)	Cohort study	5,071 infants	Primary care	KIND recipients were more likely than nonrecipients to have completed a lead test and developmental screen, and they were more likely to have received a full set of well-infant visits by 14 months. Those receiving KIND also were significantly more likely to have been referred to social worker the medical-legal partnership. Weight-for-length at 9 months did not statistically differ between groups.	Process Outcomes: Positive Social Risk Outcomes: No effect Health Outcomes: No effect Healthcare Use Outcomes: Mixed results
Berkowitz, 2018[24]	Cohort study	757 participants	Home	Participants with MLM had fewer emergency department visits than matched non-participants, as did NTF program participants. MTM program participants also had fewer inpatient admissions and lower medical expenditure. NTF program participation was not associated with fewer inpatient admissions but was associated with lower medical expenditure. Meal delivery programs may be an important way to improve healthcare utilization and costs for vulnerable patients.	Healthcare Use Outcomes: Mixed results Cost Outcomes: Positive
Berkowitz, 2019[25]	Cohort study	1,020 participants	Primary care	Participation in a medically tailored meals program appears to be associated with fewer hospital and skilled nursing admissions and less overall medical spending.	Healthcare Use Outcomes: Positive Cost Outcomes: Positive
Bottino, 2017[26]	Observational without comparator	340 caregivers	Primary care	In this sample, a menu offering food-assistance referrals identified more families than standard food insecurity screening alone. There were families who did not report food insecurity but who selected one or more referrals for food assistance. Food insecurity and referral selection were linked, but the overlap was only partial.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Burkhardt, 2012[27]	Pre-post	24 clinicians	Primary care	Application of quality-improvement methods in a primary care clinic increased ability to effectively screen and positively identify households with food insecurity.	Process Outcomes: Positive
Cohen, 2017[28]	Pre-post	177 participants	Primary care	The intervention was associated with an increase in uptake of a SNAP incentive program, as well as clinically and statistically significant increases in produce consumption.	Social Risk Outcomes: Positive Health Outcomes: Positive
Cullen, 2019[29] Complete Eats	Observational without comparator	86 families	ED	Providing information regarding Summer Food Service Program (SFSP) sites in the community along with meals in the clinical setting resulted in a high level of intended participation in the SFSP	Process Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				and high levels of confidence in caregiver ability to locate community sites of the program.	
Cullen, 2021[30]	Observational without comparator	1,820 families	ED	Although the majority of caregivers in a pediatric ED showed interest in connecting to resource agencies, there was a gap between interest and ultimate engagement with resource agencies.	Process Outcomes: N/A (no comparator)
Fritz, 2021[31]	Observational without comparator	5,735 families	Primary care, Outpatient clinic, Hospital (inpatient), ED	A minority of families with food insecurity desired referral to Hunger Free Colorado (HFC), the primary community-based organization addressing food insecurity in the state that connects families to federal food assistance programs and local food resources. Families referred to HFC were successfully connected with supplemental food resources more than half of the time. Food pantries were the community resource most commonly utilized, and nearly a quarter of contacted families were newly enrolled in SNAP. Families screened in the ED and inpatient settings were more likely to pursue HFC referral, while families with more people in the home were more likely to be connected to a food resource.	Process Outcomes: N/A (no comparator)
Hager, 2020[32]	Pre-post	NR	Outpatient clinic	After systematic food insecurity screening was introduced, Senior Care and Pediatrics referrals to the food bank increased significantly.	Process Outcomes: Positive
Hickey, 2020[33] Food As Medicine in Low-Income Youth (FAMILY)	Cohort study	909 families	Primary care	No significant relationship was found between accessing the pantry and preventative service completion for up-to-date immunization status, completed lead screening, or completed developmental screening at 27 months of age.	Health Outcomes: No effect
Jones, 2020[34] Navajo Fruit and Vegetable Prescription Program	Pre-post	212 families	Primary care, Outpatient clinic, Hospital (inpatient)	Children enrolled in the program significantly increased their fruit and vegetable consumption, and there was a significant decrease in BMI percentile between baseline and follow-up among children who were initially overweight or obese. The proportion of families facing food insecurity also significantly decreased between baseline and follow-up.	Social Risk Outcomes: Positive Health Outcomes: Mixed results
Kelly, 2020[35]	Observational without comparator	15,296 patients	Primary care, Community-based organization	In the overall sample, ten percent of those who reported food insecurity enrolled in SNAP after engaging in at least one step of the care cascade. Thirty-five percent of individuals who participated in the full care cascade enrolled in SNAP. Community-based organizations assisted a greater proportion of food-insecure individuals than clinics.	Process Outcomes: N/A (no comparator)

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Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Knowles, 2018[36]	Observational without comparator	7,284 families	Primary care	Results show mixed effectiveness of the food insecurity screening and referral process. One success was the substantial number of families screened through provider and self- administered methods. Caregivers screened via paper screener reported food insecurity at over six times the rate of caregivers screened verbally by their child's physician.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Lane, 2014[37] Safe Environment for Every Kid (SEEK)	RCT	558 caregivers	Primary care	A single question screen can identify many families with food insecurity and may help maintain food program enrollment. The SEEK model increased both the rate of screening and the rate of food insecurity intervention when compared to routine care without standardized screening; however, screening programs may not be adequate to alleviate food insecurity.	Process Outcomes: Positive Social Risk Outcomes: Mixed results
Martel, 2018[38]	Pre-post	NR	ED	After focused education, ED referrals to the regional food bank increased.	Process Outcomes: Positive Social Risk Outcomes: No effect
Morales, 2016[39]	Cohort study	1,295 pregnant women	Primary care	The study found that participation in Food for Families was associated with modestly better blood pressure trends during pregnancy. Propensity score-matched patients who were not referred to Food for Families and those who were referred but did not enroll experienced a rise in blood pressure during pregnancy, whereas those who enrolled in Food for Families did not. There was no observed difference in blood glucose levels between groups.	Process Outcomes: N/A (no comparator) Health Outcomes: Mixed results
Palakshappa, 2017[40,41]	Observational without comparator	5,645 families	Primary care	This study found it is feasible and acceptable for clinicians to screen for food insecurity in suburban practices, but the referral method used in this study was ineffective in assisting families in obtaining benefits.	Process Outcomes: N/A (no comparator)
Smith, 2017[42]	Pre-post	85 clinicians	Primary care	Educational interventions focused on the role of food insecurity in health can produce improvements in knowledge and attitudes toward addressing food insecurity, increase discussions with patients about food insecurity, and result in measurable patient and systems-level changes.	Process Outcomes: N/A (no comparator) Provider Outcomes: Positive
Smith, 2017[43]	Observational without comparator	463 patients	Primary care	Implementing food insecurity screening and referral programs in student-run free clinics is feasible and can serve as a useful tool in detecting and addressing food insecurity within a medically underserved and hard to reach population.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Stenmark, 2018[44]	Observational without comparator	1,586 families	Primary care	Awareness of food insecurity screening rose across the Pediatric Department with the distribution of handouts at departmental meetings highlighting population-specific impacts of food insecurity, validated screening questions, and referral processes. Teams with staff experienced in linking patients with social services, such as social workers, were more likely to embrace food insecurity screening.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator) Provider Outcomes: N/A (no comparator)
Swavely, 2019[45] Temple Food Insecurity Program (TFIP)	Observational without comparator	3,860 patients	Hospital (inpatient)	Food insecure patients were identified and referred to community-based resources, with a 30-day follow-up call. More than a quarter of patients screened reported food insecurity. Of these patients, two-thirds were already receiving benefits through the Supplemental Nutrition Assistance Program (SNAP) but were still food insecure. All patients with food insecurity were referred to one of 2 resources for help. Despite significant need, less than a quarter of patients connected with these resources.	Process Outcomes: N/A (no comparator)
Housing Instability					
Beck, 2012[46] Cincinnati Child Health-Law Partnership (Child HeLP)	Observational without comparator	16 families	Primary care	A medical-legal partnership co-located in a pediatric primary care setting identified and treated a large cluster of poor quality, substandard housing. Housing improvements were possible because of strong collaboration between clinicians, attorneys, community partners, and families.	Social Risk Outcomes: N/A (no comparator)
Fargo, 2017[47]	Observational without comparator	5,771,496 veterans	Outpatient clinic	Screening for housing instability and risk, which results in an acceptance of a referral for services in cases of positive screens, in turn leads to provision of homelessness-related services at a higher level, as evidenced by administrative data.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Mares, 2010[48-51] Collaborative Initiative to Help End Chronic Homelessness (CICH)	Pre-post	756 patients	Primary care, Outpatient clinic	The average number of days housed during the previous 3 months increased dramatically. Significant improvements of more modest magnitude were also observed in overall quality of life, mental health functioning, and reduced psychological distress. Alcohol and drug problems remained largely unchanged over time.	Social Risk Outcomes: Positive Health Outcomes: Mixed results Healthcare Use Outcomes: Mixed results Cost Outcomes: Positive
Sadowski, 2009[52,53]	RCT	407 patients	Hospital (inpatient)	The findings of this randomized, controlled trial demonstrate that a housing and case management program for chronically ill homeless adults reduced hospitalizations and emergency department visits.	Health Outcomes: Positive Healthcare Use Outcomes: Positive
Smith, 2020[54]	Pre-post	11 patients	Transitional Housing	Once connected to community supports, the hospital noted significantly reduced nonemergent ED utilization and an increase in	Healthcare Use Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Frequent User System Engagement (FUSE) pilot program				primary care visits and preventative care. It was also exceedingly evident that housing and primary care decreased general medical needs and costs once routine health maintenance was up to date.	Cost Outcomes: Positive
Transportation Help Needs					
Bove, 2018[141]	Pre-post	NR	Outpatient clinic	Offering free door-to-door van rides to an outpatient physical therapy clinic was associated with a significant increase in visit attendance rate.	Healthcare Use Outcomes: Positive
Chaiyachati, 2018[56]	Cohort study	506 patients	Primary care	Offering a rideshare-based transportation service may increase show rates for primary care appointments among Medicaid patients. At the control practice, the show rate declined, and at the rideshare practice, the show rate improved.	Healthcare Use Outcomes: Positive
Chaiyachati, 2018[57]	Cohort study	786 patients	Primary care	The uptake of ridesharing was low and did not decrease missed primary care appointments. There were no significant differences in missed appointment rate or emergency room utilization between the control and intervention groups.	Healthcare Use Outcomes: No effect
Whorms, 2021[58]	Pre-post	15,728 patients	Outpatient clinic	Implementation of a rideshare program did not significantly decrease missed appointment rates.	Healthcare Use Outcomes: No effect
Utility Help Needs					
Taylor, 2015[9]	Pre-post	2,573 families	Primary care	Between the first and second year of the study, certification of medical need approvals [to provide utility assistance] increased by 65%.	Social Risk Outcomes: Positive
Interpersonal Violence					
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Education					
Herman, 2009[59]	Pre-post	113 caregivers	Emergency department	Before-and-after comparisons demonstrated that fewer respondents reported actual visits to the emergency department in the previous 6 months.	Healthcare Use Outcomes: Positive
Financial Strain					
Abbott, 2000[60] Health and Advice Project (HAP)	Observational without comparator	80 patients	Primary care	This study demonstrated a measurable and statistically significant health gain associated with welfare benefits advice in a registered practice population.	Social Risk Outcomes: N/A (no comparator) Health Outcomes: N/A (no comparator)
Jones, 2017[61]	Observational without comparator	181 patients	Primary care	Income Security Health Promotion is a novel service within primary care to assist vulnerable patients with a key social determinant of health. Encounters focused on helping patients with increasing their income, reducing their expenses, and improving their financial	Process Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				literacy. The health promoter provided an array of services to patients, including assistance with taxes, connecting to community services, budgeting, and accessing free services.	
Parthasarathy, 2014[62] Building Economic Security Today (BEST)	Observational without comparator	6,248 WIC client families (financial classes); 139 primary caregivers of Medically Vulnerable Infant Program (MVIP) infants	Primary care	The classes at Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) increased clients' awareness of financial issues and confidence that they could improve their financial situations. WIC clients and staff also gained knowledge about financial resources in the community. MVIP's financial assessments offered clients a new and needed perspective on their financial situations, as well as support around the financial and psychological stresses of caring for a child with special healthcare needs. BEST offered Family, Maternal, and Child Health Programs staff opportunities to engage in nontraditional, cross-sector partnerships, and gain new knowledge and skills to address a pressing social determinant of health.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Pettignano, 2012[63] Health Law Partnership (HeLP)	Observational without comparator	62 low-income families	Outpatient clinic, Hospital (inpatient), Urgent care	Legal and educational services provided by HeLP secured otherwise unreimbursed Medicaid payments and increased physician satisfaction.	Cost Outcomes: N/A (no comparator)
Pinto, 2020[64]	Pre-post	59 patients	Primary care	At 3 months, the majority participants had sustained higher rates of optimism about their financial situation, their degree of control, and stress around finances.	Social Risk Outcomes: Positive
Sherratt, 2000[65]	Observational without comparator	683 patients	Primary care	It is clear from our results that the primary care–based Citizens' Advice Bureau service was welcomed, much needed, valued, and effective. It enabled the expertise of the Citizens' Advice Bureau to reach a cohort of patients who would not otherwise have received it or derived financial advantage from it. Moreover, primary healthcare team members felt better able to cope with benefit problems presented by their patients, and they welcomed the initial training.	Social Risk Outcomes: N/A (no comparator)
Vest, 2018[66]	Pre-post	14,094 patients	Primary care	This study found that receipt of wraparound services, consisting of nonmedical interventions that directly address SDH, was associated with a reduction in the expected number of subsequent hospitalizations and emergency department visits.	Healthcare Use Outcomes: Positive Cost Outcomes: Positive
Woodhead, 2017[67]	Pre-post	901 patients	Primary care	Co-located welfare advice in the primary care setting improves short-term mental health and well-being, reduces financial strain, and generates considerable financial returns.	Process Outcomes: Negative Social Risk Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
					Health Outcomes: Positive Healthcare Use Outcomes: No effect Cost Outcomes: Positive
Multiple Social Risk Domains					
Agarwal, 2020[68]	Observational without comparator	770 patients	Primary care	The majority of patients screened had at least one legal need, with an average of more than 4 legal needs per participant who had at least one legal issue.	Process Outcomes: N/A (no comparator)
Becker, 2004[69] Caught in the Crossfire	Cohort study	112 youth	Hospital (inpatient)	A peer-based program that intervenes immediately after, or very soon after, youth are violently injured can directly reduce at-risk youth involvement in the criminal justice system. Intervention youth were less likely to be arrested for any offense and less likely to have any criminal involvement when compared with controls. No statistically significant differences were found for rates of reinjury or death.	Social Risk Outcomes: Positive Health Outcomes: No effect Healthcare Use Outcomes: No effect
Berkowitz, 2018[70]	Pre-post	141 patients	Primary care	Participants saw decreases in cost-related medication underuse and transportation barriers, but not food insecurity. There also were small improvements in consumption of added sugars, though the clinical significance of this change is not clear.	Process Outcomes: Mixed results Health Outcomes: Mixed results
Bovell-Ammon, 2020[71] Housing Prescriptions as Health Care	RCT	78 families	Primary care, ED, Recruited from health plan membership	Our difference-in-differences analysis demonstrated significantly greater improvements in child health status and parental anxiety and depression scores among those in the intervention group, compared to the control group. There were no significant differences in homelessness; multiple moves; being behind on rent; or numbers of child urgent care visits, ED visits, or hospitalizations.	Social Risk Outcomes: No effect Health Outcomes: Mixed results Healthcare Use Outcomes: No effect
Bronstein, 2015[72]	RCT	89 patients	Hospital (inpatient)	This study shows that a time-efficient care coordination intervention by MSW interns may decrease hospital readmission rates.	Healthcare Use Outcomes: Positive
Buchanan, 2006[73]	Cohort study	225 patients	Hospital (inpatient)	Respite care significantly reduced homeless patients' utilization of inpatient services when compared with usual care.	Health Outcomes: No effect Healthcare Use Outcomes: Mixed results
Buitron de la Vega, 2019[74] THRIVE	Observational without comparator	2,420 patients	Primary care	This study demonstrates the feasibility of implementing a systematic strategy to address unmet social needs in primary care settings using electronic health record decision support workflows.	Process Outcomes: N/A (no comparator) Provider Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Clark, 2009[75] Women's Health Demonstration Project (WHDP)	Observational without comparator	437 patients	Primary care	The study found case management was associated with increased mammography uptake rates, although no increase in repeat (longitudinal) mammography use was found. Housing concerns and lacking a regular provider should be addressed to promote mammography uptake.	Healthcare Use Outcomes: N/A (no comparator)
Costich, 2019[76] Special Kids Achieving Their Everything (SKATE)	Pre-post	80 caregivers	Primary care	This study found that caregiver distress improved after completion of the SKATE CHW program, suggesting that some aspect of the CHW intervention, whether peer support, assistance with scheduling appointments, communicating with providers, or connection to social service referrals, contributed to reductions in caregiver distress.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: Positive Health Outcomes: Positive
Fiori, 2019[77] Community Linkage to Care (CLC)	Observational without comparator	6,410 families	Primary care	We conducted social needs screens at the majority of eligible well-child visits. Childcare, housing quality and/or availability, and food insecurity were the most frequently reported needs. On average, three-quarters of providers had their patients screened on more than half of eligible well-child visits. Our experience suggests that screening for social needs at well-child visits is feasible as part of routine primary care.	Process Outcomes: N/A (no comparator) Provider Outcomes: N/A (no comparator)
Forti, 2002[78]	Observational without comparator	273 patients	Primary care	Health centers noted an increase in revenues through reimbursements for health services, new patient enrollees, and increased patient visits. Over half of clients who were eligible prior to this intervention and were not receiving benefits were successfully enrolled in public benefit programs such as Supplemental Security Income, Specified Low-Income Medicare Beneficiary, Qualified Medicare Beneficiary, disability, railroad pensions, and Veterans Administration benefits.	Social Risk Outcomes: N/A (no comparator) Cost Outcomes: N/A (no comparator)
Freeman, 2020[79] Health + Housing Project	Pre-post	226 patients	Home-based care	Compared with baseline, we observed a significant decrease in the percentage of participants who reported food insecurity and inability to pay rent on time after the intervention. In addition, significantly fewer participants reported needing and being unable to access food, a place to exercise, job training or employment placement programs, and education. More participants reported having a personal doctor on the postintervention survey than at baseline, but fewer reported seeing their personal doctor in the past six months. There was a significant change from baseline in the number of outpatient visits in the past six months, with more participants reporting four or more visits. No significant change from baseline was seen in self-reported emergency department visits or	Social Risk Outcomes: Mixed results Health Outcomes: No effect Healthcare Use Outcomes: Mixed results

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				hospitalizations in the past year. No change from baseline occurred in participants' self-reported general or mental health status or health behaviors.	
Garg, 2007[80,81] Well-child Care Visit, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE)	RCT	200 parents, 45 residents	Primary care	This study demonstrated a positive impact of the WE CARE intervention on provider discussion and referral for family psychosocial problems at well-child care visits for children in low-income families.	Process Outcomes: Positive
Garg, 2010[82]	Observational without comparator	59 caregivers	Primary care	In this pilot study, we found the implementation of a Family Help Desk in an urban clinic had a positive impact on educating parents about community resources and linking them to these services.	Process Outcomes: N/A (no comparator)
Garg, 2012[83] Health Leads (HL)	Observational without comparator	1,059 families	Primary care	The HL model had a positive impact on reducing unmet social needs for low-income families.	Process Outcomes: N/A (no comparator)
Garg, 2015[5] Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE)	RCT	336 mothers	Primary care	We found that a simple primary care screening and referral system for unmet basic needs increased families' receipt of community-based resources. More WE CARE mothers received at least one referral at the index visit. At the 12-month visit, more WE CARE mothers had enrolled in a new community resource. WE CARE mothers had greater odds of being employed. WE CARE children had greater odds of being in childcare. WE CARE families had greater odds of receiving fuel assistance and lower odds of being in a homeless shelter.	Process Outcomes: Positive Social Risk Outcomes: Positive
Gold, 2018[84]	Observational without comparator	1,130 patients	Primary care	Our results indicate that adoption of systematic electronic health record based SDH documentation may be feasible, but substantial barriers to adoption exist.	Process Outcomes: N/A (no comparator)
Gottlieb, 2016[85,86]	RCT	1,809 caregivers	Primary care, Urgent care	The number of social needs reported by the intervention arm decreased more than that reported by the control arm. In addition, caregivers in the intervention arm reported significantly greater improvement in their child's health.	Social Risk Outcomes: Positive Health Outcomes: Positive
Gottlieb, 2020[87]	RCT	611 child-caregiver dyads	Urgent care	There were no significant differences between groups in the effects of the interventions. Caregivers in both groups reported fewer social risks and improved child and caregiver health 6 months after	Social Risk Outcomes: Positive Health Outcomes: Mixed results

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				the intervention. There were no significant changes in children's physical, social, or cognitive or school functioning based on the PedsQL in either group.	
Graham-Jones, 2004[88,89]	Cohort study	117 homeless persons or families	Primary care, Transitional Housing	Three independent outcome measures all demonstrated improvements in the health-related quality of life of people recruited and supported by a health advocate during their stay in temporary housing, in comparison with a control group given usual care at the same health center. The additional costs of providing health advocacy were offset by a reduction in demand for health center-based care.	Social Risk Outcomes: Positive Health Outcomes: Positive Healthcare Use Outcomes: Mixed results Cost Outcomes: No effect
Gunderson, 2018[90]	Observational without comparator	735 patients	Primary care	We found a significant decrease in outpatient visits and emergency department utilization among adults, with decreases among patients with more medically complex needs particularly. We observed similar effectiveness on the cost of care.	Healthcare Use Outcomes: N/A (no comparator) Cost Outcomes: N/A (no comparator)
Hassan, 2015[91,92]	Observational without comparator	401 patients	Primary care	When provided with services to address health-related social problems, the majority of youth choose to receive help, with nearly half successfully addressing their priority concern.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Higginbotham, 2019[93]	Observational without comparator	133 families	Primary care	This initiative demonstrated the feasibility of incorporating a simplified screening and community resource referral process into the well-child appointments at a rural health clinic.	Process Outcomes: N/A (no comparator)
Iglesias, 2018[94]	RCT	250 patients	ED	There was a higher increase of environment quality of life dimension for frequent emergency department users in the case management intervention group after 12 months and a non-significant effect of the case management intervention on physical health, psychological health, and social relationships quality of life dimensions.	Health Outcomes: Mixed results
Juillard, 2016[95-97]	Pre-post	466 at-risk youth and adults	ED	The violence intervention program (VIP) demonstrated sustained recidivism reduction and success in addressing client needs from a traditionally underserved population. After 6 years, the recidivism rate has decreased fourfold compared to the rate before VIP implementation.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator) Healthcare Use Outcomes: Positive Provider Outcomes: N/A (no comparator)
Kangovi, 2014[98] Individualized	RCT	446 patients	Hospital (inpatient)	Results indicate that a brief community health worker intervention improves posthospital primary care access, discharge communication, patient activation, mental health, and recurrent	Health Outcomes: Mixed results Healthcare Use Outcomes: Mixed results

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Management for Patient-Centered Target (IMPaCT)				readmissions for a population of high-risk hospitalized patients with varied conditions. There were no significant differences between groups in physical health, satisfaction with medical care, or medication adherence.	
Kenyon, 2016[99]	RCT	1,324 women	Primary care	Antenatal attendances were high in the standard care control and did not increase further with addition of the pregnancy outreach worker intervention. In the powered subgroup of women with two or more social risk factors, mental health status was significantly better, although for all women recruited, no significant differences were seen. Mother-to infant bonding was significantly better in the intervention group for all women, and there were no differences in other secondary outcomes.	Health Outcomes: Mixed results Healthcare Use Outcomes: No effect
Khidir, 2021[100]	Observational without comparator	723 patients	Telephone or web-based care	More than one-third of patients reported a social need, most commonly related to food, housing, or utilities.	Process Outcomes: N/A (no comparator
Klein, 2011[101]	Pre-post	38 residents	Primary care	The educational intervention increased the interns' comfort and knowledge of SDH and community resources. Documentation of social questions also increased.	Process Outcomes: Positive Provider Outcomes: Positive
Klein, 2014[102]	Pre-post	47 residents; 141 parents	Primary care	This SDH video curriculum improved residents self-assessed screening competence, parental perception of screening, and both medical legal referrals and formula distribution.	Process Outcomes: Mixed results Provider Outcomes: Positive
Kulie, 2021[103]	Observational without comparator	505 patients	ED	The adult Medicaid beneficiaries who participated in our screening and referral program reported a high prevalence of social adversities such as housing instability, food insecurity and trouble paying bills. The vast majority of participants requested assistance with at least one social need. The most common unmet needs were related to housing, food insecurity, medical and job training. Our referral program was not associated with a substantial proportion of Medicaid beneficiaries getting their social needs met.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Kwan, 2018[104] Better Health through Social and Healthcare Linkages beyond the Emergency Department (HealthiER)	Observational without comparator	1,600 patients	Primary care, ED	Achieving objectives was often difficult, such that less than 43% of objectives were met as of discharge from the program. Achieving objectives related to government resources was the highest, while employment/education, housing, dental care, and life skills had the lowest rate of achievement. Objective achievement (e.g., helping a client fill out a housing or employment application) does not necessarily mean the larger goal (e.g., finding an apartment or a job) has been met.	Process Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Lindau, 2019[105,106] CommunityRx	RCT	411 patients	Primary care, ED	We found no significant effect of this intervention on mental or physical HRQOL during the 3-month follow-up period. In contrast, we found a significant effect of the intervention on individuals' confidence in finding community resources to manage their health.	Process Outcomes: Positive Health Outcomes: No effect
Liss, 2019[107]	RCT	654 patients	Hospital (inpatient), ED	Among patients randomized to a patient-centered transitional care intervention, there was no significant reduction in 90-day probability of death or additional hospital encounters. However, there were significant decreases in measures of inpatient admissions over 180 days.	Health Outcomes: No effect Healthcare Use Outcomes: Mixed results
Losonczy, 2017[108] Highland Health Advocates (HHA)	Cohort study	459 patients	ED	After an encounter with our integrated model help desk for health-related social needs, most patients found it helpful, and many of the patients we were able to follow reported a sustained positive effect on their access to helping agencies, as well as increased access to a medical home. Our preliminary findings do not provide evidence of an impact on self-reported health status or resolution of the patient's primary need by the 6-month follow-up time point.	Process Outcomes: Positive Social Risk Outcomes: No effect Health Outcomes: No effect Healthcare Use Outcomes: Mixed results
Mackintosh, 2006[109,110]	RCT	126 patients	Primary care	The trial design was feasible and acceptable. The study found a large proportion of participants in the sample was eligible for welfare benefits but not claiming them. However, there was little evidence of differences in health outcome measures between groups over time.	Social Risk Outcomes: Positive Health Outcomes: No effect
Moreno, 2021[111] Connecting Home to Provider	Cohort study	1,120 patients	Primary care	The program demonstrated statistically significant reductions in acute hospitalizations and ED use.	Healthcare Use Outcomes: Positive
Nguyen, 2021[112]	Cohort study	4,699 patients	Primary care	Relative to similar patients who did not receive social needs assistance, those who received social needs assistance were significantly more likely to report a community health center as their usual source of care. They were also significantly less likely to report the ED as their usual source of care. There were no significant differences in having a checkup in the last year.	Healthcare Use Outcomes: Mixed results
O'Toole, 2016[113] Homeless Patient Aligned Care Team (H-PACT) program	Pre-post	3,543 homeless veterans	Primary care	Integrating SDH into clinical care can be effective for high-risk homeless veterans. Six-month patterns of acute care use pre-enrollment and post-enrollment showed a reduction in emergency department use and a reduction in hospitalizations.	Healthcare Use Outcomes: Positive
Okin, 2000[114]	Pre-post	53 patients	Emergency department	In this pilot study of emergency department high users, the introduction of intensive clinical case management was associated	Social Risk Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				with statistically significant reductions in utilization and cost of acute hospital services and reductions in psychosocial problems. The intervention appears to be both cost-efficient and cost-effective.	Health Outcomes: Positive Healthcare Use Outcomes: Positive Cost Outcomes: Positive
Olds, 2002[115]	RCT	1,539 pregnant women	Home	An intervention program of nurse home visits to at-risk pregnant mothers was successful in improving prenatal care of the child. The impact on pregnancy outcomes was unequivocal.	Social Risk Outcomes: Positive Health Outcomes: Mixed results Healthcare Use Outcomes: Mixed results Cost Outcomes: Positive
Onyekere, 2016[116]	Observational without comparator	369 patients, 31 medical students	Primary care	Students who participated in the program reported increased empathy toward patients and demonstrated an understanding of the social determinants of health and their impact on health outcomes.	Process Outcomes: N/A (no comparator) Social Risk Outcomes: N/A (no comparator)
Patel, 2018[117]	Pre-post	6 pediatric residents, 322 patients	Outpatient clinic	This study found that the implementation of an IHELLP (Income, Housing, Education, Legal status, Language/Immigration, Personal Safety)-based intervention in the outpatient setting of a pediatric residency program, through a brief teaching module and visual reminders, significantly improved resident documentation of family income and housing in the outpatient setting. Specifically, resident physicians in the outpatient clinic setting were more likely to discuss WIC, SNAP, and housing subsidies after learning about IHELLP, SDH, and after reinforcements with visual cues, as compared to baseline. However, there was no improvement in the documentation of education, legal needs, immigration status, or personal safety.	Process Outcomes: Mixed results
Polk, 2020[118] Health Leads	Observational without comparator	11,661 families	Primary care	Reported social needs differed by language. Spanish speakers most frequently reported needs related to food. English speakers most frequently reported child-related needs. The association between household language and the odds of a successful resource connection varied by region.	Process Outcomes: N/A (no comparator)
Pruitt, 2018[119] HealthConnections	Pre-post	2,718 participants	Home	Although there was a reduction in mean expenses for both groups in the second year, there was an additional 10% reduction for those who reported their social needs met, compared to those who did	Cost Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				not. This relative reduction may be related to addressing their social needs.	
Raven, 2011[120]	Pre-post	19 patients	Hospital (inpatient), Emergency department	Inpatient hospitalizations and emergency department visits decreased, while outpatient clinic visits increased. The pilot was associated with a trend towards reduced overall Medicaid spending when accounting for intervention costs.	Healthcare Use Outcomes: Positive Cost Outcomes: Positive
Real, 2016[121]	Pre-post	37 residents	Primary care	The results of our study suggest that a neighborhood-based curriculum can have considerable impact on resident self-perceived competence in administering anticipatory guidance and produce helpful advice for families. Results were particularly notable for improved self-assessed competence on the topics of safe play, transportation, and obtaining healthy foods.	Provider Outcomes: Positive
Rosen Valverde, 2018[122] H.E.A.L. collaborative	Pre-post	167 families	Primary care, Hospital (inpatient)	The top five areas for which H.E.A.L. provided assistance were special education, social work, public benefits, general education, and housing, with special education as the most common area addressed. There were declines from the pre-test to the post-test in self-reported stress from a range of sources. The analyses show declines in stress associated with the child's school/education, financial issues, legal matters, transportation, childcare, housing, mental health, and parent/caregiver isolation.	Health Outcomes: Mixed results
Ryan, 2012[123]	Pre-post	104 patients	Primary care	This pilot study demonstrates large improvements in both well-being and perceived stress scores after receipt of legal intervention.	Health Outcomes: Positive
Sandhu, 2021[124]	Observational without comparator	61 patients	Primary care	Of the patients screened for unmet social needs by the behavioral health, nearly half were referred for follow-up and nearly half of referred patients reported accessing at least one of the recommended community resources.	Process Outcomes: N/A (no comparator)
Schickedanz, 2019[125] Health Leads	Cohort study	34,225 patients	Telephone or web-based care	This telephonic social needs screening and navigation program for predicted high utilizers in a large integrated health system showed a statistically equivocal decline in overall healthcare utilization, but larger, significant declines in utilization were seen among sub-samples with lower socioeconomic status, including those with Medicaid coverage.	Healthcare Use Outcomes: No effect
Sege, 2015[126] Developmental Understanding and Legal Collaboration	RCT	330 families	Primary care	Compared with controls, families receiving the intervention had accelerated access to concrete supports, improved rates of on-time immunization and preventive care, and decreased emergency department utilization.	Social Risk Outcomes: Mixed results Health Outcomes: Positive Healthcare Use Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
for Everyone (DULCE)					
Selvaraj, 2018[127] Addressing Social Key Questions for Health Study (ASK)	Pre-post	2,569 families	Primary care	Universal screening for toxic stress risk factors in pediatric primary care improved identification and management of family needs. Screening was feasible and acceptable to families.	Process Outcomes: Positive Social Risk Outcomes: N/A (no comparator)
Shannon, 2006[128,129] The Care Advocate Program	RCT	823 patients	Home	Intervention patients were significantly more likely than controls to use primary care physician services, and number of hospital admissions and hospital days were significantly more stable for Care Advocate group members than for controls.	Process Outcomes: N/A (no comparator) Healthcare Use Outcomes: Mixed results
Shumway, 2008[130]	RCT	252 patients	Emergency department	Case management was associated with statistically significant reductions in psychosocial problems common among frequent emergency department users, including homelessness, alcohol use, lack of health insurance and social security income, and financial need. Case management was associated with statistically significant reductions in emergency department use and cost. Case management and usual care patients did not differ in use or cost of other hospital services.	Social Risk Outcomes: Positive Health Outcomes: Mixed results Healthcare Use Outcomes: Mixed results Cost Outcomes: Mixed results
Srebnik, 2013[131]	Pre-post	60 patients	Hospital (inpatient)	Participants showed a significantly greater reduction in emergency department and sobering center use relative to the comparison group. At a trend level, participants had greater reductions in hospital admissions and jail bookings.	Social Risk Outcomes: Mixed results Healthcare Use Outcomes: Positive Cost Outcomes: Positive
Tessaro, 1997[132] The Maternal Outreach Worker (MOW) Program	Cohort study	1,726 births, 12,988 comparison births	Primary care	Although no differences were found in the use of healthcare and social services such as WIC and Early and Periodic Screening, Diagnosis, and Treatment visits following the birth of the baby, modest differences in the adequacy of prenatal care among Caucasians, and in birth outcomes among African American MOW Program participants were noted. The MOW Program did not show a significant benefit, compared to not being enrolled in the program, in terms of fulfilling the perceived emotional, informational, and assistance support needs of its participants.	Social Risk Outcomes: No effect Health Outcomes: Mixed results Healthcare Use Outcomes: No effect
Teufel, 2009[133,134]	Observational without comparator	428 patients	Primary care	Through this unique collaboration of providers of health and legal services, underserved individuals are gaining greater access to healthcare, legal, and social services. The follow-up study supports the sustained impact of the medical legal partnership, which is especially important due to the under-representation of medical	Social Risk Outcomes: N/A (no comparator) Cost Outcomes: N/A (no comparator)

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
				legal partnerships in rural areas and the health and socioeconomic inequities found in rural areas. Based on the analysis reimbursements to expenditures, the health and law program appears to be cost-effective and thereby economically sustainable.	
Tsai, 2017[135]	Observational without comparator	148 veterans	Primary care, Hospital (inpatient)	We observed significant improvements in housing, income, and mental health. Veterans who received more partnership services showed greater improvements in housing and mental health than those who received fewer services, and those who achieved their predefined legal goals showed great improvements in housing status and community integration than those who did not.	Social Risk Outcomes: N/A (no comparator) Health Outcomes: N/A (no comparator)
Weintraub, 2010[136] The Peninsula Family Advocacy Program (FAP)	Pre-post, Observational without comparator	102 families	Primary care	This pilot study suggests that the addition of a legal aid attorney to the medical team can increase access to legal and social services and decrease barriers to healthcare. Of particular promise were increased awareness and use of free legal services, increased access to food and income supports, decreased barriers to healthcare and reported improvement in child health and well-being. Trends towards improvement were seen for indicators of well-child care.	Process Outcomes: Positive Social Risk Outcomes: N/A (no comparator) Health Outcomes: Positive Healthcare Use Outcomes: Mixed results Cost Outcomes: Positive
Wilder, 2016[137]	Observational without comparator	15 medical residents	Primary care	More than half of the residents surveyed reported that the community health needs assessment greatly improved their comfort level speaking to patients about social factors that affect their health. Participants responded that they valued the opportunity to engage with community members and to understand their patients on a population level.	Provider Outcomes: N/A (no comparator)
Wu, 2019[138] Baltimore Community-based Organizations Neighborhood Network: Enhancing Capacity Together (CONNECT)	RCT	4,917 patients	Outpatient clinic	Based on the outcome measures selected for this study, the intervention did not improve patients' healthcare utilization outcomes. There was a suggestion that the intervention enhanced the capacity of inpatient and outpatient hospital staff to refer patients to community resources, evidenced by increased awareness about CBO services, and increased confidence about community resources.	Healthcare Use Outcomes: No effect Provider Outcomes: Mixed results
Xiang, 2019[139]	Pre-post	586 patients	Hospital (inpatient), Telephone	In the 12 months after the intervention, hospital charges per patient were reduced, ED visits and 30-day readmission rates decreased, and significant reduction in health services utilization and cost	Healthcare Use Outcomes: Mixed results Cost Outcomes: Positive

Appendix C Table 3. Study Characteristics

Author, Year Study Name	Study Design	Sample Size	Setting	Summary of Results	Results by Outcome Category
Bridge Model for Super Utilizers (Bridge-SU)			or web-based care, Home-based care	outcomes was observed. Average length of stay did not change significantly after the intervention.	
Yaggy, 2006[140] Just for Us	Observational without comparator	281 patients	Home-based care	After 2 years of operation, Just for Us is serving nearly 300 individuals in 10 buildings. The program is demonstrating improvement in individual indices of health. Medicaid expenditures for enrollees are shifting from ambulances and hospital services to pharmacy, personal care, and outpatient visits.	Social Risks Outcomes: N/A (no comparator) Health Outcomes: N/A (no comparator) Cost Outcomes: N/A (no comparator)

Abbreviations: BMI = body mass index; CBO = community-based organization; CHW = community health worker; ED = emergency department; HRQOL = health-related quality of life; MLM = medically tailored meals; MSW = master of social work; MVIP = medically vulnerable infant program; N/A = Not applicable; NR = Not reported; NTF = non-tailored food; PedsQL = Pediatric Quality of Life Inventory; RCT = randomized controlled trial; SDH = social determinants of health; SNAP = Supplemental Nutrition Assistance Program; WIC = women, infants, children.

Appendix C Table 4. Effects by Outcome Category and Domain in Studies With a Comparator

Outcome Category	Positive	Mixed	No Effect	Negative	TOTAL STUDIES
Food Insecurity (k=11)					
Process	**5**	0	0	0	5
Social risk	**2**	**1**	**1**	0	4
Physiologic and behavioral health	0	**2**	**1**	0	3
Healthcare utilization	**1**	**2**	0	0	3
Cost	**2**	0	0	0	2
Provider	**1**	0	0	0	1
Transportation Help Needs (k=4)					
Process	0	0	0	0	0
Social risk	0	0	0	0	0
Physiologic and behavioral health	0	0	0	0	0
Healthcare utilization	**2**	0	**2**	0	4
Cost	0	0	0	0	0
Provider	0	0	0	0	0
Utilities Help Needs (k=1)					
Process	0	0	0	0	0
Social risk	**1**	0	0	0	1
Physiologic and behavioral health	0	0	0	0	0
Healthcare utilization	0	0	0	0	0
Cost	0	0	0	0	0
Provider	0	0	0	0	0
Education (k=1)					
Process	0	0	0	0	0
Social risk	0	0	0	0	0
Physiologic and behavioral health	0	0	0	0	0
Healthcare utilization	**1**	0	0	0	1
Cost	0	0	0	0	0
Provider	0	0	0	0	0
Financial Strain (k=2)					
Process	0	0	0	**1**	1
Social risk	**1**	0	0	0	1
Physiologic and behavioral health	**1**	0	0	0	1
Healthcare utilization	**1**	0	0	**1**	2
Cost	**2**	0	0	0	2
Provider	0	0	0	0	0
Multidomain (k=49)					
Process	**7**	**3**	0	0	10
Social risk	**12**	**3**	**3**	0	18
Physiologic and behavioral health	**9**	**11**	**8**	0	28
Healthcare utilization	**11**	**12**	**6**	0	29
Cost	**10**	**1**	**1**	0	12
Provider	**3**	**1**	0	0	4

Appendix C Table 5. In-Process Studies From ClinicalTrials.gov by Social Risk Domain

Study Title	Conditions	Intervention(s)	Outcome Measures	Number Enrolled	Start Date	Completion Date	NCT Number
Food Insecurity							
Fresh Truck Pilot to Reduce Food Insecurity in a Medicaid ACO	Food Insecurity	• Fresh Truck with stipend • THRIVE screening	• USDA Food insecurity scale • Fruit and vegetable consumption • Food insecurity based on THRIVE screener • ED visits • All-cause inpatient discharges • Patient-level cost of care	120	October 2019	September 2020	NCT04017624
CommunityRX for Hunger: A Hospital-Based Intervention	• Food insecurity • Caregivers • Clinical trial • Hunger • Health-related QoL • Patient satisfaction	CommunityRx-H	• Change from baseline in use of food resources • Patient satisfaction with care • Change from baseline in mental-health related QoL • Change from baseline in household food insecurity	840	April 2018	September 2021	NCT03173794
A Trial of Behavioral Economic Interventions Among Food Pantry Clients	Food preferences	Behavioral: Behavioral economic intervention of online purchasing at a food pantry	• Monthly change in: Number of units of healthier foods Number of units of less healthy food Calories from healthier foods per shopping trip Calories from less healthier foods per shopping trip • Self-reported change in fruit and vegetable intake • Biomarker change in fruit and vegetable intake • Change in BMI • Change in systolic blood pressure • Change in diastolic blood pressure • Change in HbA1c percentage	500	July 2019	December 2021	NCT04011384
Financial Needs							
Clinic-Based Financial Coaching and Family Health and Development	• Economic problems • Development, child • Quality of life	Behavioral: Financial coaching and services	• Health-related QoL via PROMIS-10 • Ages and Stages Questionnaire • Accountable Health Communities Social Needs Screening items • Family Economic Strain Scale • Parent Sense of Competence Scale • Pediatric primary care visit adherence	400	November 2018	July 2023	NCT03736590

Appendix C Table 5. In-Process Studies From ClinicalTrials.gov by Social Risk Domain

Study Title	Conditions	Intervention(s)	Outcome Measures	Number Enrolled	Start Date	Completion Date	NCT Number
addressInG iNcome securITy n primary carE (IGNITE)	• Poverty • Income • Social determinants of health	Income security health promotion	• Change in monthly income from BL to 6 months after intervention • Change in scores on WHO QoL BREF and EQ-5D-5L • Change in scores on the Community Integration Scale • Change in scores on the Canadian Centre for Financial Literacy Personal Financial Literacy Quiz • Comorbidities and medication access • Other SDH • Food security	300	September 2017	September 2020	NCT02459184
Multiple Domains							
Implementing an Intervention to Address Social Determinants of Health in Pediatric Practices	• Basic unmet material needs • Patient satisfaction • Receipt of community resources • Provider Referrals	Behavioral: WE CARE	• Receipt of community resources • Provider referrals for unmet material needs at visit • WE CARE survey distribution • Appropriate referrals made by providers • Patient satisfaction (CAHPS survey) • Family centeredness (National Survey of Children's Health—2016) • Acceptability of WE CARE • Whether discussion of unmet needs occurred at child's well-child care visit • Appropriateness of WE CARE	2,520	October 2017	April 2022	NCT02918435
Social Determinants of Health Screening and Interventions	• Social determinants of health • Patient satisfaction • Quality of life	SDH Referrals	• Patient satisfaction questionnaire • Patient community services questionnaire • Patient satisfaction of health status questionnaire • Communication between patient and healthcare providers questionnaire • Abbreviated HCAHPS data	300	May 2018	May 2020	NCT03661359
CREATION Health Readmission Risk Assessment Tool	• Heart failure • COPD • Myocardial infarction • Coronary artery bypass graft • Pneumonia	n/a	• Social Determinant Survey • Readmission status	1,240	May 2017	January 2020	NCT03424382

Appendix C Table 5. In-Process Studies From ClinicalTrials.gov by Social Risk Domain

Study Title	Conditions	Intervention(s)	Outcome Measures	Number Enrolled	Start Date	Completion Date	NCT Number
	• Total knee replacement • Total hip replacement • Stroke						
Community Paramedicine at Home	• Cardiovascular disease • Diabetes mellitus • Accidental falls • Social isolation • Food insecurity	CP@Home	• Change in number of repeat EMS calls • Change in number of ED presentations • Change in number of hospital admissions	261	October 2018	September 2019	NCT02835989
THRIVE+ Pharmacy Liaison-Patient Navigation Intervention	Healthcare utilization	• THRIVE screening and referral • Pharmacy care Program services • Patient navigation services • Motivational interviewing • Linkage to community partner organization	• Acute healthcare utilization composite measure • Number of all-cause ED visits • Number of 30-day ED revisits • ED revisits rate • Number of all-cause hospital discharges • Number of 30-day hospital readmissions • 30-day inpatient readmission rate	364	May 2019	May 2021	NCT03919084
Contra Costa Health Services Whole Person Care (CommunityConnect) Program Evaluation	Social determinants of health	Behavioral: Telephonic services and in-person services	• Avoidable ER visit rate • Avoidable inpatient visit rate • Specialty care visit rate • Primary care visit rate • Mental health/alcohol and drug visit rate • Medi-Cal retention • Overall health costs • Cal-Fresh/SNAP enrollment rates • No-show rates • Blood pressure	60,000	January 2017	December 2021	NCT04000074

Appendix C Table 5. In-Process Studies From ClinicalTrials.gov by Social Risk Domain

Study Title	Conditions	Intervention(s)	Outcome Measures	Number Enrolled	Start Date	Completion Date	NCT Number
Reducing Socioeconomic Disparities in Health at Pediatric Visits	• Asthma • Obesity • Healthcare utilization • Healthcare disparities • Basic unmet socia needs • Blood pressure • Child maltreatment • Child development	Behavioral: • WE CARE survey • WE CARE community resource handout • Patient navigator	• Healthcare utilization • Child maltreatment • Developmental delay • Obesity • Asthma • Blood pressure • Provider referrals • Family receipt of community-based resource • Focus group data	1,205	September 2015	March 2020	NCT02451059
Patient Navigation in Primary Care and Access to Resources in the Community	• Healthcare inequity • Patient navigation	Behavioral: Patient navigator	• Access to community resources • Ability of the intervention to address equity • Needs/difficulties • Use of healthcare • Ability to engage • QoL VR-12 • Health action process approach • Patient activation measure • Community service evaluation • Navigator assessment (intervention arm only)	368	April 2018	August 2019	NCT03451552
ARC—Access to Resources in the Community	Problems with access to healthcare	Mixed method feasibility study	• Active patient utilization • Referrals • First contact access • Needs/difficulties/use of healthcare • QoL VR-12 • Self-efficacy • Engagement with primary medical care and appropriateness of care • Ability to engage • Health action process approach • Patient activation measure	468	May 2017	July 2018	NCT03105635

Abbreviations: ACO = Accountable Care Organization; BL = baseline; BMI = body mass index; CAHPS = Consumer Assessment of Healthcare Providers and Systems; COPD = chronic obstructive pulmonary disease; ED = emergency department; EMS = emergency medical services; HbA1c = hemoglobin A1c; HCAHPS = Hospital Consumer Assessment of Healthcare Providers and Systems; QoL = quality of life; SDH = social determinant of health; SNAP = Supplemental Nutrition Assistance Program; USDA = U.S. Department of Agriculture.

Appendix C Table 6. In-Process Studies From HSRProj Registry by Social Risk Domain

Study Title	Description	Number Enrolled	Start Date	Completion Date	Project Number
Food Insecurity					
Developmental Research on Household Food Insecurity and Feeding Practices: Informing Health Equity Policy and Infant Feeding Recommendations*	The overall objective of this research is to address knowledge gaps and develop and pilot a survey on infant food insecurity in Nova Scotia to support the conditions necessary for optimal infant feeding and healthy development in food insecure households.	NR	2019	2022	20191015
Effects of the Supplemental Nutrition Assistance Program (SNAP) of Health Care Costs and Utilization*	We propose to assess the potential causal relationships between SNAP and healthcare expenditures and utilization, hypothesizing that SNAP reduces healthcare expenditures and utilization (aim 1) and that such effects are heightened for people with disabilities and chronic illnesses (aim 2). We will link 2012–2016 data from the Massachusetts (MA) All-Payer Claims Database, the MA Department of Transitional Assistance (which operates SNAP in the state), the MA Medicaid program, and the MA Department of Public Health, yielding uniquely detailed longitudinal data. We will have in-depth SNAP information for recipients, as well as data on expenditures, utilization, disability, chronic conditions, and demographics for recipients and nonrecipients. We will exploit technical errors that led to 43,000 out of 449,000 MA SNAP-recipient households arbitrarily receiving wrongful termination notices in 2014–2015.	43,000 (households)	2018	2020	20191393
Housing Insecurity					
Aging Among the Homeless: Social Isolation, Function, and Institutional Care	The long-term goal of this proposal is to reduce the need for institutional care and identify optimal housing options in older adults with an experience of homelessness. We propose to extend the HOPE HOME study in order to examine 1) the prevalence of, and association between, perceived social isolation, social support, functional and cognitive impairments, and healthcare utilization; 2) the need for, use of, and barriers to home- and community-based long-term services and supports; and 3) rates of and risk factors for nursing home placement and mortality.	430	2012	2022	20131185
Primary Care Quality and Homeless Service Tailoring	Despite significant efforts to develop patient-centered medical homes for people who are homeless, little is known about the aspects of service design and delivery that offer the best results for patients. This project prioritizes homeless patients' experience of care as the proximal indicator of successful engagement, and includes other indicators (i.e., healthcare utilization).	6,000	2016	2020	20171107
Education					
Reducing Health Disparities in Primary Care Through a Family Medicine-Library Alliance	Evidence suggests that a digital divide (i.e., inequitable access and disparities in the use of technology) still exists among the lower socioeconomic status, racial/ethnic minority, and other medically underserved populations. This divide limits comprehensibility and access to accurate health information and hinders effective health decision making. To address these health disparities, we propose an innovative partnership between Baylor College of Medicine's (BCM)	NR	2017	2020	20181019

Appendix C Table 6. In-Process Studies From HSRProj Registry by Social Risk Domain

Study Title	Description	Number Enrolled	Start Date	Completion Date	Project Number
	Martin Luther King, Jr. (MLK) Health Center and a prominent health sciences library, the Houston Academy of Medicine-Texas Medical Center (HAM-TMC) Library. The project will address influential factors in patients' access, use, and understandability of health information.				
Reducing Assessment Barriers for Patients With Low Literacy	Almost none of the survey instruments being used across the country has been validated for use with people who have low health literacy. This fundamental cross-cutting weakness in survey methods undermines the accuracy of a broad swath of data collected in research and clinical care. We will remove health literacy barriers to accurate survey research by 1) evaluating differences in psychometric properties by health literacy of PROMIS questionnaires as well as other commonly used surveys, 2) identifying and characterizing survey items that do not work properly for people with low health literacy, and 3) creating a guide for survey item development and evaluation for different modes of test administration that are most appropriate for people who have low health literacy.	NR	2017	2022	20174035
Multiple Domains					
From Emergency to Community: Implementing a Social Needs Assessment and Referral Infrastructure Using Health Information Technology	Emergency Departments (EDs) serve a disproportionate share of low-income and uninsured patients, for whom high-quality care during ED discharges may rest in meaningfully assessing and addressing the many social characteristics associated with poorer health outcomes such as homelessness, financial struggle, lack of insurance, and lack of routine care. By developing effective, sustainable methods for integrating both "social needs" assessment and referrals into routine ED service delivery, this proposal will provide the necessary structure to deliver high-quality care and reduce costs.	NR	2018	2020	20191488
Johns Hopkins Center for Health Disparities Solutions*	Based in the Department of Health Policy and Management in the Bloomberg School of Public Health, we promote and encourage health disparities research, training, and community engagement using the resources of the Johns Hopkins Schools of Public Health, Medicine, and Nursing. Over the next 5 years we propose to conduct three major research projects that primarily focus on interpersonal and community-level influences. The cross-cutting theme for these projects is “exploring and addressing the impact of place-based determinants in health disparities among African Americans.” We define place broadly as the physical/built environment, sociocultural environment, and the healthcare system.	NR	2002	2022	20122376
Identifying and Predicting Patients With Preventable High Utilization*	This project, Identifying and Predicting Patients with Preventable High Utilization, involves 20 New York City, Chicago, and Florida health systems who share a commitment to conducting patient-centered research to improve the care they provide to patients. The focus of our project is patients with high healthcare use. The health and healthcare for some of these patients, defined as those with preventable high use, can be improved if they are identified early and provided targeted help. For example, a given patient may benefit from transportation assistance while another may benefit from coordination of multiple prescriptions.	20 (health systems)	2016	2020	20164078

Appendix C Table 6. In-Process Studies From HSRProj Registry by Social Risk Domain

Study Title	Description	Number Enrolled	Start Date	Completion Date	Project Number
The Impact of Patient Complexity on Health Care Utilization*	Vulnerable patient populations served by our nation's healthcare safety net are often left out of healthcare research, and it is important that we understand the best way to care for them. Because they have not been included in research, many interventions, healthcare systems, and policies do not adequately account for the complexities, challenges, and needs of patients who are low-income, racial/ethnic minorities, and/or adversely impacted by social determinants of health. For this observational study, ADVANCE will partner with the OneFlorida Clinical Data Research Network whose stakeholders have prioritized high healthcare utilizers and more effectively analyzing risk, with a particular emphasis on patients experiencing co-occurring physical and mental health disorders. This study looks at how factors like where a patient lives, how much money they have, and whether or not they graduated high school have an effect on how patients use healthcare services and how healthy they are.	NA	2016	2020	20164067
Examining the Integration of Hospitals, Public Health, and Social Services to Target the Social Determinants of Health Using Patient-Centered and Comparative Effectiveness Research Methods*	This project will engage patients, caregivers, and community stakeholders to determine the extent to which patient, caregiver, and provider experiences with healthcare are influenced by the surrounding delivery systems for public health and social services.	NA	2018	2023	20184009

*Indicates observational or cross-sectional study.

Abbreviation: NR = not reported.

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Patient-Level Challenges and Barriers					
Screening					
Stigma and privacy concerns	--	"Communicating appropriately with patients [about SDH], without jeopardizing the patient/provider relationship. This is especially true during the initial stages of a relationship, when trust and therapeutic rapport have yet to be established. If a provider is viewed as presumptuous or judgmental, the provider-patient relationship could be unintentionally damaged."[164]	"I think there's a lot of pride too. Like I had one patient that looked at the survey and he figured out pretty quick what it was and then he just didn't want to do it."[161]	--	**N=5** Examples: Questions are difficult to ask in a way that feels unobtrusive; parents may see assessing children's needs as a threat to custody or feel that their parenting skills are being questioned; immigrant/undocumented populations may misinterpret the reason screening questions are being asked.
Concerns about the value of screening to patients/respect for patient autonomy	--	--	Examples: Patient needs fluctuate over time and may or may not be salient at a given timepoint; patients may already be enrolled in benefits; patients may not be eligible for benefits.	"Providers (perhaps unwittingly) may move away from shared decision making and respect for patient autonomy to a more paternalistic approach of making referrals to support staff or community agencies."[165]	--

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Issues regarding form completion	--	--	"…stakeholders expressed numerous concerns, including… patients may refuse to fill out forms assessing for social needs…"[155]	--	**N=3** Examples: Challenges around using proxies vs. having patients complete screener themselves; moderately high decline rates; patient reading level and health literacy.
Intervention					
Logistical barriers to following through on referrals	--	The project "included no plans to influence… transportation or safety barriers that further impede access to healthy food options."[166]	"Logistical barriers were commonly reported as reasons for WIC [Women, Infants, and Children] program cessation."[153]	--	**N=2** Examples: Ability to connect to and navigate the legal system; context of the individual's life, including social connection/isolation.
Lack of evidence of impact of social risk interventions on patient outcomes	--	--	--	"Social prescribing is feasible, but evidence of its effectiveness is currently lacking."[167]	**N=2** Examples: Most research has been interventional but few randomized clinical trials; lack of research on potential harms.
Low utilization of referrals/resources; lack of patient engagement	--	"Our experience thus far has illustrated challenges in activating patients."[168]	"Achieving [SDH] objectives was often difficult, such that only 43% of objectives were met as of discharge from the program. Client-level correlates of objective achievement included…. sustained client engagement with the CHW	--	**N=1** Example: Relatively high refusal rates of assistance/referrals.

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
			[community health worker].[104]		
Dissatisfaction with outcome of referrals/resources	--	--	"Nonresponders often were not satisfied with available resources, meaning that they felt the resources would not 'solve their problem.'"[70]	--	--
Provider-Level Challenges and Barriers					
Screening					
Provider concern about lack of referral resources	"…require that screening occur in a setting where appropriate referral or linkage to resources to address an identified need can take place. To do otherwise would be ineffective and unethical."[169]	"All interviewees were concerned about care teams being unable to address positive SDH screenings because of limited staff time, lack of local resources, etc."[20]	"Others [providers and staff] cited as a barrier a specific lack of resources due to system-level issues and this was not something that could be overcome by implementing a screening and referral program."[170]	"Ultimately, however, social prescribing can only work if effective services are available in the community to address patients' social needs."[167]	**N=7** Examples: Lack of clinician support for screening if there are not referral systems in place; limitations based on location (not all resources available in all communities); importance of keeping resource lists accurate and up to date.
Provider burden and workflow issues	"Because physicians can become easily overwhelmed and stretched when asked to incorporate 'just one more thing' to their daily practice flow…"[169]	"Another common concern was how to administer SDH screening in ambulatory primary care workflows."[20]	"Others [providers] felt that additional screening was too time consuming for a busy clinic. Participants also described confusion regarding the referral processes. Some felt it was not clear when a referral was needed and to whom on the care team a patient should be referred	"With existing payment models, clinical visit time constraints, and the current structure of primary care, how can most pediatric primary care practices deliver these critical screening and referral services to vulnerable families?"[171]	**N=4** Examples: Particularly challenging to implement in certain setting workflows (e.g., emergency departments); challenging to find the right time to screen (e.g., as part of medical appointment or not).

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
			[case manager or navigator]."[170]		
Lack of knowledge; inadequate training	"Factors that prevented clinicians form using the [screening] guidelines included being unaware of the content…"[172]	"Care team members who have not been adequately trained on how to discuss SDOH [SDH] with patients may feel uncomfortable asking personal questions that expose social barriers…"[164]	"Support for routinely screening patients for poverty was low, and reasons given included a lack of knowledge about benefits or programmes to help patients."[159]	"…given their lack of personal experience with such needs [such as food insecurity, unemployment, and interpersonal violence] and inadequate training on how to respectfully elicit and respond to patient's concerns."[165]	--
Lack of confidence or comfort with screening	"Factors that prevented clinicians form using the [screening] guidelines included… lacking self-efficiency or confidence in being able to apply the guidelines properly…"[172]	See above[164]	"Each physician was aware of patients in their practice who would benefit from additional income but rated their current ability to improve a patient's income as low."[159]	"Physicians may be uncomfortable routinely inquiring about adverse social circumstances…"[165]	--
Lack of support	"…screening and followup must not be the sole responsibility of the physician."[169]	--	"The most cited barriers to screening included… factors such as lack of training and staff support as significant barriers."[160]	--	--
Intervention					
Lack of provider enthusiasm to	--	--	"There were differing levels of enthusiasm	--	**N=1**

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
sustain interventions			among providers for sustaining the intervention."[170]		Example: provider hesitancy to continue referrals outside of study-funded activities.
Health System-Level Challenges and Barriers					
Screening					
Data collection and management concerns	"Many CBOs [community-based organizations] lack a technical platform and know-how to integrate data from different sources, such as EMRs [electronic medical records], claims data, and HIEs [health information exchanges]; many programs lack the infrastructure to consult multiple data sources during the provision of health care or social services, leading to poor coordination."[173]	"CHCs [community health centers] are federally required to collect certain SDH measures from the IOM [Institute of Medicine] list, including race/ethnicity, tobacco/alcohol use, and depression. Our SDH data tools had to incorporate these data, without requiring duplicate data entry."[174]	--	"Major gaps exist in the evidence base needed to inform the selection of screening items and the collection of data for detecting health-related social needs."[175]	
Coding, documentation, and payment considerations	"Although Z codes [ICD-10] are not generally reimbursable, including these codes in the medical record can help with population health,	"None of the providers reported using ICD codes to document FI [food insecurity] status of patients. "Food insecurity" is not available as an ICD code and providers	"With respect to the health care system level, PCPs raised the issue of competing demands placed on health care practices from a business perspective, noting that fee for service	"Several social determinants of health screening domains and items used in existing tools have no clear ICD-10 code equivalent. Some social screening	

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
	panel management, and quality improvement initiatives."[169]	noted they could not remember the code we provided during training, *Lack of inadequate Food*."[176]	systems are not conducive to implementing this type of screening."[177]	items map to more than one ICD-10 code."[178] "…the financial incentive for health care payer organizations to invest broadly in programs to address SDH…may not be sufficient to encourage its adoption or, worse, could cause….delivery systems to abandon social needs prematurely after early pilots fall short of lofty expectations of short-term health care savings."[171]	
Issues related to social risk screening tool selection	"There is no single preferred screening tool recommended for social determinants of health."[169]	"The organizations started by reviewing existing tools and found that none met their needs (e.g., inappropriate for a given organization's structure, preferences, and patients)…"[20]	--	"Many validated screening tools for unmet material needs, such as food and housing, were created for research purposes. For clinical use, such tools should always be interpreted in the context of what is known about the patient and family."[165]	

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Lack of evidence-based screening recommendations	"…there is no evidence-based screening recommendation for social determinants of health from an organization such as the U.S. Preventive Services Task Force."[169]	--	--	--	
Concerns about data privacy and use	"A related challenge is complying with requirements to protect patient health information under the Health Insurance Portability and Accountability Act (HIPAA), including possible privacy issues when sharing patient referral data with program partners external to the health system."[179]	"KP [Kaiser Permanente] was concerned about the impact of collecting potentially sensitive data via phone. Mosaic was concerned about the sensitivity of intimate partner violence and substance use items and omitted these."[20]	--	--	
Universal vs. targeted screening	--	"…highlighted the effort required to screen such a large number of…patients, prompting a discussion about the possibility of using	--	--	

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
		predictive modeling to target screening to certain high-risk population groups."[44]			
"Buy-in" from health system leadership	--	"Active support from some level of leadership is necessary to pave the way for organizational transformation."[166]	"Implementation of the tool would require a system-level change: administrators would be required to review and approve the tool; therefore, to implement screening would require not just buy-in from the providers but prioritization among leadership."[177]	--	
Intervention					
Sustainability of funding	"Many programs indicated that their funding was obtained from multiple short-term funding sources, and several program managers expressed concern about long-term sustainability."[179]	"Our findings show that CHCs [community health centers], which have a close relationship with their funder, and whose mandate in the overall health care system is clearer, benefit from a more flexible funding environment and adapted accountability frameworks. Where distance and ambiguity exist, CHRs' contributions to equity is undermined."[180]	--	"Effective partnerships among medical care, social services, public health, and community-based organizations could improve population health outcomes but developing sustainable payment models to support such partnerships has proved challenging."[175]	

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Partnerships with community resources	--	"Another challenge that health centers faced was learning how to build trusting relationships with community partners."[166]	--	--	
Staffing challenges	--	Program challenges include "increased CHW [community health worker] turnover and burnout risk."[90]	--	"…building the capacity of the health care system to recognize and respond to FI [food insecurity] will require additional personnel (e.g., social workers and registered dieticians) to oversee clinic-community connections."[181]	
Lack of effective implementation strategies to put social risk interventions into practice	--	--	--	"Before we ask practices to take on these tasks…we need much more evidence that it is both feasible and effective. We also need to know that taking on this added responsibility won't divert care systems from the important task of transforming the way we accomplish existing responsibilities and	

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
				won't cause clinic personnel even great stress."[182]	
Lack of evidence of impact of social risk interventions	--	--	--	"…experimentation with social prescribing has outpaced evaluation of its impact, and the little evaluation done is often of poor quality."[167]	
Community-Level Challenges and Barriers					
Intervention					
Limited capacity of social resources	--	--	--	"Encouraging health providers to screen for homelessness may inadvertently shift limited housing resources from the poor who are not sick to those who seek medical care because of illness."[165]	**N=4** Examples: Social services are already stretched thin and funding is scarce; equity of resources of patients and nonpatients.
Availability of nutritious food at food banks	"These efforts are consistent with an increased recognition among food banks that a large proportion of beneficiaries have chronic disease and that food banks should provide nutritious foods that help	--	--	"If health care systems work with food banks, clinicians could help ensure that the food provided promotes health, because many shelf-stable foods are high in refined carbohydrates and sodium."[183]	--

Appendix D Table 1. Challenges and Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes				
	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
	prevent or manage chronic disease."[179]				
Political uncertainty	--	--	--	"Congressional attempts to repeal the ACA [Affordable Care Act] and to deeply cut Medicaid funding leave states skittish about further innovation. The prospect of reduced health insurance coverage and increased hospital uncompensated care costs could prompt hospitals to scale back community-benefit investments."[184]	--

Abbreviations: PCP = primary care physician; SDH = social determinant of health.

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Patient-Level Solutions to Challenges						
Screening						
Stigma and privacy concerns	"Use patient-centered care models to more routinely incorporate social risk data into care decisions." (p. 10)	--	--	"Parents reported that a trusting relationship with their children's doctors helped them feel comfortable answering the screening."[36]	"Screening for adverse social determinants should therefore be accompanied by identifying the strengths and asset of patients and families."[165]	--
Concerns about the value of screening to patients/respect for patient autonomy	"Use patient-centered care models to more routinely incorporate social risk data into care decisions." (p. 10)	--	"Patients with a positive SDH screening result may not want assistance in addressing the identified need. Consider creating EHR-based SDH data tools that include response options to indicate this preference, or to otherwise note that help was offered and declined."[174]	"The [screening] tool was seen as most useful for people who are not already accessing government benefits. Physicians cited several examples where benefits were identified that a patient was not yet accessing but for which he or she was eligible."[159]	"The clear adverse health outcomes associated with FI [food insecurity] and the likelihood of positive effects associated with connections to food resources, combined with the string psychometric properties and brevity of the screening instrument, make the benefits of FI screening very likely to outweigh the costs."[181]	--

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Issues regarding form completion	--	--	"Patients may decline to answer SDH questions. Consider having SDH tools include a "patient refused to answer" option. Consider the advisability of including a "decline to answer" option on patient-facing data collection tools, which might make it too easy for patients to decline."[174]	"Caregivers were evenly divided on preference for paper or physician screening. Some providers also reported that they suspected families would be more likely to answer honestly on the self-administered paper screening."[36]	--	--
Intervention						
Logistical barriers to following through on referrals	--	--	--	"…alternative delivery models that could increase WIC retention, such as online nutrition education, should be explored…some public health clinics have co-located primary care and WIC services, which may	--	--

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
				potentially increase retention."[153]		
Lack of evidence of impact of social risk interventions on patient outcomes	"Fund, conduct, and translate research and evaluation on the effectiveness and implementation of social care practices in health care settings." (p. 10, 16-17)	--	--	--	--	--
Low utilization of referrals/resources ; lack of patient engagement	--	--	--	--	--	--
Dissatisfaction with outcome of referrals/resources	--	--	--	--	--	**N=1** Example: Explore why referrals did/did not make a difference
Provider-Level Solutions to Challenges						
Screening						
Provider concern about lack of referral resources	"Alter incentives." (p. 141)	"Four program components that help to increase clinician self-efficacy for screening include… facilitation of access to onsite and/or offsite referral and	"SDH referral tools rely on updated lists of local resources. Consider whether established processes for maintaining other referral lists can be applied to SDH	"Community-based organizations may also be able to assist health systems by providing written materials that can be shared with patients on local food resources, such as food pantries, congregate meal	"Screening for social determinants of health should not occur in isolation, especially because most of the remedies for social determinants lie beyond the health sector.	**N=4** Examples: Use of Social Service Resource Locator (SSRL) vendors; frequent updating of resource databases.

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
		support services."[172]	tools. Consider partnering with organizations that maintain such lists."[174]	programs, soup kitchens, and low-cost grocery outlets."[177]	Generating referrals could involve strategies ranging from providing patients with resource information to electronic referrals made directly to community agencies."[165]	
Provider burden and workflow issues	"Support the development of those infrastructure components needed to meet the goal of care integration, including the redesign and refinement of the workflow…" (p. 11)	"There is also evidence that more time to address complex issues, even simply adding a few minutes onto the consultation, is helpful."[172]	"Ensure that EHR-based SDH tools do not require duplicate entry of SDH data collected elsewhere in workflows."[174]	"One physician recommended having patients self-administer the screening in the waiting room and directing them to appropriate resources if they screened positively for low income. This could be complemented with information videos in the waiting rom. Other approaches could be to incorporate screening for social needs into standard primary care flowsheets for periodic health	"Health care clinicians can adapt existing programs to support patients with FI [food insecurity]. Clinicians with access to social workers can leverage these workflows to respond to FI."[181]	**N=2** Examples: Alleviation of administrative burden by decreasing paperwork/integration with electronic medical record; use of iPad in the waiting room to administer screening items.

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
				exams, well-baby appointments and prenatal visits. Participants also recommended using automated reminders in the electronic medical record to prompt health team members to screen for social needs."[159]		
Lack of knowledge; inadequate training	"Support the development of those infrastructure components needed to meet the goal of care integration, including… information on best practices…" (p. 11)	"Four program components that help to increase clinician self-efficacy for screening include… clear screening protocols, initial and ongoing trainings…"[172]	"The Health Commons models allow health professions students and resident trainees to get practical experience in underserved, community-based settings to balance their expertise in more traditional urban, tertiary AHC venues."[186]	"Provider knowledge gaps could be addressed through the resources that are available to assist pediatricians in managing food insecurity."[153]	"Training clinicians in the clinical relevance of screenings, efficient delivery and framing of screening questions, and systematic treatment responses to patients who identify as at risk will be crucial. Independent training resources exist."[181]	**N=1** Example: Train doctors in trauma informed care.
Lack of confidence or comfort with screening	"Engage patients to increase demand." (p. 141)	"Four program components that help to increase clinician self-	"Training care team members in techniques such as motivational	"Previous studies have demonstrated that educational interventions can have a significant	--	--

Appendix D Table 2. Proposed Solutions to Challenges/Barriers to Social Risk Screening and Intervention

Theme	Sources of Information and Illustrative Examples or Quotes					
	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
		efficacy for screening include institutional support, clear screening protocols, initial and ongoing trainings, and facilitation of access to onsite and/or offsite referral and support services."[172]	interviewing and health coaching can help empower staff and build confidence."[164]	impact on physician comfort and knowledge of resources to address social determinants of health."[153]		
Lack of support	"Support the development of those infrastructure components needed to meet the goal of care integration, including…technical assistance and support, staff with the ability to support the redesign, champions of the redesign…" (p. 11)	"In primary care, there is continuity of care and ongoing opportunities to address these issues over time as well as sharing the responsibility for care with a broader clinical team as well as partners working in the community in local NGOs [non-governmental organization] and referral	--	"Several physicians suggested that the [screening] tool is most useful in an interprofessional team, saying that allied health staff such as social workers might be most appropriate for using this tool with patients."[159]	--	--

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		support centers."[172]				
Intervention						
Lack of provider enthusiasm to sustain interventions	"Share data with clinicians. Identify and prepare clinical champions." (p. 141)	--	--	--	--	--
Health System-Level Solutions to Challenges						
Screening						
Data collection and management concerns	"Develop a digital infrastructure that is interoperable between health care and social care organizations." (p. 10, 13-14, 85-108)	"Utilize workflow case management systems at the CBO [community-based organization] level that could integrate with EMR [electronic medical record] systems; use hospitals' data and technology expertise to serve as anchors for community efforts."[173]	"Carefully consider which SDH data sources should populate the SDH data summary and how to manage potentially conflicting data."[174]	--	"Adapting electronic health records or developing web-based application allows immediate data sharing between health care clinicians and charitable food providers."[181]	**N=2** Example: Partnering with data analytic vendors.
Coding, documentation, and payment considerations	"Value-based payment models appear to serve a necessary, but not sufficient, mechanism for integrating social	"Identification of local philanthropies, foundations, and trusts that would provide funding to	"ICD-10 codes related to SDH needs enable the tracking of such needs, but they may add to the	"Physicians raised the important of financial incentives for providers. Some providers suggested counting the time using the	"In the US, states are increasingly taking advantage of flexibilities within the	**N=4** "Payment models need to shift." Examples: American Academy of Family Physicians (AAFP)

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	care into health care by creating stronger financial incentives for providers to focus on care coordination, prevention, and outcomes (McWilliams et al., 2016, as cited in NASEM 2019)." (p. 118) "The Centers for Medicare & Medicaid Services should clearly define which aspects of social care that Medicaid can pay for as covered services (e.g., in the context of providing care management, targeted case management, and home- and community-based long-term care services and supports as well as within the context of managed care)." (p. 14)	accelerate experimentation around financial partnerships; focus on areas where health systems are subject to potential financial penalties or incentives aligned with a CBO's [community-based organization's] specific core competency."[173] "Although Z codes are not generally reimbursable, including these codes in the medical record can help with population health, panel management, and quality improvement initiatives. Data collected may also eventually factor into	complexity of the problem list. Consider creating an SDH 'box' within the problem list."[174]	screening tool as counseling, for which providers can bill the provincial [Canadian] government, under a publicly funded 'fee for service' model of payment."[159] "There have also been significant policy and payment shifts toward identifying and addressing SDOH [SDH] in health care, including the Accountable Health Communities model and the Massachusetts Medicaid demonstration project."[170]	Medicaid system, including plan amendments, waivers, and alternative payment models, to cover the costs of social interventions for high-cost patients."[167]	payment model for addressing SDH; determine which ICD-10 codes can be used to document social needs consistently.

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		value-based payment systems that will reimburse family physicians for this critical work to improve health."[169]				
Issues related to social risk screening tool selection	"Recognize that comprehensive health care should include understanding an individual's social context. Evidence is rapidly accumulating concerning the most effective strategies for screening and assessing for social risk factors and social needs. Such strategies should include standardized and validated questions, as available." (p. 10)	"It is important for each practice setting to consider the needs of their particular population to determine how to best deploy (e.g., via paper vs. electronic health record) and target surveillance efforts, and how screening and diagnostic processes can connect to interventions."[187]	"Consider striking a balance between standardized data collection (i.e., aligned with the IOM-recommended measures) and the need to adapt to meet local needs, especially given that SDH data collection may become required for EHR certification and Uniform Data System reporting."[174]	"Using a validated food security screening tool, in addition to other nutrition screenings, would allow health professionals to better understand the needs of their patients and potentially identify this important contributor to poor health and disease management practices.[177]	--	**N=3** Examples: Tools selected should be as specific to the clinical/social situation as possible; use of standardized tools vs. homegrown tools as much as possible; focus prevention on risk factors that are common across multiple medical conditions (e.g., food insecurity).

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	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
Lack of evidence-based screening recommendations	"Fund, conduct, and translate research and evaluation on the effectiveness and implementation of social care practices in health care settings." (p. 10, 16-17)	--	--	"…in 2015, the American Academy of Pediatrics formalized guidelines to screen for poverty-related conditions at well-child visits."[170]	--	--
Concerns about data privacy and use	"All the organizations involved in this data sharing will need technical assistance to build informed consent for individuals and data sharing arrangements that can support information flow." (p. 101)	--	"Although most safety net partners have incompatible medical information systems, they can now communicate via ExtraNet, which is a web-based interface that is compliant with the Health Insurance Portability and Accountability Act (HIPAA)."[186]	--	--	**N=1** Example: For information to be secure, community partners may need to "beef up" their IT security.
Universal vs. targeted screening	--	--	"To avoid overwhelming clinic staff and care teams with SDH-related work, consider	--	"If a practice decides that the prevalence of food insecurity is too low or the rate of false-positive	**N=1** Example: Focus on risk factors that are common across multiple medical conditions (e.g., food, housing)

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			limiting SDH screening to a subset of patients and ensuring that EHR-based SDH data tools enable targeting this subset. Consider creating an alert to identify overdue patients."[174]		screening tests is too high to justify universal screening, it may need to consider risk-based screening for the subpopulation of patients at highest risk."[188]	
"Buy-in" from health system leadership	"Make and communicate an organizational commitment to addressing health-related social needs and health disparities at the community and individual levels." (p. 10)	"Four program components that help to increase clinician self-efficacy for screening include institutional support…"[172]	"Active support from some level of leadership is necessary to pave the way for organizational transformation. Leadership, whether senior manager or executives, can be powerful champions in guiding change coalitions, creating and communicating a vision, and institutionalizing changes in	"It will be important to consider involvement of clinic leadership and frontline staff to best incorporate clinical practices and ensure all providers and staff are knowledgeable and invested in study protocol and expectations."[170]	--	--

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	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
			organizational culture." [166]			
Intervention						
Sustainability of funding	"Finance the integration of health care and social care." (p.10, 14-16, 109-136)	"Payment reform around transitional care activities and population health; coalition of CBOs [community-based organizations] establishing alignment with hospitals' strategic plans."[173]	--	"…the National Commission on Hunger's recommendation that Medicare-managed care plans be expanded to include coverage for meal delivery for seniors with physician recommendation."[177]	--	**N=2** Example: Look for opportunities to fund investment toward new solutions.
Partnerships with community resources	"Establish linkages and communication pathways between health care and social service providers." (p. 11) "Develop and finance referral relationships with selected social care providers when feasible, supported by operational integration such as co-location or patient information systems." (p. 11)	--	"A multisector approach that included insurers, health-care providers, social service and faith-based organizations, and academic partners is needed to develop innovative, community-engaged initiatives that bridge the gap between historically	"A number of organizations have investigated and developed resources to aid health systems in instituting food security screening and referral processes, and public-private partnerships have evolved to provide referrals outside of the primary care visit.[177]	"A value-based health care system that comprehensively addresses families' adverse social circumstances by engaging multiple sectors has the potential to improve the quality of children's care, address impediments that jeopardize health, and	**N=4** Examples: Public-private partnerships to leverage their resources.

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	NASEM 2019[185]	Reviews	Case Studies	Other Descriptive Research Studies	Opinion	Key Informant Interviews
			underserved communities experiencing health disparities and health care delivery systems."[152]		improve wellbeing."[165]	
Staffing challenges	"Build a workforce to integrate social care into health care delivery." (p. 10, 11-12, 59-84) "Include social care workers as being integral to a team-based approach to designing and delivering health care." (p. 11)	"Large practices may have care coordinators, patient navigators, or community health workers that can assist in streamlining and directing screening process as well as coordination of care. In small practices, nurses, medical assistants, and other support staff will be critical."[169]	"Community health workers are a vital, shared resource between safety net health systems and agencies within the Health Commons. One managed care organization contracts with the consortium for $100,000 to employ community health workers to manage patients who consume a high level of resources."[186]	"The highest-performing CHWs [community-health workers] were those who exhibited resourcefulness, persistence, accountability, and ability to establish rapport with clients."[104]	"A comprehensive clinical model of care requires dedicated expertise and support from clinical team members, such as social workers, with expertise in evaluating social needs, connecting to resources, and following up to ensure successful community connection."[181]	**N=2** Examples: Utilization of community health workers and social workers.
Lack of effective implementation strategies to put social risk	"Fund, conduct, and translate research and evaluation on the	"Demonstration grants provide critical support to experiment	--	--	--	--

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interventions into practice	effectiveness and implementation of social care practices in health care settings." (p. 10, 16-17) "Design and implement integrated care systems using approaches that engage patients, community partners, frontline staff, social care workers, and clinicians in the planning and evaluation and incorporating the preferences of patients and communities." (p. 11)	and establish this evidence base; national collaboratives, learning networks, and information clearinghouses can also help fill this gap."[173]				
Lack of evidence of impact of social risk interventions	"Fund, conduct, and translate research and evaluation on the effectiveness and implementation of social care practices in health care settings." (p. 10, 16-17)	--	--	--	--	--
Community-Level Solutions to Challenges						
Intervention						
Limited capacity of social resources	"Support the development of	--	--	"Systematic clinical screenings for FI	--	**N=1**

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	those infrastructure components needed to meet the goal of care integration, including…support for community partners and their infrastructure needs." (p. 11)			[food insecurity] will likely increase the demand for access to SNAP, WIC, and charitable feeding programs. These programs must invest in an infrastructure that will allow them to absorb new health care system referrals, coordinate services…the health care system must contribute financially to these efforts to avoid overburdening an already stretched system for addressing FI in the United States."[181]		Example: "Warm hand-offs" to community partners to ensure that resources are available.
Availability of nutritious food at food banks	--	--	--	"These programs must invest in an infrastructure that will allow them to…build a nutritionally appropriate food supply."[181]	"Adapting electronic health records or developing web-based application… could also provide community-based organizations with the information that is needed to	**N=1** Example: Help create a "roadmap" for community-based organizations to take a whole person approach to services.

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					tailor nutrition programs to the health and social needs of individuals."[181]	
Political uncertainty	"In both the alignment and advocacy categories, health care organizations leverage their political, social, and economic capital within a community or local environment to encourage and enable health care and social care organizations to partner and pool resources, such as services and information, to achieve greater net benefit from the health care and social care services available in the community." (p. 47)	--	--	--	--	--

Abbreviations: AHC = Accountable Health Community; EHR = electronic health record; IOM = Institute of Medicine; IT = information technology; NASEM = National Academies of Sciences, Engineering, and Medicine; SDH = social determinant of health; SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

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Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
Patient Satisfaction/Acceptability			
Aiyer, 2019[22]	High perceived financial, dietary, and health benefits of participating in the program.	✓	✓
Bronstein, 2015[72]	The majority of participants reported being highly satisfied with the services provided.		✓
Byoff, 2019[142]	Interviews with adult patients and caregivers of pediatric patients who had responded to a 10-item screening tool found broad consensus on the acceptability and importance of social risk screening. Participants stressed the importance of patient-centered implementation of social risk screening, including attention to empathy and privacy.	✓	
Colvin, 2016[143]	Parents who reported being asked about unmet needs at the time of admission reported greater confidence in their ability to ask and receive help from their physician and more favorable opinions regarding whether physicians should ask patients about social issues.	✓	
Cullen, 2019[144]	High rate of acceptability of screening; caretaker comfort levels and disclosure of social risk were higher with tablet-based screening than verbal screening.	✓	
Cullen, 2019[29]	Caregivers agreed that the hospital was a good location for the Summer Food Service Program, felt comfortable with the program in the ED, and thought the process of their children receiving the meals was easy.	✓	✓
Cullen, 2020[145]	Caregivers reported different levels of initial comfort with screening, and described feeling anywhere from “comfortable,” “totally fine,” and “happy” to “embarrassed,” “nervous,” and “awkward.” However, regardless of their initial comfort level, caregivers frequently described the screening as necessary and helpful to both identify the problem and enhance access to additional resources.	✓	
De Marchis, 2019[146]	After responding to a 10-item social risk screening tool, 79% of adult patients and caregivers of pediatric patients reported that social risk screening was appropriate and 65% were comfortable with including social risk data in electronic health records.	✓	
Fleeger, 2007[147]	Parents welcomed inquiries about problems within each domain.	✓	
O'Toole, 2017[148]	Screening was a good rapport builder; patients appreciated being asked these questions; screening helped patients build a stronger connection with the healthcare system.	✓	
Galvin, 2000[149]	Local access to the Citizens Advice Bureau service was much appreciated by participants, especially home visits; users felt the quality of consultation with advisers was excellent; none of the users were dissatisfied with the service; participants appreciated the confidentiality of the service.		✓
Hamity, 2018[150]	Members and caregivers who completed a social needs screening questionnaire reported that they welcomed the assistance, and that the assessment comprehensively addressed their needs; the discussion with a care coordinator about their needs was generally perceived as friendly and caring.	✓	✓
Hassan, 2015[91]	Majority of participants shared positive feedback, support for screening for health-related social problems as part of an annual medical visit; most would recommend the screening tool to family or a friend.	✓	
Herman, 2009[59]	Patients found the materials very easy to use and very useful and were more confident in caring for their children as a result of intervention.		✓
Hickey, 2020[33]	Themes that emerged from participant interviews included the connections the pantry referral facilitated to address families’ underlying and long-term social needs; increased trust in the clinic and	✓	✓

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
	reinforcement of the many roles of the primary care office; and the ability that the pantry encounter afforded families to allocate limited resources to other family needs, including diapers, clothing, and transportation.		
Jaganath, 2018[151]	Participants support the idea that that the clinic should provide financial services.		✓
Kangovi, 2014[98]	Most patients provided positive open-ended feedback; patients appreciated that the intervention was tailored to their preferences; patients appreciated the social support the most among components of the intervention.		✓
Klein, 2014[102]	Parents' perceptions of residents' trust, respect, and ability to listen and provide compassionate care were high.		✓
Kwon, 2017[152]	Patients gave high rankings regarding willingness to recommend the intervention to another person.		✓
Lindau, 2019[105,106]	Participant satisfaction was consistently high. Of participants surveyed, the majority found places listed that they did not know were in their community. The majority were very satisfied and found the HealtheRx to be very useful. Half reported telling others about the HealtheRx, and all but one person (reporting a neutral comment) told others something positive about the HealtheRx.		✓
Losonczy, 2017[108]	Most reported that they felt that the program was helpful.		✓
Mackintosh, 2006[109]	No one was concerned about the time commitment, divulging personal information, or breaches of confidentiality; the most common description of the service was "helpful," but many participants spoke at length about having the chance to talk and having someone take an interest, suggesting that the welfare consultation itself had a therapeutic effect.		✓
Moreno, 2021[111]	Participants reported high quality of communication with the social worker and CHW and rated the program highly globally. Patients believed the Connecting Provider to Home program was a key resource to improving their disease self-management skills and decreasing the use of the ED and the hospital.	✓	✓
Orr, 2019[153]	One participant reported initially feeling uncomfortable with the screening questions; however, after learning the clinic was attempting to help, reported feeling cared for by clinic staff.	✓	
Pinto, 2020[64]	Participants found the intervention useful and were satisfied with the curriculum, the setting and the facilitator, suggesting it is acceptable and feasible in primary care. Many had entered into the program with low expectations that were exceeded, and people felt hopeful in the end. The program provided participants with a supportive environment and emotional support to overcome their financial issues. They were also able to learn from others' past experiences. The group environment also created accountability for participants to complete weekly goals. The only negative comments regarding the peer-to-peer group format involved people talking too much or going off on tangents. The participants were pleased it was in a health care setting as they felt that it provided them with a reliable, professional, and trustworthy source of information in comparison to traditional financial settings.		✓
Quinn, 2018[154]	Patients felt that employment and financial needs could be addressed in a clinic setting.		✓
Real, 2016[121]	The majority of families reported the advice as somewhat or very helpful.		✓

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
Selvaraj, 2018[127]	Most families felt comfortable completing the screening; were glad to discuss answers with providers; wanted the screening to continue.	✓	
Sherratt, 2000[65]	Patients, professionals and workers all welcomed the opportunity to make a Citizens' Advice Bureau appointment within the near future with no anticipated delays.		✓
Sundar, 2018[155]	Only one patient opted out of screening, suggesting screening acceptability among the patient population.	✓	
Weintraub, 2010[136]	Participants reported that it was helpful to have the program at their child's healthcare clinic or hospital; participants felt comfortable speaking with providers about their needs; information given to them was useful; they would continue to use services.		✓
Patient Challenges/Unintended Consequences			
Cullen, 2020[145]	Caregivers that had a negative perception of screening feared negative consequences if they were to disclose FI. Some caregivers feared judgment by their provider and some feared being reported to child protective agencies.	✓	
Ettinger de Cuba, 2019[156]	This study showed that, paradoxically, families with children that participated in the Supplemental Nutrition Assistance Program increased their earned income and therefore had their SNAP benefits reduced or cut off in response faced economic strain that diminished their ability to pay for housing, utilities, healthcare, or food—compared to families with consistent SNAP benefits.	✓	
Freeman, 2020[79]	We did not observe any adverse effects from the intervention.		✓
Hamity, 2018[150]	Members wanted to know more about how the information would be used and with whom it would be shared. Some were concerned about how to update the information when their status changed.	✓	
Knowles, 2018[36]	Caregivers unable to connect with Benefits Data Trust identified challenges such as frequently changing phone numbers, lapses in phone access because of inability to pay, time constraints, and avoiding answering phone calls from unfamiliar numbers. Caregivers described concerns that admitting food insecurity would signal that they were unfit parents, and described feeling shame about difficulties affording food. Caregivers also described being afraid to admit food hardship because physicians are mandatory reporters of child mistreatment and/or neglect. Providers also described sensing concerns related to immigration status that made parents reluctant to fill out a form that was not specifically for the child.	✓	
Parthasarathy, 2014[62]	One situation that arose repeatedly was that of clients who had never before discussed their financial issues with anyone now expressing distress once they started to discuss their "financial health."		✓
Sandhu, 2021[124]	Barriers for patients unable to connect to the resources recommended included lack of time, lost contact information, need to clarify service application process, compromised physical health, major life events that took precedence, and failed contact with community-based organizations.	✓	✓
Saxe-Custack, 2018[157]	Although caregivers expressed a strong appreciation for the produce bags, the majority were unaware that they could request [a prescription instead].		✓
Swavely, 2019[45]	Some patients did not remember the information provided to them, were overwhelmed with poor health or other social determinants of health, had competing priorities, did not perceive the need for food assistance, and experienced system barriers. Health literacy also was an issue.	✓	

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
Weintraub, 2010[136]	Participants expressed some concern about settling legal issues; some did not follow up on referrals because it was too complicated.		✓
Wu, 2019[138]	No harm was done to any of the participants in either group.		✓
Clinician Satisfaction/Acceptability			
Aiyer, 2019[22]	High perceived effectiveness, acceptability, and satisfaction among providers.	✓	✓
Galvin, 2000[149]	Referral agents felt that the Citizens Advice Bureau service was a benefit to the primary care health team. The perception among service providers and the surgery staff was that weekly service was satisfactory, with appointments filled and service users seen reasonably quickly.		✓
Garg, 2007 [80]	None reported feeling uncomfortable with having parents hand them the WE CARE survey. Most residents reported that the survey did not slow down the visit and the survey only added 2-5 minutes to the visit.	✓	
Greasley, 2005[158]	There was a great deal of enthusiasm for the project, especially from the practices where the number of referrals was high. A provider stated, “[The referral service] saves us time and the advice worker can do it far better than us." "I [a primary care provider] probably saved three hours a week.” Primary care staff generally welcomed the welfare advice service as a resource to address their patients' socioeconomic needs, which actually reduced the amount of time spent dealing with welfare issues.		✓
Hamity, 2018[150]	Most interviewed members and clinicians believed that it was important to capture information about members’ social needs, that social needs influence health outcomes, and that equipping care teams with information about member social needs could improve care. Data from clinicians suggested that time and lack of resources were primary reasons that clinicians did not assess social needs. However, in discussion groups, staff and clinicians reported that assessing social needs was an opportunity to obtain valuable information to inform care decisions and improve communication with their patients. Clinicians wanted information on a range of social needs, such as living situation, food insecurity and difficulty with meal preparation, transportation, substance abuse, domestic violence, literacy and learning disabilities, and insurance coverage and copayments.	✓	
Klein, 2014[102]	None of the residents identified social risk screening as inappropriate for a physician to perform.	✓	
O'Toole, 2017[148]	When healthcare providers at pilot clinics were queried on user acceptance and implementation issues related to the screening, all universally endorsed the program. No team found the questions burdensome.	✓	
Palakshappa, 2017[40]	Time and workflow were not barriers to screening. Clinicians reported that parents felt the screening showed caring, which reinforced clinicians’ continued screening.	✓	
Parthasarathy, 2014[62]	Not surprisingly, we met reasonable resistance when we asked staff to incorporate new BEST activities into their already busy WIC classes and MVIP home visits.		✓
Pettignano, 2012[63]	Seventy percent of providers who referred patients reported that they believed the services provided allowed them to reallocate time to other cases. When compared with the annual Referring Provider Survey results for FY 2009, more referring providers indicated that they believed that the services helped to decrease emergency department visits, readmissions, and inpatient length of stay. Most referring providers reported a positive impact on their perceptions of working collaboratively with the legal community to serve their patients.		✓

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
Pinto, 2019[159]	During focus groups, multiple physicians expressed their belief that health providers could play a role in improving a patient's income. A key benefit was helping the physicians themselves better understand the social assistance system. The tool was seen as a methodical approach to addressing financial difficulties. Furthermore, physicians said that they learned more about their patients' lives.	✓	✓
Real, 2016[121]	Self-assessed competence for assisting families with transportation significantly increased following the curriculum. Advising on obtaining healthy foods trended toward significance.		✓
Schickedanz, 2019[160]	The majority of respondents agreed or strongly agreed that screening for social needs should be a standard part of clinical care and considered such screening within the scope of healthcare services. Large majorities of respondents either agreed or strongly agreed that information about social needs could be used to improve trust, communication with patients, and care overall.	✓	
Sherratt, 2000[65]	Patients, professionals, and workers all welcomed the opportunity to make a Citizens' Advice Bureau appointment within the near future with no anticipated delays. By "kind of prescribing it to them," as a worker commented, the service was legitimized. GPs commented that the referral could be seen as part of a "total package of care,"' an "extension of our services," and the fact that it was initiated by the doctor removed barriers and could be perceived as making it more confidential.		✓
Stenmark, 2018[44]	The screening increased clinicians' awareness of food insecurity among their patient population and reinforced the extent to which food insecurity was jeopardizing the prevention and treatment of many of their patients' health conditions. As a result, these clinicians advocated for permanent integration of the Hunger Vital Sign into the standard well-child visit questionnaires.	✓	
Sundar, 2018[155]	Practitioners and medical assistants stated that the administration of the screening tool did not disrupt clinical workflow.	✓	
Tong, 2018 [161]	Clinicians reported that the social needs survey helped change care in almost a quarter of encounters...and helped them know the patient better.	✓	
Williams, 2018[162]	Intervention students reported that the six-domain model helped them identify clinical information that could be addressed with existing resources and prompted involvement of social workers, pharmacists, and nurses in care planning. Students felt the six-domain biopsychosocial framework provided a better understanding of their patients and found the model had important clinical implications for patient care. Student comments nearly uniformly discussed the positive impact of the six-domain biopsychosocial model. Attending physicians found social risk information provided by students valuable with discharge planning, as students had information they were not aware of and were able to address barriers to care.	✓	
Clinician Challenges/Unintended Consequences			
Chhabra, 2019[163]	Discussing their role in addressing housing instability, many providers distinguished between medical and social aspects of patients' presenting problems, and felt their training best positioned them to manage the former. Most providers expressed the view that others on the care team—social workers in particular—had the knowledge and expertise and were better positioned to address patients' housing needs. Even those who felt they should have a role in the screening process believed their role should end after administration and referral, given their expertise was primarily medical, they lack familiarity with available resources, and they needed to prioritize patient care needs during time-	✓	

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
	limited visits. When participants were asked about their experience caring for patients who were homeless, they highlighted both a sense of reward in caring for a vulnerable population and a sense of frustration and, at times, futility. Not knowing how best to manage or care for a patient who might not return for further evaluation added a level of uncertainty that was challenging for providers.		
Gold, 2018[84]	Perceptions that EHR-based social risk data tools created a fragmented view of the patient, with relevant data in multiple places, and did not readily support documenting a narrative about a given patient; could add a layer of difficulty to collecting and acting on social risk data (e.g., due to lack of staff EHR expertise, the tools' customized nature, differences in EHR security access by staff role, the need for new EHR competencies from some staff); necessitated a data entry step if social risk information were collected on paper; Referral workflows were seen as too time-consuming, especially when no follow-up was planned; until questions asking whether patients desired follow-up for social needs were added, the high positive screening rate yielded an unmanageable follow-up workload.	✓	
Hamity, 2018[150]	Providers voiced concern about having too much information. They suggested that an easily understood format, such as yes/no questions about difficulty with transportation, paying for medications, and financial concerns, would help reconcile this dilemma.	✓	
Klein, 2011[101]	Control group interns were more likely to report knowledge as a barrier. Most of the intervention group thought time was a barrier to social screening. Doctor and patient discomfort were infrequently listed as barriers to screening by residents in both groups.	✓	
Klein, 2014[102]	Resident identification of the perceived barriers that limit social risk screening did not change from the pre-intervention survey to the post-intervention survey in either the control or intervention groups. Both groups identified time as the greatest barrier to screening on both the pre-intervention and post-intervention surveys; lack of solutions and discomfort screening were identified as other significant barriers before intervention.	✓	✓
Knowles, 2018[36]	Although EMR screening was faster and considered lower burden than paper screening, physicians reported that follow-up conversation following a positive screen could be difficult in the time constraints of well-child visits. Administrative staff members described high administrative burden of paper screening. Another barrier was the IRB requirement of a separate consenting process to share contact information after families reported food insecurity. This delayed communication, as the protocol required a week-long wait between sending an opt-out letter and consenting by phone. It required two phone calls: one to consent and a second to screen for benefits eligibility. Many families were subsequently lost to follow-up.	✓	
O'Toole, 2017[148]	Providers communicated that this is more than a nursing or social work issue, and they [patients] may have food stamps but that doesn't mean they are making good decisions or know how to make them (the food stamps) last. Additionally, teams identified challenges with real-time triage and referral to extended-team members.		✓
Okin, 2000[114]	The case managers had to persevere in obtaining assisted housing for these patients and in advocating with residential substance-abuse providers, each of whom had their own restrictive conditions for admission. These restrictions often served to exclude multi-problem patients with multiple diagnoses and complicated medical regimens. In certain cases, case managers were unable		✓

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
	to find stable, affordable housing except in drug-infested, impoverished neighborhoods where patients were tempted to resume their drug use and criminal behavior.		
Palakshappa, 2017[40]	The primary barriers reported were personal discomfort and concern about families reacting negatively. Another barrier identified was clinicians' concern about being unable to provide adequate resources... Clinicians described feeling compelled to address food insecurity in families but simultaneously feeling unable to offer them adequate resources.	✓	✓
Pinto, 2019[159]	Physicians reported several barriers to screening patients for poverty. It was difficult to begin a conversation about poverty within the usual workflow. Some physicians discussed how trust was central to whether they broached the topic. Some physicians feared offending or confusing patients by asking about income when they expected assistance with acute ailments. Physicians reported that patients had mixed responses to being asked about their income, with some expressing discomfort while others appreciated being asked about their social circumstance. Lack of sufficient time was identified as a main challenge. Physicians also expressed uncertainty about whether they were the most appropriate team member to use the screening tool, given time constraints, lack of expertise on financial benefits, and challenges in providing ongoing support. The volume of information produced by the tool was a challenge. The recommendations were often many pages in length, which could be overwhelming for patients. This also made it difficult for physicians to access specific information about certain benefits. Given that several patients had limited English-speaking ability, the English-only nature of the tool and tensions related to offering a patient an enormous amount of information on potential benefits without any assistance in navigating the application process for those same benefits caused some concern.	✓	
Schickendanz, 2019[160]	Barriers to social needs screening most commonly identified were lack of time to ask and lack of resources to address any social needs identified. Lack of training and lack of comfort in asking patients about social needs were the least prevalent barriers.	✓	
Stenmark, 2018[44]	Despite its success, we encountered a few barriers in creating and sustaining the more active referral processes. First, we had to address both compliance and legal concerns to ensure we maintained patient confidentiality and adhered to all regulations and legal requirements. Second, clinical teams spent valuable time printing and hand-faxing referrals. The subsequent formation of the community specialist team addressed this barrier. Although it reduces the burden on the clinical team, it also adds an additional outreach step for patients. Survey results indicated that patients are confused by the multiple handoffs and outreaches. Unable to track whether referrals to any of these programs are successful because of a lack of capacity to call clients back and a lack of data-sharing agreements.	✓	✓
Tong, 2018 [161]	There remained concern [among clinicians] that screening for social needs might not change practice significantly and whether or not the healthcare system is the right place to address social needs.	✓	
Williams, 2018[162]	Students who used the model gathered substantially more nonbiomedical information than controls, though compared with other domains they were less likely to gather adequate information on patients' behavioral health strengths and challenges and on their functional status.	✓	

Appendix E Table 1. Patient and Clinician Satisfaction/Acceptability and Challenges/Unintended Consequences

Author, Year	Summary Results	Screening	Intervention
Wu, 2019[138]	For inpatient hospital staff and outpatient staff, the most frequently reported challenges in linking patients with community resources were the lack of information about available community resources and the lack of accurate, up-to-date information about CBO services.		✓

Abbreviations: CBO = community-based organization; CHW = community health worker; ED = emergency department; EHR = electronic health record; EMR = electronic medical record; FI = food insecurity; FY = fiscal year; GP = general practitioner; IRB = institutional review board; MVIP = medically vulnerable infant program; SNAP = Supplemental Nutrition Assistance Program; WIC = women, infants, children.

Appendix F Table 1. USPSTF Recommendations Addressing Social Risk Domains

Title	Year	Recommendation
Screening and Behavioral Counseling Interventions to Reduce Unhealthy **Alcohol** Use in Adolescents and Adults	2018	The USPSTF recommends screening for unhealthy alcohol use in primary care settings in adults age 18 years or older, including pregnant women, and providing persons engaged in risky or hazardous drinking with brief behavioral counseling interventions to reduce unhealthy alcohol use. (Grade: **B recommendation**) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening and brief behavioral counseling interventions for alcohol use in primary care settings in adolescents ages 12 to 17 years. (Grade: **I statement**)
Screening for Unhealthy **Drug** Use	2020	The USPSTF recommends screening by asking questions about unhealthy drug use in adults age 18 years or older. Screening should be implemented when services for accurate diagnosis, effective treatment, and appropriate care can be offered or referred. (Screening refers to asking questions about unhealthy drug use, not testing biological specimens.) (Grade: **B recommendation**) The USPSTF concludes that the current evidence is insufficient to address the balance of benefits and harms of screening for unhealthy drug use in adolescents. (Grade: **I statement**)
Primary-Care Based Interventions for Illicit **Drug** Use in Children, Adolescents, and Young Adults	2020	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of primary care–based behavioral counseling interventions to prevent illicit drug use, including nonmedical use of prescription drugs, in children, adolescents, and young adults. (Grade: **I statement**)
Behavioral and Pharmacotherapy Interventions for **Tobacco** Smoking Cessation in Adults, Including Pregnant Women	2015*	The USPSTF recommends that clinicians ask all adults about tobacco use, advise them to stop using tobacco, and provide behavioral interventions and U.S. Food and Drug Administration-approved pharmacotherapy for cessation to adults who use tobacco. (Grade: **A recommendation**) The USPSTF recommends that clinicians ask all pregnant women about tobacco use, advise them to stop using tobacco, and provide behavioral interventions for cessation to pregnant women who use tobacco. (Grade: **A recommendation**) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of pharmacotherapy interventions for tobacco cessation in pregnant women. (Grade: **I statement**) The USPSTF concludes that the current evidence is insufficient to recommend electronic nicotine delivery systems for tobacco cessation in adults, including pregnant women. The USPSTF recommends that clinicians direct patients who smoke tobacco to other cessation interventions with established effectiveness and safety. (Grade: **I statement**)

Appendix F Table 1. USPSTF Recommendations Addressing Social Risk Domains

Primary Care Interventions for Prevention and Cessation of **Tobacco** Use in Children and Adolescents	2020	The USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents. (Grade: **B recommendation**) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of primary care–feasible interventions for the cessation of tobacco use among school-aged children and adolescents. (Grade: **I statement**)
Screening for **Intimate Partner Violence**, Elder Abuse, and Abuse of Vulnerable Adults	2018	The USPSTF recommends that clinicians screen for intimate partner violence (IPV) in women of reproductive age and provide or refer women who screen positive to ongoing support services. (Grade: **B recommendation**) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for abuse and neglect in all older or vulnerable adults. (Grade: **I statement**)
Primary Care Interventions to Prevent **Child Maltreatment**	2018	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of primary care interventions to prevent child maltreatment. (Grade: **I statement**)
Screening for **Depression** in Adults*	2016	The USPSTF recommends screening for depression in the general adult population, including pregnant and postpartum women. Screening should be implemented with adequate systems in place to ensure accurate diagnosis, effective treatment, and appropriate followup. (Grade: **B recommendation**)
Screening for **Depression** in Children and Adolescents*	2016	The USPSTF recommends screening for major depressive disorder in adolescents ages 12 to 18 years. Screening should be implemented with adequate systems in place to ensure accurate diagnosis, effective treatment, and appropriate followup. (Grade: **B recommendation**) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for major depressive disorder in children age 11 years or younger. (Grade: **I statement**)
Interventions to Prevent Perinatal **Depression**	2019	The USPSTF recommends that clinicians provide or refer pregnant and postpartum persons who are at increased risk of perinatal depression to counseling interventions. (Grade: **B recommendation**)
Behavioral Counseling to Promote a Healthful **Diet** and **Physical Activity** for Cardiovascular Disease Prevention in Adults with Cardiovascular Risk Factors	2014*	The USPSTF recommends offering or referring adults who are overweight or obese and have additional cardiovascular disease risk factors to intensive behavioral counseling interventions to promote a healthful diet and physical activity for cardiovascular disease prevention. (Grade: **B recommendation**)
Behavioral Counseling to Promote a Healthful **Diet** and **Physical Activity**	2017*	The USPSTF recommends that primary care professionals individualize the decision to offer or refer adults without obesity who do not have hypertension, dyslipidemia, abnormal

Appendix F Table 1. USPSTF Recommendations Addressing Social Risk Domains

for Cardiovascular Disease Prevention in Adults Without Known Risk Factors		blood glucose levels, or diabetes to behavioral counseling to promote a healthful diet and physical activity. Existing evidence indicates a positive but small benefit of behavioral counseling for the prevention of cardiovascular disease in this population. Persons who are interested and ready to make behavioral changes may be most likely to benefit from behavioral counseling. (Grade: **C recommendation**)
Behavioral Interventions for Weight Loss to Prevent **Obesity**-Related Morbidity and Mortality in Adults	2018	The USPSTF recommends that clinicians offer or refer adults with a body mass index of 30 or higher (calculated as weight in kilograms divided by height in meters squared) to intensive, multicomponent behavioral interventions. (Grade: **B recommendation**)
Screening for **Obesity** in Children and Adolescents	2017	The USPSTF recommends that clinicians screen for obesity in children and adolescents age 6 years and older and offer or refer them to comprehensive, intensive behavioral interventions to promote improvements in weight status. (Grade: **B recommendation**)

*Update in process.

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Abdominal Aortic Aneurism	2019								√	√								"The reduction in prevalence is attributed to the **decrease in smoking prevalence** over time."
Adolescent Idiopathic Scoliosis	2018																	
Aspirin Use to Prevent CVD and Colorectal Cancer	2016								√	√	√	√						"The primary **risk factors for CVD include…race/ethnicity… and smoking**." "Risk assessment for CVD should include ascertainment of the following risk factors: **race/ethnicity… and smoking**." "No data exist on the role of aspirin therapy in **racial/ethnic groups**."
Asymptomatic Bacteriuria in Adults	2019																	
Atrial Fibrillation: Screening with Electrocardiography	2018								√		√							"Other risk factors include…**current smoking… alcohol and drug use**…"
Autism Spectrum Disorder in Young Children	2016							√	√		√	√						"Disparities have been observed in the frequency and age at which ASD is diagnosed among children by **race/ethnicity, socioeconomic status, and language of origin**, creating concern that certain groups of children with ASD may be systematically underdiagnosed."

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																		"...studies are especially needed in **populations with low socioeconomic status and minority populations**, where access to care may be more limited."
Bacterial Vaginosis in Pregnancy	2008							√	√					√				"Furthermore, bacterial vaginosis in pregnancy is more common among **African American women, women of low socioeconomic status**…"
Bladder Cancer	2011																	
BRCA-Related Cancer: Risk Assessment, Genetic Counseling, and Genetic Testing	2019																	
Breast Cancer: Screening	2016							√	√			√		√				"Direct evidence about any differential effectiveness of breast cancer screening is lacking for important subgroups of women, such as **African American women**, who are at increased risk for dying of breast cancer..." "**Race and ethnicity** is a factor that has prompted concern because of a growing disparity in breast cancer mortality rates. Although white women have historically had higher incidence rates than African American women, incidence rates have

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																		come close to converging as of 2012 (128 vs. 124 cases per 100,000 women per year, respectively). More African American women die each year from breast cancer than white women... The difference in mortality rate may also be due to **socioeconomic differences** and health system failures. Multiple studies have shown an association between **African American race** and experiencing delays in receiving health care services for cancer, not receiving appropriate treatment, or not receiving treatment at all."
Breast Cancer: Medications for Risk Reduction	2019				√				√	√			√		√			"**African American women** are more likely to die of breast cancer compared with women of other races." "Although incidence rates are similar among white and African American women (128.6 vs 126.9 cases per 100,000 persons, respectively), **mortality rates are higher among African American** women (28.7 deaths per 100,000 African American persons vs 20.3 deaths per 100,000 white persons)."

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																		"...newer [risk assessment] models include **race/ethnicity,** prior false-positive mammography results or benign breast disease, body mass index or height, estrogen and progestin use, history of breastfeeding, menopause status or age, **smoking, alcohol use, physical activity, education**, breast density, and **diet**."
Breastfeeding	2016							√		√								"…there are significant disparities in breastfeeding rates among younger mothers and in **disadvantaged communities**."
Cardiovascular Disease Risk: Screening with Electrocardiography	2018																	
Cardiovascular Disease: Risk Assessment with Nontraditional Risk Factors	2018							√	√		√	√						"Prevalence also varies by **race/ethnicity**; in 2015, the prevalence of coronary artery disease was 2 times greater among American Indian/Alaskan Native adults than Asian adults…" "Studies are especially needed in more diverse populations (women, **racial/ethnic minorities, persons of lower socioeconomic status)**, in whom

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																		assessment of nontraditional risk factors may help address the shortcomings of traditional risk models."
Carotid Artery Stenosis	2014																	
Celiac Disease	2017																	
Cervical Cancer	2018							√	√		√	√				√		"In particular, **women with limited access to care, women from racial/ethnic minority groups,** and women from countries where screening is not available may be less likely to meet criteria for adequate prior screening." "The most important factors contributing to higher incidence and mortality rates include **financial, geographic, and language or cultural barriers** to screening; barriers to followup; unequal treatment; and difference in cancer types, all of which vary across subpopulations." "Although low screening rates contribute to high mortality rates in certain **underserved populations,** screening alone is not sufficient to reduce overall cervical cancer morbidity and mortality

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																		and related disparities. " "Research is needed to...ensure **equitable access to treatment** across populations."
Child Maltreatment†	2018				√		√	√	√		√	√						"Children are also at increased risk based on factors related to their caregiver or environment, including having young, single, or nonbiological parents or **parents with poor educational attainment, low income, history of maltreatment, and social isolation**. Additionally, living in a **community with high rates of violence, high rates of unemployment, or weak social network**s are linked to child maltreatment." "Several factors may play a role in the underreporting of child maltreatment, including missed diagnosis of intentional child injury, fear of alienating caregivers, and **stigma related to CPS involvement**." "When investigating interventions and outcomes, the inclusion of diverse populations and settings would help improve the applicability of study findings. These would include families

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																		with known risk factors for child maltreatment (e.g., **history of substance abuse in the home) and settings with limited access to social services.**" "Some data reveal **racial/ethnic disparities** in the incidence of maltreatment, but it is unclear as to whether this represents true disparity or reporting bias."
Chlamydia and Gonorrhea	2014								√					√				"Prevalence is also higher among **incarcerated populations**…"
Chronic Obstructive Pulmonary Disease	2016								√					√	√			"Epidemiological studies have found that 15% to 50% of smokers develop COPD. More than 70% of all COPD cases occur in **current or former smokers**." "Among different **racial/ethnic groups**, the prevalence of COPD is highest among non-Hispanic white individuals (14.9%) and non-Hispanic black individuals (12.8%).
Cognitive Impairment in Older Adults	2014								√						√			"Prevalence varies by **race**; prevalence in adults age 71 years and older in 1 large study was 21.3% for blacks and 11.2% for whites. The prevalence of Alzheimer

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																		disease in Hispanics is approximately 1.5 times that seen in the white population."
Colorectal Cancer	2016								√			√		√				"Male sex and black **race** are also associated with higher colorectal cancer incidence and mortality. Black adults have the highest incidence and mortality rates compared with other racial/ethnic subgroups. The reasons for these disparities are not entirely clear. Studies have documented inequalities in screening, diagnostic followup, and treatment; they also suggest that equal treatment generally seems to produce equal outcomes." "**Black and Alaska Native individuals** have a higher incidence of and mortality rate from colorectal cancer compared with the general population. Empirical data about the effectiveness of different screening strategies for these at-risk populations are not available."
Dental Caries in Children From Birth to 5 Years	2014							√	√			√		√				"Higher prevalence and severity of dental caries are found among **minority and economically disadvantaged children**... Maternal and family factors can also increase children's risk. These factors

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																		include poor oral hygiene, **low socioeconomic status**, recent maternal caries, sibling caries, and frequent snacking. Additional factors associated with dental caries in young children include **lack of access to dental care**; inadequate preventive measures, such as failure to use fluoride-containing toothpastes; and lack of parental knowledge about oral health" "**Racial and ethnic minority children, as well as children living in low socioeconomic conditions,** are at significantly increased risk for caries compared with white children and children who live in adequate to high socioeconomic conditions. Future studies on risk assessment and preventive interventions should enroll sufficient numbers of **racial and ethnic minority** children to understand the benefits and harms of interventions in these specific populations."
Depression in Adults†	2016				√				√					√				"Women, young and middle-aged adults, and **nonwhite persons** have higher rates of depression than their counterparts, as

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																		do persons who are **undereducated,** previously married, or **unemployed**."
Depression in Children and Adolescents†	2016						√	√	√					√				"Risk factors for MDD in children and adolescents include…**family (especially maternal) history of depression**… and, in some studies, Hispanic **race/ethnicity**. Other psychosocial risk factors include **childhood abuse or neglect**, exposure to traumatic events (including natural disasters), loss of a loved one or romantic relationship, family conflict, uncertainty about sexual orientation, **low socioeconomic status**, and poor academic performance."
Diabetes Mellitus (Type 2) in Adults	2015								√		√	√	√					"…members of certain **racial/ethnic groups** (that is, African Americans, American Indians or Alaska Natives, Asian Americans, Hispanics or Latinos, or Native Hawaiians or Pacific Islanders) may be at increased risk for diabetes at a younger age or at a lower body mass index. Clinicians should consider screening earlier in persons with one or more of these characteristics." "More research is needed on the effects of screening among **racial/ethnic**

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																		minorities because they have a higher prevalence of diabetes than white persons." "The USPSTF found no studies that directly evaluated whether the effects of screening vary by subpopulation, such as by age, sex, or **race/ethnicity**."
Elevated Blood Lead Levels in Children and Pregnant Women	2019		√					√	√		√				√			"Elevated blood lead levels primarily affect children with a **lower socioeconomic status and from minority communities** because of the increased risk of housing-related exposure." "Risk factors for lead exposure include **socioeconomic factors (e.g., lower family income, older housing, and poor nutritional status)**, living near an industry that involves lead, proximity to the renovation or deterioration of older houses with lead-based paint, and previously living in countries where lead exposure is high. The risks vary by **race/ethnicity, socioeconomic status, and housing**."

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Falls Prevention in Community-Dwelling Older Adults	2018																	
Folic Acid to Prevent Neural Tube Defects	2017								√			√		√				"Questions persist regarding increased risk of neural tube defects in some **racial/ethnic groups**. Birth prevalence rates are highest among Hispanic women, followed by non-Hispanic white and non-Hispanic black women. Genetic mutations in folate-related enzymes may vary by **race/ethnicity**. Dietary folate or folic acid intake differs by **race/ethnicity.** For example, Mexican American women may be at increased risk because of decreased consumption of fortified foods and greater intake of corn masa–based diets" "Study results on the effectiveness of folic acid supplementation in reducing neural tube defects among **Hispanic women compared with white or black women** have been inconsistent. Future research should continue to evaluate differences in diverse populations."
Genital Herpes	2016							√	√		√							"Incidence rates are thought to vary by geographic region and **race/ethnicity.** In the multistate study, incidence rates

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																		were substantially higher in infants born to women **covered by Medicaid** (15.1 cases per 100,000 live births) **vs. private insurance** (5.4 cases per 100,000 live births)."
Gestational Diabetes Mellitus	2014								√					√				"…belonging to an **ethnic group** at increased risk for GDM (Hispanic, Native American, South or East Asian, African American, or Pacific Island descent)."
Glaucoma	2013								√					√	√			"Recent evidence shows that glaucoma may be increased in **Hispanics. Older African Americans** have a higher prevalence of glaucoma and perhaps a more rapid disease progression; if screening reduces vision impairment, then African Americans would probably have a greater absolute benefit than whites." "Important risk factors include older age, family history of the condition, and **African American race**... Age-adjusted estimates are approximately 3 times higher in African Americans than in whites. A recent study reported a prevalence of 4.7% in Hispanics older than age 40 years."

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Gonococcal Ophthalmia Neonatorum: Ocular Prophylaxis	2019																	
Gynecological Conditions: Periodic Screening With the Pelvic Examination	2017																	
Healthful Diet and Physical Activity for CVD Prevention in Adults With CVD Risk Factors†	2014																	
Healthful Diet and Physical Activity for CVD Prevention in Adults Without Cardiovascular Risk Factors†	2017																	
Hearing Loss in Older Adults	2012							√			√							"The cost of a hearing aid is a barrier to use for many older adults because it is **not covered by Medicare and many private insurance companies**."
Hepatitis B Virus Infection in Pregnant Women	2019				√			√	√						√			"In the United States, new cases of HBV among adults are largely transmitted through **injection drug use** or sexual intercourse, but most prevalent cases of

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																		HBV infection are chronic infections from exposure occurring in infancy or childhood." "Older maternal age, **race/ethnicity** (non-Hispanic black and Asian populations), **lower education, higher poverty levels, and lack of insurance coverage** are risk factors for HBV infection among women."
Hepatitis B Virus Infection	2014								√						√			"The burden of HBV infection disproportionately affects foreign-born persons from countries with a high prevalence of infection and their unvaccinated offspring, HIV-positive persons, men who have sex with men, and **injection drug users**... Compared with non–HBV-related deaths, HBV-associated mortality is approximately 11 times higher among persons of **non-Hispanic Asian or Pacific Islander descent**."
Hepatitis C Virus Infection	2013								√	√	√			√				"The most important risk factor for HCV infection is **past or current injection drug use**, with most studies reporting a prevalence of 50% of more." "In screening strategies targeting persons

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																		with risk factors for HCV infection (such as **past or present injection drug use,** sex with an injection drug user..." "The incidence rate for acute hepatitis C was lowest among persons of Asian or Pacific Islander descent and highest among American Indians and Alaskan natives. **Black persons** had the highest mortality rates from HCV, at 6.5 to 7.8 deaths per 100,000 persons, according to data from 2004 to 2008."
High Blood Pressure in Adolescents and Children	2013								√					√				"Other risk factors include**…ethnicity**…"
High Blood Pressure in Adults	2015								√						√			"The percentage of patients who are diagnosed with hypertension after confirmatory monitoring is significantly higher among **African Americans,** persons with an initial high-normal blood pressure (130 to 139/85 to 89 mm Hg), those who are obese or overweight, and those older than age 40 years." "**Non-Hispanic black** adults have the highest prevalence (42.1%) compared

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																		with white (28.0%), Hispanic (26.0%), and Asian (24.7%) Americans."
HIV Infection	2019								√					√	√			"**Injection drug use** is another important risk factor for HIV infection; the estimated prevalence of HIV infection among persons who inject drugs is 1.9%." "Groups disproportionately affected by HIV infection in the United States include…**black/African American populations, and Hispanic/Latino populations**…" "There are **racial/ethnic** disparities in rates of perinatal HIV transmission, with more than 5 time greater rates in black/African American women than in white or Hispanic/Latino women. Of the approximately 99 cases of perinatal HIV infection in 2016, 65% occurred in black/African American mothers."
Hormone Therapy in Postmenopausal Women	2017																	
Illicit Drug Use in Children,	2019																	

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Adolescents, and Young Adults†‡																		
Illicit Drug Use in Adults, Including Pregnant Women†‡	2019							√	√	√	√							"...some factors are associated with a higher prevalence of illicit drug use. These include being age 18 to 25 years; being male; or having a **mental health condition**, personality or mood disorder, **nicotine or alcohol dependence; a history of physical or sexual abuse, parental neglect, or other adversity in childhood**; or drug or alcohol addiction in a first-degree relative." "In practice, the benefits and harms of screening may vary due to several health, social, and legal issues. In many communities, **affordable, accessible, and timely services for diagnostic assessment and treatment for patients with positive screening results are in limited supply or unaffordable**." "Risk factors for illicit drug use in youth include aggressive childhood behavior, lack of parental supervision, poor social skills, access to drugs at school, and **community poverty**."

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Impaired Visual Acuity in Older Adults	2016								√		√							"Additional risk factors for cataracts are **smoking, alcohol use**, UV light exposure, diabetes, corticosteroid use, and **black race**. Risk factors for AMD include **smoking**, family history, and **white race**."
Intimate Partner Violence, Elder Abuse, and Abuse of Vulnerable Adults†	2018							√	√	√				√	√			"Prevalence rates vary by age, **race/ethnicity, and income**." "Although all women of reproductive age are at potential risk for IPV and should be screened, a variety of factors increase risk of IPV, such as **exposure to violence as a child,** young age, **unemployment, substance abuse,** marital difficulties, and **economic hardships.** Risk factors for elder abuse include **isolation and lack of social support**, functional impairment, and poor physical health. For older adults, **lower income** and living in a shared living environment with a large number of household members (other than a spouse) are associated with an increased risk of financial and physical abuse." "The 1995–1996 National Violence Against Women Survey (N=6,273) found

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																		that **women with severe disability impairments** were 4 times more likely to experience sexual assault in the past year than women without disabilities."
Iron Deficiency Anemia in Pregnant Women	2015				√			√	√	√	√							"Rates may be higher in **low-income and minority populations**." "**Non-Hispanic black and Mexican American** women have higher prevalence rates of iron deficiency than white women and women with parity of 2 or more. Evidence on additional risk factors, such as **lower educational level and family income**, has been less consistent. "
Iron Deficiency Anemia in Young Children	2015							√	√		√							"Demographic factors associated with increased risk for iron deficiency anemia include **low socioeconomic status** and having parents who are **migrant workers or recent immigrants**."
Lipid Disorders in Children and Adolescents	2016																	
Lung Cancer	2013							√				√						"Smoking prevalence and lung cancer incidence are higher among **socioeconomically disadvantaged populations,** and more research is needed in these groups."

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Obesity in Children and Adolescents†	2017							√	√			√		√	√			"...obesity rates continue to increase in certain populations, such as African American girls and Hispanic boys. These **racial/ethnic differences** in obesity prevalence are likely a result of both genetic and nongenetic factors (e.g., **socioeconomic status, intake of sugar-sweetened beverages and fast food,** and having a television in the bedroom)." "Although all children and adolescents are at risk for obesity and should be screened, there are several specific risk factors, including parental obesity**, poor nutrition, low levels of physical activity,** inadequate sleep, **sedentary behaviors, and low family income**." "The USPSTF recognizes the challenges that children and their families encounter in having **limited access** to effective, intensive behavioral interventions for obesity."

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Obesity-Related Morbidity and Mortality in Adults†	2018							√	√			√			√			"Further research is needed to examine the effects of interventions for obesity on longer-term weight and health outcomes (e.g., cardiovascular outcomes), including data on important subpopulations (e.g., older adults, **racial/ethnic groups**, or persons who are overweight)." "The age-adjusted prevalence of obesity is higher among **non-Hispanic black (57.2%) and Hispanic (46.9%) women than among non-Hispanic white (38.2%) women**. Among men, obesity prevalence is 38.0% in non-Hispanic black, 37.9% in Hispanic, and 34.7% in non-Hispanic white men. Obesity rates among Asian Americans are lower than among other racial/ethnic groups (12.6% and 12.4% in men and women, respectively)"
Obstructive Sleep Apnea	2017																	
Oral Cancer	2013								√					√				"In the United States, up to 75% of cases of oral cancer may be attributable to **tobacco and alcohol use**... The prevalence of oral HPV infection is associated with age, sex, number of

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																		sexual partners, and number of **cigarettes smoked** per day."
Osteoporosis to Prevent Fractures	2018								√	√	√			√				"The prevalence of primary osteoporosis (i.e., osteoporosis without underlying disease) increases with age and **differs by race/ethnicity.**" "clinicians should first consider factors associated with increased risk of osteoporotic fractures. These include parental history of hip fracture, **smoking, excessive alcohol consumption**, and low body weight." "Similar to women, risk factors for fractures in men include low body mass index, **excessive alcohol consumption, current smoking**, long-term corticosteroid use, previous fractures, and history of falls within the past year."
Ovarian Cancer	2018								√						√			"From 2010 to 2014, **white women** had the highest age-adjusted incidence rate (11.8 cases per 100,000 women), followed by **Hispanic women** (10.3 cases per 100,000 women), black women (9.2 cases per 100,000 women), Asian/Pacific Islander women (9.1 cases per 100,000

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																		women), and American Indian/Alaska Native women (8.3 cases per 100,000 women). White women are most likely to die of ovarian cancer, followed by black, Hispanic, American Indian/Alaska Native women, and Asian/Pacific Islander women."
Pancreatic Cancer	2019																	
Perinatal Depression†	2019							√	√					√	√			"...social factors such as **low socioeconomic status, lack of social or financial support**, and adolescent parenthood have also been shown to increase the risk of developing perinatal depression." "Rates vary by age, **race/ethnicity**, and other sociodemographic characteristics. For example, women age 19 years or younger, American Indian/Alaska Native women, women with less than 12 years of education, unmarried women, or women with six or more stressful life events in the previous 12 months have higher reported rates of perinatal depression." "A number of risk factors are thought to

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																		be associated with the development of perinatal depression. These include a past history of depression, current depressive symptoms (that do not reach a diagnostic threshold), **history of physical or sexual abuse,** unplanned or unwanted pregnancy, stressful life events, **lack of social and financial support, intimate partner violence**, pregestational or gestational diabetes, and complications during pregnancy. Additional risk factors include adolescent parenthood, low socioeconomic status, and lack of social support."
Peripheral Artery Disease and CVD in Adults	2018							√	√			√		√				"In addition to older age, major risk factors for PAD include diabetes, **current smoking**, high blood pressure, high cholesterol levels, obesity, and **physical inactivity**, with current smoking and diabetes showing the strongest association." "Studies of screening with the ABI and interventions to stop disease progression in the lower limbs in more diverse populations (e.g., women, **racial/ethnic minorities, or persons with a lower**

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																		socioeconomic status) and populations at high risk (i.e., persons with diabetes) would also be valuable."
Preeclampsia: Low-Dose Aspirin Use for the Prevention of Morbidity and Mortality	2014								√			√			√			"Future trials should recruit adequate numbers of women from **racial/ethnic populations** that are at disproportionate risk, such as African American women, in order to have sufficient power to determine the effectiveness of different aspirin dosages and timing of initiation in these high-risk groups." "There are **racial/ethnic disparities** in the prevalence of and mortality from preeclampsia. Non-Hispanic black women are at greater risk for preeclampsia than other women and bear a greater burden of maternal and infant morbidity and perinatal mortality. In the United States, the rate of maternal death from preeclampsia is higher in non-Hispanic black women than in non-Hispanic white women. Disparities in risk factors for preeclampsia, limited access to early prenatal care, and obstetric interventions may account for some of the differences in prevalence and clinical outcomes."

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Preeclampsia: Screening	2017							√	√					√			√	"Preeclampsia is more prevalent among **African American women** than among white women. Differences in prevalence may be, in part, due to African American women being disproportionally affected by risk factors for preeclampsia. African American women also have case fatality rates related to preeclampsia 3 times higher than rates among white women. **Inequalities in access** to adequate prenatal care may contribute to poor outcomes associated with preeclampsia in **African American women**." "Other risk factors include nulliparity, obesity, **African American race, low socioeconomic status,** and advanced maternal age. Higher prevalence and case fatality rates factor into why African American women are 3 times more likely to die of preeclampsia than white women."

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Prevention of HIV Infection: Preexposure Prophylaxis	2019							√	√					√		√		"Persons at risk of HIV infection include men who have sex with men, persons at risk via heterosexual contact, and persons who **inject drugs**." "It is important for clinicians to recognize that barriers to the implementation and uptake of PrEP exist. These barriers can include structural barriers, such as **lack of health insuranc**e, and other factors, such as an individual's willingness to believe that he or she is an appropriate candidate for PrEP or to take PrEP. There are also **racial/ethnic disparities** in the use of PrEP. "
Prostate Cancer	2018								√	√			√	√				"African American men have an increased lifetime risk of prostate cancer death compared with those of other **races/ethnicities** (4.2% for African American men, 2.9% for Hispanic men, 2.3% for white men, and 2.1% for Asian and Pacific Islander men)." "Older age, **African American race**, and family history of prostate cancer are the most important risk factors for the development of prostate cancer. Other

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																		factors with weaker associations and less evidence include **diets high in fat and low in vegetable consumption. Cigarette smoking** is associated with higher risk of prostate cancer mortality." "In the United States, **African American men** are more likely to develop prostate cancer than white men (203.5 vs 121.9 cases per 100,000 men). African American men are also more than twice as likely as white men to die of prostate cancer (44.1 vs. 19.1 deaths per 100,000 men). The higher death rate is attributable in part to an earlier age at cancer onset, more advanced cancer stage at diagnosis, and higher rates of more aggressive cancer (i.e., higher tumor grade). These differences in death from prostate cancer may also reflect that African American men have lower rates of receiving high-quality care."
Rh (D) Incompatibility	2004																	
Sexually Transmitted Infections	2014							√	√				√	√		√		"African Americans have the highest STI prevalence of any **racial/ethnic group**, and prevalence is higher in American

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																		Indians, Alaska Natives, and Latinos than in white persons. Increased STI prevalence rates are also found in men who have sex with men (MSM), **persons with low incomes** living in urban settings, **current or former inmates,** military recruits, persons who exchange sex for money or drugs, **persons with mental illness or a disability, current or former intravenous drug users, persons with a history of sexual abuse**, and patients at public STI clinics." "Surveys examining STI counseling by primary care clinicians have found wide variations in practice. **Stronger linkages between the primary care setting and the community** may greatly improve the delivery of this service." According to the CDC, STI incidence rates are consistently 8 or more times higher in **African Americans than white persons**, and African American youth accounted for 57% of all new HIV infections among persons ages 13 to 24 years in 2009."

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																		"The USPSTF found no consistent evidence of differential effectiveness by sex or **race/ethnicity**. The USPSTF also found no evidence of differential effectiveness associated with **low-income setting; mental illness; or history of sexual, physical, or intimate partner abuse.** However, these groups were poorly represented in available studies. Some subpopulations were also poorly represented, such as low-risk populations, adolescent boys, MSM, and American Indians or Alaska Natives. "
Skin Cancer: Behavioral Counseling	2018																	
Skin Cancer: Screening in Adults	2016																	
Speech and Language Delay in Preschool Children	2015				√									√				"...several risk factors have been reported to be associated with speech and language delay and disorders, including male sex, family history of speech and language impairment, **low parental educational level**, and perinatal risk factors."

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Statin Use for the Primary Prevention of Cardiovascular Disease in Adults	2016																	
Suicide Risk	2014						√	√	√		√	√		√				"Other important risk factors for suicide attempt include **serious adverse childhood events; family history of suicide; prejudice or discrimination associated with being lesbian, gay, bisexual, or transgender;** access to lethal means; and possibly **a history of being bullied, sleep disturbances**, and such chronic medical conditions as epilepsy and chronic pain. In males, **socioeconomic factors, such as low income, occupation, and unemployment**, are also related to suicide risk." "In the health care system, laws requiring coverage parity between mental and physical health disorders will give more persons the ability **to access care for** psychiatric problems associated with suicide, such as depression. Efforts to coordinate care among programs that address mental health, substance use,

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																		and physical health can also increase access to care." "Investigating ways to **link clinical and community resources** might also lead to other possible methods to help patients at risk for suicide."
Syphilis Infection in Nonpregnant Adults and Adolescents	2016								√					√	√			"Factors associated with increased prevalence that clinicians should consider include history of incarceration, history of commercial sex work, certain racial/ethnic groups, and being a male younger than 29 years, as well as regional variations that are well described." **"**Increased prevalence of syphilis infection was also associated with certain **racial/ethnic groups** (black, Hispanic, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander individuals had higher prevalence rates than white individuals, ranging from 6.5 to 18.9 vs. 3.5 cases per 100,000 persons), geography (southern and western United States and metropolitan areas), and being a male younger than 29 years."

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Syphilis Infection in Pregnant Women	2018								√						√			"Primary, secondary, and congenital syphilis rates differ by **race/ethnicity**. Case rates of primary, secondary, and congenital syphilis are higher in black, American Indian/Alaska Native, and Hispanic populations than in white populations."
Testicular Cancer	2011																	
Thyroid Cancer	2017																	
Thyroid Dysfunction	2015																	
Tobacco Smoking Cessation in Adults and Pregnant Women†	2015				√			√	√					√	√			"According to the 2012–2013 National Adult Tobacco Survey, **s**moking prevalence is higher in the following groups: men; adults aged 25 to 44 years; **persons with a race or ethnicity category of "other, non-Hispanic"; persons with a GED (vs. graduate-level education); persons with an annual household income of less than $20 000**; and persons who are lesbian, gay, bisexual, or transgender. Higher rates of smoking have been found in persons with mental health conditions." "Rates are higher among men; adults aged 24 to 44 years; lesbian, gay, bisexual, or transgender adults;

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																		multiracial groups and American Indians or Alaska Natives; persons whose highest education level attained is a GED; and persons living below the poverty level. **Adults with mental health conditions** have higher smoking rates and tend to smoke a higher average number of cigarettes than adults without mental health conditions. Approximately 27% of persons with a mental health or substance use disorder smoke."
Tobacco Use in Children and Adolescents†‡	2019				√				√					√				"The following risk factors may increase the risk of tobacco use in youth: being male, **white race, not college-bound**, from a rural area, **having parents with lower levels of education**, parental smoking, having childhood friends who smoke, being an older adolescent, experiencing highly stressful events, and perceiving tobacco use as low risk."
Tuberculosis Infection	2016		√						√					√	√			"Populations at increased risk for LTBI based on increased prevalence of active disease and increased risk of exposure include persons who were born in, or are former residents of, countries with increased tuberculosis prevalence and **persons who live in, or have lived in,**

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																		high-risk congregate settings (e.g., homeless shelters and correctional facilities)." "**Asians** represented the largest percentage of total cases (33%), followed by Hispanics (28%), African Americans (21%), and whites (13%); American Indian or Alaska Natives and Native Hawaiian or other Pacific Islanders each represented approximately 1% of cases."
Unhealthy Alcohol Use in Adolescents and Adults†	2018																	
Vision in Children Ages 6 Months to 5 Years	2017				√			√	√					√	√		√	"Studies show that screening rates among children vary by **race/ethnicity and family income**. Data based on parent reports from 2009–2010 indicated identical screening rates among black non-Hispanic children and white non-Hispanic children (80.7%); however, Hispanic children were less likely than non-Hispanic children to report vision screening (69.8%). Children whose families earned 200% or more above the federal poverty level were more likely to report vision screening than families with

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																		lower incomes." "Additional risk factors associated with amblyopia, strabismus, or refractive errors include family history in a first-degree relative, prematurity, low birth weight, **maternal substance abuse, maternal smoking during pregnancy, and low levels of parental education**." "Medical Expenditure Panel Survey data from 2009–2010 reported identical screening rates among black non-Hispanic children and white non-Hispanic children (80.7%); however, **Hispanic** children were less likely than non-Hispanic children to report vision screening (69.8%). Children whose families earned 200% or more above the federal poverty level were more likely to report vision screening than families with **lower incomes**."
Vitamin D Deficiency	2014																	
Vitamin D: Calcium, or Combined Supplementation to Prevent Fractures	2018																	

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Vitamin Supplementation to Prevent Cancer and CVD	2014																	
TOTALS		**0**	**2**	**0**	**9**	**0**	**3**	**28**	**53**	**10**	**17**	**16**	**4**	**31**	**20**	**3**	**2**	

Shaded rows indicate recommendation statements that do **not** address social risk factors.

*Nontarget domains include: abuse (e.g., intimate partner violence, elder abuse, and child maltreatment), caregiver responsibilities, childcare access and affordability, disabilities, discrimination/racism/stigma, early childhood education and development, employment, health/functional status, healthcare/medication access and affordability, healthy lifestyle (diet and physical activity), immigration/refugee status, incarceration, legal needs, literacy, mental health, neighborhood/built environment, race and ethnicity, social support/isolation, substance use (e.g., tobacco, alcohol, and other drug use), and veteran status.

†Recommendation topic included in some definitions of SDH (**Appendix E Table 1**).

‡Draft recommendation statement audited.

Abbreviations: ABI = ankle-brachial index; AMD = age-related macular degeneration; ASD = autism spectrum disorder; CDC = Centers for Disease Control and Prevention; COPD = chronic obstructive pulmonary disease; CPS = Child Protective Services; CVD = cardiovascular disease; GDM = gestational diabetes mellitus; HBV = hepatitis B virus; HCV = hepatitis C virus; HPV = human papillomavirus; LTBI = latent tuberculosis infection; MDD = major depressive disorder; PAD = peripheral artery disease; PrEP = pre-exposure prophylaxis; RS = recommendation statement; SDH = social determinant of health; STI = sexually transmitted infection; UV = ultraviolet.

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
AARP	The organization lists initiatives on eliminating senior poverty and addressing issues such as education, employment, food security, and income for seniors;[189] social connectedness and related health outcomes are a focus, with a Policy Institute update on the issue and self-assessment tools to aid people age 50 years or older in staying connected;[190] the AARP Public Policy Institute lists several SDH issues as research foci (e.g., financial security, health disparities, screening uptake in vulnerable populations, social isolation); Future of Work@50+ is a multiyear initiative with the goal of suggesting policy changes to ensure older Americans have access to financial stability and job opportunities.[191]	----
American Academy of Allergy, Asthma & Immunology	----	----
American Academy of Dermatology	----	----
American Academy of Family Physicians (AAFP)	Policy on SDH supports physicians' need to know how to identify and address SDH; stresses importance of graduate medical education on SDH;[192] 2017 policy statement recognizes violence as a public health concern and encourages AAFP members to consider risk factors (including SDH) related to violence and become involved in community partnership efforts to address violence;[193] 2015 position paper on poverty and health states that screening to identify patients' socioeconomic challenges should be incorporated into practice (e.g., ask "Do you (ever) have difficulty making ends meet at the end of the month?," casual inquiry about the cost of a patient's medications, ask whether patient has a home that is adequate to support healthy behaviors);[194] Community Health Resource Navigator is interactive mapping tool that locates community resources relevant to patients' health needs and generates customized report to share during patient visits; includes healthy eating and active living resources, behavioral health resources, and Substance Abuse and Mental Health Services Administration mental health and substance abuse services;[195] the EveryONE Project Toolkit for use at the point of care to tackle patients' SDH includes the AAFP Social Needs Screening Tool, an implementation guide, and social needs resources for physicians;[196] Every ONE survey shows that overwhelming majority of AAFP members agree that identifying SDH needs and advocating for public policies addressing SDH are important aspect of health care, but	Not described in clinical practice guideline manual;[198] behavioral treatment guidelines are all endorsements of USPSTF recommendations.

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
	physicians view time constraints, staffing concerns, and community implementation as research gaps and/or barriers.[197]	
American Academy of Hospice and Palliative Medicine	----	----
American Academy of Neurology	----	----
American Academy of Ophthalmology	----	----
American Academy of Orthopaedic Surgeons	----	----
American Academy of Otolaryngology—Head and Neck Surgery	----	----
American Academy of Pediatrics	Fourth edition of *Bright Futures* includes focus on SDH; for most visits, pediatricians are encouraged to ask about topics such as food insecurity, domestic violence, substance use, and housing situations; a footnote was added to psychosocial/behavioral assessment in the Recommendations for Preventive Pediatric Health Care: "This assessment should be family centered and may include an assessment of child social-emotional health, caregiver depression, and social determinants of health;"[199] 2013 policy statement emphasizes importance of recognizing SDH and includes recommendations for use of community data to increase understanding of SDH effects on child health outcomes and medical education curricula on SDH and how to identify community resources;[200] 2015 committee statement promotes screening and identifying children at risk for food insecurity and connecting families in need with community resources;[201] 2016 policy statement addresses poverty and child health in the United States, including related SDH needs and their effects on child development and well-being;[202] the 2017 policy on child homelessness advocates for clinicians to understand health outcomes of homelessness and suggests ways to screen for homelessness and provide resources to struggling families;[203] 2018 policy statement identifies specific opportunities for collaboration between pediatricians and public health professionals to address SDH concerns;[204] poverty and child health is a Health Initiative; practice tips webpage provides screening tool suggestions (e.g., IHELP, WE CARE) for identifying families with	No guideline methods on website; not addressed in 2017 guideline on screening and management of high blood pressure in children and adolescents.[207]

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
	unmet needs but does not endorse any specific tool; offers community resource referral template;[205] 2019 policy statement discusses racism as an SDH affecting health outcomes, evidence-based documentation allowing clinicians to engage in strategies to improve health and well-being of patients; and ways in which clinicians can address racism and its effects in primary care[206]	
American Academy of Physical Medicine and Rehabilitation	----	----
American Academy of Physician Assistants	----	----
American Association of Clinical Endocrinologists	----	----
American Association of Nurse Practitioners	Shared Principles of Primary Care lists social needs as a focus of primary care treatment, but specific SDH domains are not mentioned.[208]	----
American Cancer Society	Community Health Initiatives address unequal burden of cancer by reaching individuals in underserved communities in collaboration with community partners; the Community Health Advocates implementing Nationwide Grants for Empowerment and Equity (CHANGE) Grant Program builds community and system capacity to promote health equity, access, and navigation to screening resources within underserved communities.[209]	Not described in article on methods for guideline development;[210] 2015 breast cancer screening guideline mentions barriers to access among low-income or uninsured women and those residing in rural counties.[211]
American College of Cardiology	----	----
American College of Emergency Physicians	----	----
American College of Medical Genetics	----	----
American College of Obstetricians and Gynecologists	2018 Committee opinion focuses on importance of SDH and makes recommendations to screen for SDH and referrals to social services; refers to Health Leads Social Needs Screening Toolkit;[212] 2018 committee opinion advocates that healthcare providers address needs of homeless women, be able to identify homelessness, and provide resources to patients in need;[213] partners with National WIC Association and 32 local WIC agencies on the Community Partnership for Healthy Mothers and Children to improve access to healthy food	No methods for clinical guidance on website; 2018 committee opinion on Group Prenatal Care discusses cost as a barrier in the section on challenges to implementation.[215]

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
	environments and disease prevention and management services such as WIC.[214]	
American College of Occupational and Environmental Medicine	----	----
American College of Physicians	2018 Position paper offers recommendations on better integration of SDH into healthcare systems and medical education; states that healthcare professionals should be knowledgeable about screening and identifying SDH and approaches to treating patients whose health is affected by SDH; supports incorporating SDH into electronic health record; recommends increased screening for SDH in clinical settings;[216] 2017 policy compendium addresses important roles SDH play in affecting health inequities.[217]	Not described in article on methods for guideline development;[218] not addressed in 2017 guideline on treatment of diabetes[219] } or 2016 guideline on treatment of depression.[220]
American College of Preventive Medicine	Issued a Population Health Initiative statement and introduced two CME/MOC courses to provide clinicians with population-level strategies to address SDH issues and prevent noncommunicable diseases.[221]	
American College of Radiology	----	----
American College of Rheumatology	----	----
American College of Surgeons	Quality statement on violence intervention programs (with special attention to gun violence) highlights the importance of including SDH to have a comprehensive approach.[222]	----
American Diabetes Association	2019 Standards of Medical Care in Diabetes recommend that providers assess social context, including potential food insecurity, housing stability, and financial barriers, apply that information to treatment decisions, and refer patients to local community resources when available;[223] 2017 advocacy accomplishments included addressing health disparities through state-level laws covering: healthy food financing policies to reduce food insecurity, surplus food programs, increasing access to farmer's markets, budget allocations supporting programs and state-level offices of health equity, and school-based policies that bring free and reduced-price meals to students in high- poverty schools and school districts; worked with FDA, CMS, and HHS leadership on furthering diabetes health equity strategies;[224] collaborating with IBM Watson Health to address important issues that influence health outcomes, such as SDH.[225]	Not addressed in methodology section of Standards of Medical Care in Diabetes.

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
American Epilepsy Society	----	----
American Geriatrics Society	----	----
American Heart Association	2019 Initiative announced investment in eight SDH-focused projects combating disparities that adversely impact health outcomes;[226] 2015 scientific statement summarizes current state of knowledge about SDH and asserts that consideration of SDH is essential because the most significant opportunities for reducing death and disability from cardiovascular disease in the United States lie with addressing the social determinants of cardiovascular outcomes.[227]	Not described in methodology manual;[228] not addressed in 2018 scientific statement on routine assessment and promotion of physical activity in healthcare settings.[229]
American Medical Association	----	----
American Medical Informatics Association	Issued a press release to the Federal Communication Commission encouraging broadband-enabled health solutions and advocating for internet access to be considered an SDH.[230]	----
American Osteopathic Association	Provider guidelines recommend that all doctors of osteopathy discuss all aspects of a patient's life—including those falling in the SDH domain—to provide optimal care.[231]	----
American Psychiatric Association	----	----
American Psychological Association	Webpage on placing clinical practice guidelines in context states that consideration of treatment options should include patient circumstances and barriers in a patient's life that would make completing a guideline-recommended treatment unusually challenging or undesirable; a section on recognizing individual differences recognizes that the clinical studies on which recommendations are based often have not assessed whether or how individual differences, such as demographic and identity factors (e.g., race, ethnicity, language, nationality, socioeconomic status, religion, gender identity, sexual orientation, age, and physical disability), diagnostic factors (e.g., medical and psychiatric comorbidity), environment (e.g. safety, housing, access to healthcare, education, nutrition, and transportation), and other individual patient-level factors (e.g., patient preferences about treatment, prior treatment experiences), affect clinical outcomes;[232] Public Interest Directorate includes a socioeconomic status office.[233]	Manual of procedures for guideline development is in process; 2018 guideline for behavioral treatment of obesity and overweight in children and adolescents includes a section titled "Consideration of Patient Values and Preferences," with discussion of cost and logistical issues (e.g., childcare, transportation, competing time issues with work and school) of a family-based, time-intensive treatment program, and cautions that these barriers are likely to be higher for lower-income families.[234]
American Society for Clinical Pathology	----	----

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
American Society for Radiation Oncology	----	----
American Society for Reproductive Medicine	----	----
American Society of Anesthesiologists	----	----
American Society of Clinical Oncology	----	----
American Society of Colon and Rectal Surgeons	----	----
American Society of Hematology	----	----
American Society of Nephrology	----	----
American Society of Plastic Surgeons	----	----
American Urological Association	----	----
America's Health Insurance Plan	Three issue briefs related to SDH issues: housing security and safety,[235] food insecurity and nutrition,[236] and how care models can implement SDH to maximize patients' well-being;[237] in-process or completed studies highlighting implementation strategies are included in each report.	----
Canadian Task Force on Preventive Health Care	2017 Patient Engagement Protocol developed to ensure patient priorities and perspectives (including around social circumstances) are incorporated in the development of clinical practice guidelines and patient materials; recruitment of participants designed to yield a representative sample of Canadian public to address health equity issues relevant to the guideline topic.[238]	Procedure Manual describes equity issues as an example of a contextual question; outlines equity as one of the six criteria important for formulating recommendations in the GRADE Evidence to Recommendation Framework;[239] not addressed in 2017 guideline on prevention and treatment of cigarette smoking in children and youth;[240] } 2017 guideline on screening for hepatitis C pilot tested the Feasibility, Acceptability, Cost, and Health Equity (FACE) tool with

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
		organizational stakeholders to gain their perspective on the priority, feasibility, acceptability, cost and equity of the recommendation; equity is defined as: What would the impact on health equity compared to current status be? Would the intervention negatively or positively impact disadvantaged populations?[241]
Centers for Disease Control and Prevention	Page dedicated to SDH and their effects on health, as well as links to SDH-related data, programs, policies, and FAQs;[242] eight sponsored programs address SDH,[243] and seven policy resources support SDH-related goals;[244]provides resources for providers, communities, and partnerships to take action to address SDH.[245]	----
Centers for Medicare & Medicaid Services	The Initiatives to Accelerate the Development and Testing of New Payment and Service Delivery Models award includes plans to leverage and spread existing community transformation initiative focused on SDH;[246] a blog post from the Director of Minority Health in 2019 stresses the importance of addressing social risk factors and lists a number of tools to identify patients' social needs;[247] special populations recognized by CMS include low income as a target group.[248]	----
Community Preventive Services Task Force	Set of recommendations addressing health equity focus on education, cultural competency, and housing; website states that health inequities are caused by "the uneven distribution of social determinants of health;"[249] GuideCompass allows individuals to choose from a range of issues (e.g., address specific health issue, conduct a community health assessment, or help community understand health issues affecting neighborhood) to get links to resources.[250]	Methods paper (2000) discusses links among social, environmental, and biological determinants in development of logic framework for recommendations;[251] not addressed in 2016 review on family-based physical activity interventions.
Department of Defense/ Department of Veterans Affairs	Public Health section of website lists underserved populations as one of the four pillars upholding their ideals, services, and programs;[252] 2017 evidence review on Social Determinants of Health for Veterans addresses prevalence and characteristics of SDH and relationship between variation in SDH and differences in health services access, health-related behaviors, and health outcomes.[253]	Not described in the 2013 document titled Guidelines for Guidelines;[254] 2018 guideline on management of pregnancy recommends screening for social risk domains; indicates that women identified as food insecure may be at risk for nutritional complications

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
		in pregnancy; initial prenatal risk assessment checklist includes many social risk domains, some with suggested referral to social services; equity of resource availability listed as a factor beyond the strength of evidence that was considered;[255] 2017 management of type 2 diabetes guidelines indicate that social risk factors, including social support and food insufficiency, should be considered in setting of HbA1c target range; recommendation for referral of patients with limb-threatening conditions includes discussion of cost considerations associated with specialty care and potential resource and equity issues regarding the availability of these specialists in smaller and remote communities.[256]
Food and Drug Administration	----	----
Health Resources and Services Administration	2015 memo outlines Secretary's Advisory Committee on Infant Mortality goals, including to "increase health equity and reduce disparities by targeting social determinants of health through both multi-sector investments in high-risk, under-resourced communities and major initiatives to address poverty;"[257] Office of Women's Health supports programs that provide healthcare to women and girls who are geographically isolated or economically or medically vulnerable.[258]	----
Indian Health Service	2018 Innovations Project initiative for patient-centered medical home model of care includes a goal of developing and implementing innovative projects that address social needs such as education, transportation, housing, or employment; completed projects have addressed transportation and literacy concerns;[259] 2019–2023 strategic plan includes objective of "explor[ing] environmental and social determinants of health and trauma-informed care in healthcare delivery."[260]	The 2008 guideline on "Promoting Healthy Weight" details the importance of understanding and addressing social determinants contributing to childhood obesity.[261]

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
Infectious Diseases Society of America	----	----
National Association of Pediatric Nurse Practitioners	The Global Health Care Special Interest Group lists the American Academy of Pediatrics 2019 statement, particularly in regard to racism,[206] as an external resource relevant to their mission in delivering healthcare.[262]	----
National Business Group on Health	The group possesses an overall interest in promoting health equity and addressing disparities and offers 18 publications (must be a member to access) for businesses to use as resources to address SDH and improve health equity;[263] 2019 recipients of the Innovation in Advancing Health Equity Reward included Anthem, Inc., and Cigna for their dedication and innovative initiatives to address SDH and advance health equity through workplace and community initiatives.[264]	----
National Cancer Institute	Lists "Cancer Health Disparities" as an active research topic and aims to address cancer disparities related to low socioeconomic groups, disproportionately affected racial/ethnic populations, and geographically isolated individuals.[265]	----
National Committee for Quality Assurance	Guidelines for Patient-Centered Medical Home practices recommend that the full scope of social needs is clearly documented in patient summary reports so the practice(s) may better implement appropriate care interventions;[266] project jointly funded with the Robert Wood Johnson Foundation investigates the most effective means for connecting medical care and social service needs, specifically focusing on social risk factors and multiple social risk domains;[267] under program guidelines for the Population Health Program Accreditation (an optional program for interested employers), key area 4 on population assessment includes SDH as a key area for evaluation.[268]	----
National Institutes of Health	2017 announcement of 10 research grants to support social epigenomics research in health disparities;[269] National Institute on Minority Health and Disparities led a 2-year scoping project to develop new research to improve minority health and reduce health disparities.[270]	----
North American Spine Society	----	----
Office of the Assistant Secretary for Health, Office of Disease Prevention and Health Promotion	Healthy People 2020 Initiative has several objectives, including home quality, access, and environmental health;[271] disability and health;[272] and injury and violence prevention;[273] a new category in the 2020 initiative explicitly addresses SDH with a goal to "create social and	----

Appendix G Table 1. Professional Organizations' Statements and Methods Related to Social Risk or Social Determinants of Health

Organization (USPSTF Partners Shaded)	Social Risk/SDH Statements, Policies, Activities	Methods for Addressing Social Risk in Guidelines*
	physical environments that promote good health for all"; five key areas are economic stability, education, social and community context, health and healthcare, and neighborhood and built environment.[274]	
Patient-Centered Outcomes Research Institute	Includes "Addressing Disparities" as an active topic of research and investigation;[275] social risk issues addressed include race and ethnicity, income, health literacy, sex/gender, access to resources, and child/adolescent concerns; several in-process studies fully or partially addressing social risk factors and health-related outcomes; hosted an advisory panel on addressing disparities;[276] ongoing research to better inform caregivers, payers, and clinicians how to address social risk factors and/or disparities.	----
Society for Vascular Surgery	----	----
Society of Critical Care Medicine	----	----
Society of Gynecologic Oncology	----	----
Society of Hospital Medicine	----	----
Society of Interventional Radiology	----	----
Society of Nuclear Medicine and Molecular Imaging	----	----
Society of Thoracic Surgeons	----	----
Substance Abuse and Mental Health Services Administration	----	----

*For organizations that develop guidelines, we reviewed methods for guideline development as well as some recent guidelines of most relevance to the USPSTF (e.g., behavioral interventions, primary care screening).

Abbreviations: CME/MOC = Continuing Medical Education/Maintenance of Certification; CMS = Centers for Medicare & Medicaid Services; FAQ = frequently asked question; FDA = U.S. Food and Drug Administration; HbA1c = hemoglobin A1c; HHS = U.S. Department of Health and Human Services; SDH = social determinant of health; USPSTF = U.S. Preventive Services Task Force; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Appendix H. Excluded Studies

Reason for Exclusion	
E1.	Wrong study aim/irrelevant
E2.	Wrong setting – no link to the healthcare system
E2a.	Study country is not ranked as 'Very High' on the Human Development Index
E3.	Wrong intervention
E4.	Wrong population
E5.	No included social risk domains or components
E5a.	No additional relevant information
E6.	Wrong study design
E7.	Non-English study
E8.	Unable to locate article

1. Abbott LS, Elliott LT. Eliminating Health Disparities through Action on the Social Determinants of Health: A Systematic Review of Home Visiting in the United States, 2005-2015. Public Health Nurs. 2017;34(1):2-30. PMID: 27145717. https://dx.doi.org/10.1111/phn.12268 **GQ1E6,GQ2E6,GQ3E1**

2. Abbott S. Prescribing welfare benefits advice in primary care: is it a health intervention, and if so, what sort? J Public Health Med. 2002;24(4):307-12. **GQ1E6,GQ2E6,GQ3E6**

3. Adler NE, Glymour MM, Fielding J. Addressing Social Determinants of Health and Health Inequalities. Jama. 2016;316(16):1641-2. http://doi.org/10.1001/jama.2016.14058 **GQ1E6,GQ2E1,GQ3E1**

4. Aery A, Rucchetto A, Singer A, et al. Implementation and impact of an online tool used in primary care to improve access to financial benefits for patients: a study protocol. BMJ Open. 2017;7(10):e015947. https://dx.doi.org/10.1136/bmjopen-2017-015947 **GQ1E6,GQ2E6,GQ3E6**

5. Alderwick H, Hood-Ronick CM, Gottlieb LM. Medicaid Investments To Address Social Needs In Oregon And California. Health Aff (Millwood). 2019;38(5):774-81. **GQ1E1,GQ2E1,GQ3E1**

6. Allende-Richter SH, Johnson ST, Maloyan M, et al. A Previsit Screening Checklist Improves Teamwork and Access to Preventive Services in a Medical Home Serving Low-Income Adolescent and Young Adult Patients. Clin Pediatr (Phila). 2018;57(7):835-43. https://dx.doi.org/10.1177/0009922817733698 **GQ1E1,GQ2E1,GQ3E1**

7. Anderson-Reeves T, Goodman J, Bragg B, et al. House Parties: An Innovative Model for Outreach and Community-Based Health Education. Matern Child Health J. 2017;21(Suppl 1):75-80. https://dx.doi.org/10.1007/s10995-017-2378-9 **GQ1E5,GQ2E5,GQ3E5**

8. Andrews KG, Martin MW, Shenberger E, et al. Financial Support to Medicaid-Eligible Mothers Increases Caregiving for Preterm Infants. Maternal and Child Health Journal. 2020;24(5):587-600. **GQ1E1,GQ2E1,GQ3E1**
9. Arbaje AI, Wolff JL, Yu Q, et al. Postdischarge environmental and socioeconomic factors and the likelihood of early hospital readmission among community-dwelling Medicare beneficiaries. Gerontologist. 2008;48(4):495-504. https://doi.org/10.1093/geront/48.4.495 **GQ1E1,GQ2E1,GQ3E1**
10. 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. Psychiatr Serv. 2016;67(3):275-81. https://doi/org/10.1176/appi.ps.201400587 **GQ1E4,GQ2E4,GQ3E4**
11. Auger KA, Kahn RS, Simmons JM, et al. Using Address Information to Identify Hardships Reported by Families of Children Hospitalized With Asthma. Acad Pediatr. 2017;17(1):79-87. https://dx.doi.org/10.1016/j.acap.2016.07.003 **GQ1E4,GQ2E4,GQ3E4**
12. Bachrach D, Pfister H, Wallis KA, et al. Addressing Patients' Social Needs: An Emerging Business Case for Provider Investment. 2014. http://www.commonwealthfund.org/publications/fund-reports/2018/jan/social-inteventions-medicaid-managed-care-rate-setting. **GQ1E3,GQ2E3,GQ3E3**
13. Ballinger P. When sound housing advice leads to better health. Nurs Times. 1996;92(43):36-7. **GQ1E6,GQ2E1,GQ3E1**
14. Banegas M. Evaluation of a Novel Financial Navigator Pilot to Address Patient Concerns about Medical Care Costs. The Permanente Journal. 2019. **GQ1E5,GQ2E5,GQ3E5**
15. Bassuk EL, DeCandia CJ, Tsertsvadze A, et al. The effectiveness of housing interventions and housing and service interventions on ending family homelessness: A systematic review. Am J Orthopsychiatry. 2014;84(5):457-74. **GQ1E6,GQ2E1,GQ3E1**
16. Batista R, Pottie K, Bouchard L, et al. Primary Health Care Models Addressing Health Equity for Immigrants: A Systematic Scoping Review. J Immigr Minor Health. 2018;20(1):214-30. PMID: 27858278. https://dx.doi.org/10.1007/s10903-016-0531-y **GQ1E5,GQ2E5,GQ3E5**
17. Bayer R, Johns DM. Screening for Social Determinants of Health. Jama. 2016;316(23):2551-2. https://doi.org/10.1001/jama.2016.16922 **GQ1E6,GQ2E6,GQ3E1**
18. Beavis AL, Sanneh A, Stone RL, et al. Basic social resource needs screening in the gynecologic oncology clinic: a quality improvement initiative. American Journal of Obstetrics and Gynecology. 2020;223(5):735.e1-.e14. **GQ1E4,GQ2E4,GQ3E4**

19. Begley CE, Dowd CM, McCandless R. A cost-effectiveness evaluation of primary health care projects for the poor. Eval Health Prof. 1989;12(4):437-52. **GQ1E3,GQ2E3,GQ3E3**

20. Bell ON, Hole MK, Johnson K, et al. Medical-Financial Partnerships: Cross-Sector Collaborations Between Medical and Financial Services to Improve Health. Acad Pediatr. 2020;20(2):166-74. **GQ1E6,GQ2E1,GQ3E1**

21. Berenguera A, Pons-Vigues M, Moreno-Peral P, et al. Beyond the consultation room: Proposals to approach health promotion in primary care according to health-care users, key community informants and primary care centre workers. Health Expect. 2017;20(5):896-910. https://dx.doi.org/10.1111/hex.12530 **GQ1E6,GQ2E6,GQ3E1**

22. Berkowitz SA, Edwards ST, Polsky D. Cash Benchmarking For Integrated Health Care And Human Services Interventions: Finding The Value Added. Health Aff (Millwood). 2020;39(4):582-6. **GQ1E6,GQ2E1,GQ3E1**

23. Berkowitz SA, Hulberg AC, Hong C, et al. Addressing basic resource needs to improve primary care quality: a community collaboration programme. BMJ Qual Saf. 2016;25(3):164-72. http://doi.org/10.1136/bmjqs-2015-004521 **GQ1E6,GQ2E6,GQ3E6**

24. Berkowitz SA, Hulberg AC, Standish S, et al. Addressing Unmet Basic Resource Needs as Part of Chronic Cardiometabolic Disease Management. JAMA Intern Med. 2017;177(2):244-52. http://doi/org/10.1001/jamainternmed.2016.7691 **GQ1E4,GQ2E4,GQ3E4**

25. Berkowitz SA, O'Neill J, Sayer E, et al. Health Center–Based Community-Supported Agriculture: An RCT. American Journal of Preventive Medicine. 2019;57(6):S55-S64. **GQ1E4,GQ2E4,GQ3E4**

26. Berkowitz SA, Seligman HK, Rigdon J, et al. Supplemental Nutrition Assistance Program (SNAP) Participation and Health Care Expenditures Among Low-Income Adults. JAMA Intern Med. 2017;177(11):1642-9. http://doi.org/10.1001/jamainternmed.2017.4841 **GQ1E2,GQ2E2,GQ3E2**

27. Berman RS, Patel MR, Belamarich PF, et al. Screening for Poverty and Poverty-Related Social Determinants of Health. Pediatr Rev. 2018;39(5):235-46. https://dx.doi.org/10.1542/pir.2017-0123 **GQ1E6,GQ2E1,GQ3E1**

28. Bickerdike LA-O, Booth A, Wilson PA-O, et al. Social prescribing: less rhetoric and more reality. A systematic review of the evidence. (2044-6055 (Electronic)). PMID: PMC5558801. http://dx.doi.org/10.1136/bmjopen-2016-013384 **GQ1E5,GQ2E5,GQ3E5**

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31. Biel M, Evans SH, Clarke P. Forging links between nutrition and healthcare using community-based partnerships. Fam Community Health. 2009;32(3):196-205. https://dx.doi.org/10.1097/FCH.0b013e3181ab3a98 **GQ1E5,GQ2E5,GQ3E5**

32. Bielaszka-DuVernay C. The 'GRACE' model: in-home assessments lead to better care for dual eligibles. Health Aff (Millwood). 2011;30(3):431-4. http://doi/org/10.1377/hlthaff.2011.0043 **GQ1E5,GQ2E5,GQ3E5**

33. Bikson K, McGuire J, Blue-Howells J, et al. Psychosocial problems in primary care: patient and provider perceptions. Soc Work Health Care. 2009;48(8):736-49. https://dx.doi.org/10.1080/00981380902929057 **GQ1E1,GQ2E1,GQ3E1**

34. Blickem C, Kennedy A, Jariwala P, et al. Aligning everyday life priorities with people's self-management support networks: an exploration of the work and implementation of a needs-led telephone support system. BMC Health Serv Res. 2014;14:262. https://dx.doi.org/10.1186/1472-6963-14-262 **GQ1E4,GQ2E4,GQ3E4**

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39. Bonney J, Chang DI. Community Care Coordination Systems: Connecting Patients to Community Services. AcademyHealth Robert Wood Johnson Foundation Nemours Children's Health System; 2018. **GQ1E6,GQ2E1,GQ3E1**

40. Boutwell AE, Johnson MB, Watkins R. Analysis of a Social Work-Based Model of Transitional Care to Reduce Hospital Readmissions: Preliminary Data. J Am Geriatr Soc. 2016;64(5):1104-7. http://doi/org/10.1111/jgs.14086 **GQ1E5,GQ2E5,GQ3E5**

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45. Buchman S. Screening for poverty in family practice. Can Fam Physician. 2012;58(6):709, 10. **GQ1E5,GQ2E5,GQ3E5**

46. Burger J. A place in the community: partners with the poor. J Christ Nurs. 2008;25(1):26-33. **GQ1E6,GQ2E6,GQ3E6**

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48. Byers JB. Evaluation of a Case-Managed System of Primary Care for Indigent Children. Society for the Study of Social Problems; 00, 1988. 121820181988. **GQ1E8,GQ2E8,GQ3E8**

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58. Chan WS, Whitford DL, Conroy R, et al. A multidisciplinary primary care team consultation in a socio-economically deprived community: an exploratory randomised controlled trial. BMC Health Serv Res. 2011;11:15. https://dx.doi.org/10.1186/1472-6963-11-15 **GQ1E5,GQ2E5,GQ3E5**

59. Chase J, Bilinski J, Kanzaria HK. Caring for Emergency Department Patients With Complex Medical, Behavioral Health, and Social Needs. Jama. 2020;324(24):2550-1. https://dx.doi.org/10.1001/jama.2020.17017 **GQ1E4,GQ2E4,GQ3E4**

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61. Cheadle A, Senter S, Procello A, et al. The California wellness foundation's Health Improvement Initiative: evaluation findings and lessons learned. Am J Health Promot. 2005;19(4):286-96. **GQ1E3,GQ2E3,GQ3E3**

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