Social Needs Resource Connections: A Systematic Review of Barriers, Facilitators, and Evaluation

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Abstract

Introduction: Healthcare organizations increasingly are screening patients for social needs (e.g., food, housing) and referring them to community resources. This systematic mixed studies review assesses how studies evaluate social needs resource connections and identifies patient- and caregiver-reported factors that may inhibit or facilitate resource connections.

Methods: Investigators searched PubMed and CINAHL for articles published from October 2015 to December 2020 and used dual review to determine inclusion based on a priori selection criteria. Data related to study design, setting, population of interest, intervention, and outcomes were abstracted. Articles' quality was assessed using the Mixed Methods Appraisal Tool. Data analysis was conducted in 2021.

Results: The search identified 34 articles from 32 studies. The authors created a taxonomy of quantitative resource connection measures with 4 categories: whether participants made contact

with resources, received resources, had their social needs addressed, or rated some aspect of their experience with resources. Barriers to resource connections were inadequacy, irrelevancy, or restrictiveness; inaccessibility; fears surrounding stigma or discrimination; and factors related to staff training and resource information sharing. Facilitators were referrals' relevancy, the degree of support and simplicity embedded within the interventions, and interventions being comprehensive and inclusive.

Discussion: This synthesis of barriers and facilitators indicates areas where healthcare organizations may have agency to improve the efficacy of social needs screening and referral interventions. The authors also recommend that resource connection measures be explicitly defined and focus on whether participants received new resources and whether their social needs were addressed.

INTRODUCTION

Numerous health disciplines, including public health and primary care, have long recognized the interconnections among social justice, social conditions, and health outcomes.[1–3] Recently, the healthcare sector revitalized "an explosion of interest"[4] in both identifying patients' social risks (e.g., housing instability and food insecurity) and addressing patients' social needs (the social risks they wish to have addressed).[5] In the U.S., this renewed focus on healthcare-based social interventions corresponds with an ongoing shift toward value-based care, reflecting the intentions of multiple policies and incentives, especially the Affordable Care Act, to foster better care, better health, and lower costs.[6–9] The coronavirus disease 2019 (COVID-19) pandemic further accelerated these efforts by highlighting and exacerbating longstanding social injustices that cause health disparities.[10–13]

Healthcare-based social interventions encompass a wide range of contexts and approaches and may potentially improve patients' health through a variety of mechanisms, including by connecting patients with resources to decrease their unmet social needs.[14,15] In the U.S., prominent organizations—especially the American Academy of Pediatrics and the American Academy of Family Physicians[16]—and initiatives have been influential in promoting screening and referral strategies to facilitate access to resources. For example, since 2015, the American Academy of Pediatrics has recommended pediatricians implement routine screening and referral interventions for food insecurity.[16,17] Likewise, the Centers for Medicare & Medicaid Services is currently testing whether systematically identifying social risks and addressing social needs among Medicare and Medicaid beneficiaries can reduce healthcare costs and utilization through their Accountable Health Communities model.[18]

A key component of healthcare-based social interventions is facilitating resource connections for patients, yet the idea of what a "resource connection" entails is neither straightforward nor universally understood by healthcare organizations. For example, it may refer to a patient speaking with a staff member at a food bank, enrolling in a program to receive food boxes, or acquiring sufficient food through having received food boxes. Definitions matter because they inform how organizations design interventions and evaluate their impact. As health systems increasingly respond to patients' social needs, clarifying the range of "resource connection" definitions currently in use (as well as their potential

advantages and drawbacks) is critical. Additionally—regardless of the definition(s) an organization selects—it is vital to understand what factors patients say do or do not allow them to connect with needed resources.

Therefore, the authors conducted a systematic mixed studies review (SMSR)[19,20] of social needs screening and referral interventions to: (1) assess the ways in which healthcare organizations define—and subsequently measure—resource connections, and (2) identify patient-reported factors that may inhibit or facilitate all types of resource connections. An SMSR follows the same guidelines as a traditional systematic review, but places greater emphasis on synthesizing results across diverse study designs. This type of review may be particularly helpful when synthesizing "complex and highly context-sensitive interventions."[19] An SMSR was salient for this project, as the authors knew a priori that articles would include diverse contexts, study designs, populations of interest, and interventions.[21]

METHODS

Data Sources and Search Strategy

The review followed PRISMA guidelines and is registered in PROSPERO (CRD42021232123). Working with a health sciences librarian, the authors developed search strategies for MEDLINE and CINAHL databases. They identified a combination of subject terms and keywords for each of 3 concepts: screening, social needs, and referral. These concepts were combined using "AND" to ensure inclusion of all 3 concepts. The search was restricted to English-language studies published from October 2015 (when the American Academy of Pediatrics began recommending pediatricians screen for food insecurity)[22] through December 23, 2020. The full search strategy for MEDLINE is available as Appendix Table 1. The authors identified additional articles through the Social Interventions Research & Evaluation Network Evidence & Resource Library.[23]

Study Selection and Eligibility Criteria

Articles were imported into EndNote, version X9 software and duplicates were removed. Two authors (ASR and KB) independently reviewed titles and abstracts for inclusion or exclusion based on the protocol. The same authors read the full texts of the remaining articles, again using the protocol to make inclusion and exclusion decisions. At both stages, the authors compared their choices and resolved any points of confusion or disagreement. Included articles assessed U.S. healthcare-based social needs screening and referral interventions. Interventions screened patients or caregivers for 1 of 5 domains from the Accountable Health Communities Health-Related Social Needs Screening Tool: housing, food, transportation, utilities, and safety.[24] Most social needs screening tools include these domains.[25] "Referral" meant any attempt to link participants with needed resources, such as by providing a resource sheet or facilitating a handoff to a community-based organization (CBO). Referrals did not need to depend on screening results. Finally, articles had to report quantitative or qualitative outcomes on participants' ability to access resources or have their social needs addressed. Qualitative outcomes needed to come from patients or

caregivers who had participated in an intervention. As the review emphasized material resource connections, studies focusing exclusively on interpersonal safety were excluded.

Data Abstraction, Analysis, and Quality Appraisal

The authors abstracted information on study design, setting, population, intervention, and outcomes into a spreadsheet. The raw data are available from the lead author upon request. The analytic process was inductive, iterative, and applied a parallel-results convergent synthesis design, an optional synthesis approach for SMSRs.[20] First, 1 author (ASR) reviewed abstracted data for the outcomes of interest at the level of individual studies (i.e., resource connection measures, barriers, and facilitators) using codes generated directly from the text. In a second pass, ASR identified emerging themes across studies.[26] Initial codes and themes were shared with the senior author (MD), practitioners of healthcare-based social interventions, and an expert in the field for further validation. Next, 3 authors (ASR, MD, and KB) used negative case analysis[27]—a process in which a theory is proposed and then tested and refined based on the data—to categorize resource connection measures into a taxonomy. Regarding barriers and facilitators to resource connections, the same 3 authors collaborated to summarize the breadth and prevalence of themes initially developed by ASR.

Authors used the Mixed Methods Appraisal Tool (MMAT) to assess articles' quality.[28] The MMAT assesses 5 types of designs: quantitative descriptive, non-randomized, RCTs, qualitative, and mixed methods. Reviewers identified the study type and then assessed 5 corresponding methodological criteria, rating each as "yes," "no," or "can't tell." The MMAT recommends against quality scores, as this can obscure patterns in the types of weaknesses or strengths that exist.[28] One author (ASR) completed quality appraisals for all included studies. A second individual (either AT or a research assistant) independently completed second quality appraisals for a subset of the articles. The 2 quality appraisers for each article met to compare their work and draw conclusions through dialogue and consensus.

RESULTS

Two authors (ASR and KB) reviewed 1,826 unique abstracts, of which 118 articles underwent full-text review. Eighty-four articles were excluded because of interventions or outcomes being out of scope. Thirty-four articles met inclusion criteria (Figure 1) that report results from 32 studies.

Mixed Methods Appraisal Tool Results

Included articles encompassed diverse study designs, including descriptive (n=14),[29–42] qualitative (n=9),[43–51] articles with descriptive and qualitative components (n=2),[52,53] explicitly mixed methods (n=4),[54–57] RCTs (n=4),[58–61] and a non-randomized approach (n=1).[62] Appendix Table 2 provides each article's full MMAT assessment. The majority of articles adhered with all or most of their respective quality criteria on the MMAT, though descriptive studies appeared particularly prone to selection biases.

Study Participants and Settings

As summarized in Appendix Table 3, 16 studies focused on caregivers of pediatric patients,[29,31,33,34,38,39,42,43,47,48,51–53,56,58–61] 12 focused on adults,[30,37,40,44–46,49,50,54,55,57,62] 3 appeared to include participants of all ages,[35,36,41] and 1 focused on adolescents.[32] Some articles further incorporated participants with certain characteristics, including veterans,[30,44,55] adults with diabetes,[40,46] and children with certain chronic diseases.[34,42] Common exclusion criteria were language (e.g., non-English or Spanish speakers) and health status (e.g., severe illness).

The studies represented many healthcare settings (Appendix Table 3), including community health centers, federally qualified health centers, specialty clinics, emergency departments, and others. Twenty-three studies (72%) came from 5 states (California, Massachusetts, Pennsylvania, Minnesota, and New York) and most studies (n=20, 63%) were conducted in urban environments.

Screening and Resource Connection Strategies

As shown in Table 1, a total of 12 studies (38%) concentrated on food insecurity, using either the Hunger Vital Sign™ or U.S. Household Food Security Survey Module screening tools.[29,31,36,37,41–43,46–48,52,54,56] Three studies (9%) focused on housing instability, using the Homelessness Screening Clinical Reminder.[30,44,55] The remaining 17 studies (53%) identified multiple social needs using 8 screening tools, the most common being modifications of a tool developed by Health Leads (n=7 studies).[33,35,39,45,50,57,62] All tools with multiple social needs included food and housing and several included child care, transportation, employment, finances, and utilities.

In 14 studies (44%), participants appeared to complete the screening for themselves, either through paper, tablet, or a web-based platform (Table 1).[29,31,32,34,37–39,42,45,47,51,53,57,59] In many cases, healthcare staff were available to support completion when challenges arose (e.g., comprehension, literacy, vision). The screening was administered verbally for 12 studies (38%), either in person or by phone.[30,36,40,41,44,46,48,54–56,58,60–62] In 5 studies (16%), the screenings were both self- and staff-administered.[33,35,43,50,52]

The authors identified 4 types of referral/resource connection strategies (Table 1). Approximately 30% of studies applied >1 type of strategy. These strategies included 1-to-1 navigation support, the provision of written materials or resource sheets, a community partner facilitating the resource connections, and other community collaboration or on-site resources. The authors defined 1-to-1 navigation support as personalized assistance to understand and connect with relevant resources; varied types of healthcare staff or trained volunteers provided this help. Sixteen studies (50%) used 1-to-1 navigation support, most of which screened for multiple social needs.[32,33,35,37–40,45,46,50,51,54,57,58,60–62] Ten studies (31%) provided written materials or resources sheets.[29,32,34,40,43,46,47,53,58,59] Eight studies (25%), all of which focused on food insecurity, worked with a community partner who was responsible for facilitating the resource connections.[31,36,41–43,48,52,54,56] Finally, 7 studies (22%) described additional types of community partnerships or offered on-site resources.[37–39,46,47,51,54]

Resource Connection Outcome Measures

Twenty-five studies included diverse quantitative outcome measures related to participants' (i.e., patients or caregivers) social needs resource reconnections. The authors created a taxonomy of these measures, classifying them into 4 categories (Table 2).

Most studies with quantitative outcomes discussed resource connections as participants having made contact with services or organizations (*n*=22, 88%).[29–42,46,52–56,59,62] This was stated explicitly in most cases. For example, the number of participants who were "successfully contacted by [the community partner]"[41] or reported that more intervention than control group participants "had contacted a community resource."[59] At other times, resource connections were indicated despite ambiguous language used by the study authors. For example, the percentage of participants who "received services"[55] or "successfully utilized program-provided resources."[38]

Fewer studies (*n*=13, 52%) provided evidence for whether participants enrolled in or received new services.[31,33,35–37,39–42,46,52,56,59] This mostly occurred in the food-related studies, which often reported on whether or not participants enrolled in the Supplemental Nutrition Assistance Program (SNAP). Other studies provided specific details around what types of resources participants appeared to access through the intervention. Garg et al.[59] reported a higher proportion of participants in the intervention group enrolled in a job training program, enrolled children in child care, and were receiving fuel assistance.

Six studies (24%) included outcomes on whether participants' social needs resolved, which may or may not have been attributed to the intervention.[32,33,35,57,58,60,61] Hassan and colleagues[32] provided information regarding the percentage who "reported resolution of their top-priority problem." Berkowitz et al.[57] collected pre- and post-intervention data regarding the types of needs, and reported whether there were significant decreases in the prevalence of each need. Two RCTs by Gottlieb et al. examined changes in the number and types of "social needs"[60,61] or "social risk factors."[58] For example, Gottlieb and colleagues[60,61] found significant reductions in social needs for intervention versus control groups.

Finally, 2 studies included quantitative outcome measures that seemed to reflect an aspect of participants' experiences with the resources. Bottino et al.[29] asked participants whether they were getting "[none, a little, most, or all] of the help they needed with their referral selection." And Power-Hays and colleagues[34] reported on the percentage who found organizations to be "helpful."

Participant-Reported Barriers and Facilitators to Resource Connections for Social Needs

Table 3 summarizes participant-reported barriers and facilitators to resource connections across the qualitative components of the studies. Results also include the ways in which additional sources of data from the studies (e.g., quantitative data, clinicians' perspectives) corroborate and expand upon participants' perspectives.

The most frequent participant-reported barrier included the resources being inadequate or irrelevant. Inadequacy related to a lack of resources in the community (e.g., housing)[45,50]

or the resources offered not being tailored to or adequately addressing participants' social needs.[44–46,48,51,52,54,57] For example, an inability to take advantage of food resources owing to not having a place to cook[46] or food resources not being tailored to medical recommendations.[54] A related barrier was restrictive eligibility criteria.[44,45,48,54] Articles with quantitative outcomes also found participants disclosing food insecurity, but being ineligible for or already enrolled in in SNAP.[31,36,41,42,52]

Multiple factors related to resource inaccessibility. Broadly, participants discussed challenges of navigating complex systems and applications,[44,45,48,49] including delayed or absent resource follow-up.[51,54] Inaccessibility also included mobility and transportation. Those with certain diseases or disabilities reported difficulty in accessing services[45,57] and resources were sometimes geographically inconvenient.[43,46,47,50] Other barriers were language or literacy inaccessibility.[45,50,54,57] Zhu et al.[50] reported that participants described language barriers when filling out social services forms. In a descriptive study, Spanish speakers had significantly lower odds of successfully acquiring resources compared with English speakers in 3 of 4 examined regions.[33] Finally, participants' competing demands inhibited accessibility (e.g., not having child care).[43,46,47,49,50,54,57]

Studies discussed participants' concerns around stigma or discrimination in relation to both disclosure of social needs, as well as pursuing resource referrals.[43,45,46,52] In particular, 2 studies (1 from participants' and 1 from clinicians' perspectives) pointed out fear due to immigration policies.[46,52] In another study, a participant-reported systems barrier was immigration status and policies.[45] One descriptive study explicitly examined disparities related to immigration status. It found families with a non-U.S. citizen were most likely to be lost to follow-up, but were also most likely to utilize resources if they did engage.[38]

Some participants noted unsatisfactory experiences with healthcare or social services personnel. One study described mistreatment,[52] but most reported staff not having the necessary knowledge, skills, or time to support with resource connections.[44,45,49] A descriptive study found the type of professional conducting the screening was associated with participants receiving services.[55] Other barriers were resource information sharing and perceived information quality. Information retention, misplacing resource sheets, and participants inconsistently being told about resources may have inhibited connections.[43,44,46,47,49,53,54] Additionally, participants reported low-quality information, such as when resources were out of date or hyperlinks were nonfunctional.[45,57]

A finding across many studies was participants' desire for referrals relevant to their needs and contexts.[46,48,50,51,53,54,57] This included referrals to resources that existed in the community, that were geographically convenient, for which participants met the eligibility criteria, and that adequately aligned with the needs disclosed. For example, 2 articles indicated the importance of food resources beyond SNAP,[48,54] especially given some participants already receiving SNAP remained food insecure. Two similar RCTs compared the effectiveness of resource sheets (control group) versus navigation (intervention group) in decreasing participants' social needs.[58,60] Whereas the first study only found decreases in the intervention group, the second found decreases in both groups. Authors speculated this might have occurred because of improved resource sheets in the second study, with better

updated information, listing contact names at the relevant agencies, and highlighting the resources that most aligned with participants' priorities.[58]

Patients and caregivers shared the importance of receiving help navigating systems and enrolling in services,[44,45,48–50,52,54] including effective communication to establish trust and rapport. Similarly, participants expressed a desire for prompt, simple, and convenient follow-ups.[44,46,51] In 2 of the descriptive articles, more follow-ups were associated with "successful referrals"[39] and "optimally successful resource connections."[35] In 1 of these studies, outreach occurring within 30 days from the start of the intervention was associated with a higher proportion of "successful referrals."[39] Participants also suggested receiving resource information in one form versus another (e.g., electronic versus printout) could ease connections.[43,44]

Final facilitating factors addressed the kinds of resources offered and who is helped. A finding by Berkowitz and colleagues[57] described "nonlinearity" between which resources addressed which needs. For instance, getting help with medication costs could free up monies for food. This may suggest an advantage of offering resources for multiple needs. In 2 studies, participants suggested resources be advertised to everyone versus only those with positive screening results.[43,53] This recommendation is supported by quantitative findings from Bottino et al.[29] that 14.7% of participants selected referrals despite not disclosing food insecurity.

DISCUSSION

Although a number of reviews explore various facets of healthcare-based social interventions,[21,63–68] this is the first to focus squarely on resource connections across varied social needs. The review makes 3 notable contributions: a taxonomy of resource connection measures, a synthesis of patient- and caregiver-reported barriers and facilitators to resource connections, and the application of an SMSR approach that may be useful for both practitioners and researchers.

Taxonomy of Resource Connection Measures

The findings on resource connection measures indicate most of the included studies had outcomes about whether participants contacted services or organizations, and fewer provided details on participants' ability to enroll in or receive new services, success with addressing social needs, or experiences with resource connection processes. Additionally, vague language in some of the studies made process measures difficult to interpret or categorize. As others have pointed out, a key aspect of determining whether healthcare-based social interventions improve participants' health is first establishing whether the interventions perform as intended.[15,21] As screening and referral programs are meant to link participants with resources that will address their needs, the authors argue study designs and measures demonstrating enrollment in new services and whether needs are reduced are likely the most meaningful outcomes. By identifying distinct forms of resource connections, the review's taxonomy may help lay the groundwork for future comparative work, including meta-analyses, on the extent to which screening and referral interventions connect patients with resources.

Synthesis of Participant-Reported Barriers and Facilitators to Resource Connections

The barriers and facilitators synthesis suggests areas where healthcare organizations may have agency to improve the likelihood of success across all components of the resource connection taxonomy: making contact with CBOs, enrolling in services, getting needs resolved, and having a good experience with the process at large. Namely—given the complexity of U.S. healthcare and social services systems, the priorities that patients and caregivers are juggling, and stigma and discrimination concerns—the authors recommend simplicity, accessibility, adequate training for healthcare teams, and more CBO partnerships. Interventions could minimize the number of handoffs and follow up quickly with participants. Healthcare organizations could consider whether programs are inclusive of those with limited English proficiency, low health literacy, disabilities, and other factors that may inhibit accessibility. It is also crucial referrals be tailored to the unique needs and preferences of participants to the extent possible. This includes referrals corresponding with social needs, being geographically convenient, and for which participants are eligible. Adequate training for healthcare personnel, both in terms of communication skills (e.g., empathic inquiry)[69] and an understanding of local resources, could also enhance connections. This is particularly salient for easing participants' legitimate concerns around stigma or discrimination (e.g., fears related to child welfare involvement or immigration policies),[70,71] which could impact decisions to pursue referrals. Finally, many studies in this review did not describe CBO partnerships, a critical dimension given these are likely crucial for improving connections.[68,72,73] Future research could focus on effective collaboration strategies and how to overcome structures that make health and social services organizations reluctant to collaborate.[74]

Results around the frequent unavailability and inadequacy of resources also reaffirm the limits of healthcare organizations to address participants' social needs without major upstream investments in public health initiatives and policies.[75,76] As healthcare settings collect more data about resource gaps within their communities, the authors suggest they advocate for population-level investments to improve the conditions in which people live.[77] In that regard, it is notable that few studies in the review explicitly included rural areas, which often experience a scarcity of healthcare and social services resources.[76,78,79]

Though the review focuses on barriers and facilitators at the point when participants had disclosed social risks and consented to receive help with social needs, other researchers have noted the importance to understanding what affects connections along the entire "pathway" of screening and referral interventions; there are other instances in which "drop-offs" in participant engagement occur (A Schweitzer, Senior Fellow, Mossavar-Rahmani Center for Business & Government, Harvard Kennedy School, unpublished work, 2021). For example, many studies report drop-offs in terms of participants declining resource navigation assistance after having disclosed social risks.[80] Also, interventions only including certain groups (e.g., those with medical complexity) are prone to bias and may overlook people who would otherwise benefit.[81]

Systematic Mixed Studies Review Approach

A third contribution is the use of an SMSR approach to highlight the ways in which findings garnered from diverse methodologies coalesced around the topic of interest. To avoid privileging one form of evidence over another, the authors used the MMAT[28] to assess the quality of study designs in their own right, keeping in mind that all methodologies operate through distinct epistemologies[82] and inform different aspects of theory creation and practice. Although RCTs are frequently identified as the gold standard when it comes to establishing causality, other study designs are also vital for understanding real-world applications of complex interventions across multiple contexts.[83–87] Instead of jumping to whether healthcare-based social interventions connect patients and caregivers with needed resources, an SMSR approach prompted and allowed the authors to explore the paradigmatically pragmatic[88] questions of how to meaningfully define "resource connections" and why resource connections may or may not be successful across diverse contexts. Owing to the highly complex nature of healthcare-based social interventions, other researchers may find an SMSR approach to be beneficial for their research questions.

Limitations

The review has 2 primary limitations. First, by focusing on interventions with a screening component, studies using alternative strategies to link participants with resources (e.g., "CommunityRx")[89,90] were excluded. All approaches to resource connections merit exploration, but the authors narrowed the scope to screening and referral interventions given their current prominence across various healthcare organizations and initiatives. Second, the search terms and strategy removed certain types of information that are likely salient for better understanding this topic, including evidence from the gray literature, articles published outside the U.S., and those published before October 2015. Regarding the cut-off date, this decision would have been more problematic had the authors intended to perform a meta-analysis. Instead, the goal was to synthesize current evaluation approaches and narratives, beginning at a time when there was a notable momentum shift surrounding these interventions. Lastly, although authors consulted with a health sciences librarian, it is possible that different or additional search terms may have identified more studies.

CONCLUSIONS

As healthcare organizations increasingly develop interventions to connect patients and caregivers with resources for social needs, the review summarizes current efforts and offers specific recommendations regarding design and evaluation. To the extent that is feasible, organizations should be thoughtful about how to create programs that are simple, accessible, and incorporate adequate training for all healthcare personnel involved. Evaluation measures of resource connection should be clearly stated, and ideally focus on whether participants accessed new resources and whether the resources were able to address their needs. Effective partnerships with CBOs may increase the likelihood of both resource connections and the ability to track outcomes. Finally, advocacy for upstream public health policies is critical to the success of healthcare-based social interventions, as a primary challenge for health care is to connect patients when resources are not available in their local communities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

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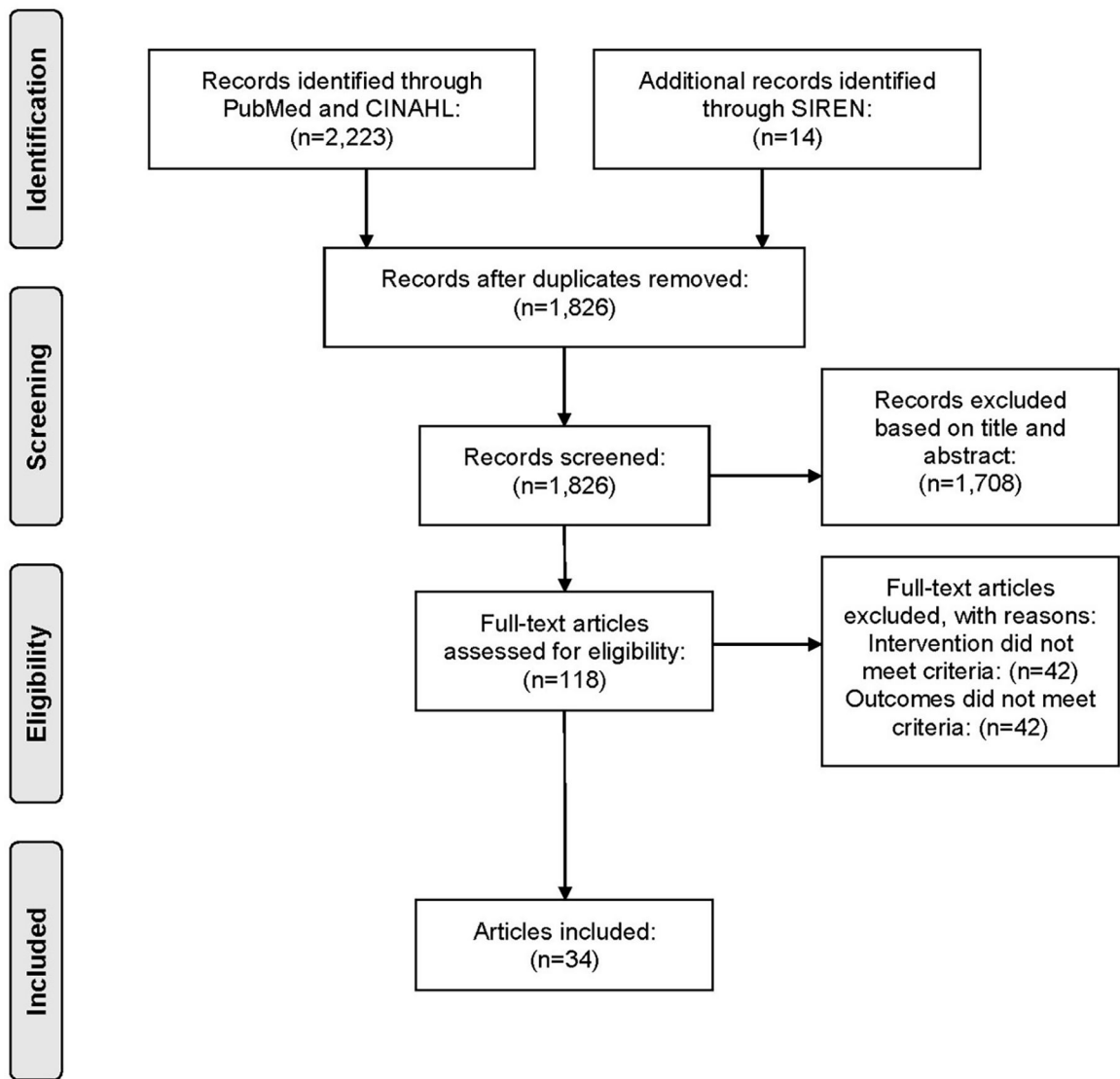**Figure 1.**
PRISMA flow diagram.
CINAHL, Cumulative Index to Nursing and Allied Health Literature; SIREN, Social Interventions Research & Evaluation Network.

Table 1.

Screening and Resource Connection Strategies (n=32 studies)

Author/year	Screening		Resource connection strategy				
	Screening tool	Screening process[a]	One-to-one navigation support	Written materials/resource sheets	Community partner facilitates resource connections	Other community partner or resources on-site	Unclear or inconsistent connection strategy
Marpadga (2019)[46]	Hunger Vital Sign	Healthcare personnel[a]	X	X		X	
Swavely (2019)[54]	Hunger Vital Sign	Healthcare personnel	X		X	X	
Cullen (2020)[43]	Hunger Vital Sign	Healthcare personnel OR Participants[a]		X	X		
Orr (2019)[47]	Hunger Vital Sign	Participants		X		X	
Fox (2016)[31]	Hunger Vital Sign	Participants			X		
Fritz (2020)[42]	Hunger Vital Sign	Participants			X		
Martel (2018)[41]	Hunger Vital Sign	Healthcare personnel			X		
Knowles (2018)[52]	Hunger Vital Sign	Healthcare personnel OR Participants			X		
Palakshappa (2017a)[56] Palakshappa (2017b)[48]	Hunger Vital Sign	Healthcare personnel			X		
Smith A (2020)[36]	Hunger Vital Sign	Healthcare personnel			X		
Smith S (2017)[37]	U.S. Household Food Security Survey Module	Participants	X			X	
Bottino (2017)[29]	U.S. Household Food Security Survey Module (Embedded within Online Advocate, now HelpSteps)	Participants		X			
Hassan (2015)[32]	HelpSteps (Online Advocate)	Participants	X	X			
Cusack (2020)[44]	Homelessness Screening Clinical Reminder (HSCR)	Healthcare personnel					X
Fargo (2017)[30]	HSCR	Healthcare personnel					X
Montgomery (2020)[55]	HSCR	Healthcare personnel					X
Berkowitz (2019)[57]	Health Leads	Participants	X				
Fiori (2020)[39]	Health Leads	Participants	X			X	

	Screening		Resource connection strategy				
Author/year	**Screening tool**	**Screening process** [a]	**One-to-one navigation support**	**Written materials/ resource sheets**	**Community partner facilitates resource connections**	**Other community partner or resources on-site**	**Unclear or inconsistent connection strategy**
Hsu (2020)[45]	Health Leads	Participants	X				
Polk (2020)[33]	Health Leads	Healthcare personnel OR Participants	X				
Manian (2020)[35]	Health Leads	Healthcare personnel OR Participants	X				
Schickedanz (2019)[62]	Health Leads	Healthcare personnel	X				
Zhu (2020)[50]	Two different tools, both inspired by Health Leads	Healthcare personnel OR Participants	X				
Garg (2015)[b][59]	WE CARE	Participants		X			
Power-Hays (2019)[34]	WE CARE	Participants		X			
Emengo (2020)[51]	Social Health Alliance to Promote Equity (SHAPE) (Formerly "Family Needs")	Participants	X			X	
Uwemedimo (2018)[38]	Social Health Alliance to Promote Equity (SHAPE) (Formerly "Family Needs")	Participants	X			X	
Gottlieb (2020)[b][58]	18-item social risk screening questionnaire (iScreen)	Healthcare personnel	X	X			
Gottlieb (2018)[b][61] Gottlieb (2016)[b][60]	14-item social and mental health needs questionnaire (iScreen)	Healthcare personnel	X				
Nguyen (2016)[40]	7-item social needs checklist	Healthcare personnel	X	X			
Ray (2020)[53]	59-item survey (7 questions related to social needs)	Participants		X			
Hamity (2018)[49]	Your Current Life Situation (YCLS) tool	Unclear					X
Total			16	10	8	7	4

[a] Screening process = Person who administered the screening; Healthcare personnel = People administering the screening to the participants (i.e., study team members, healthcare personnel, volunteers); Participants = Patients or caregivers completed the screening tool on their own.

[b] For the RCTs, the table reflects what appeared to be done for the intervention groups.

Table 2.

Taxonomy of Quantitative Resource Connection Outcome Measures (n=25 studies)

Author/year	Whether made contact with a service / organization	Whether enrolled in or received new services	Whether social needs were addressed	Participants' ratings of their experiences with resources
Fargo (2017)[30]	X			
Montgomery (2020)[55]	X			
Ray (2020)[53]	X			
Schickedanz (2019)[62]	X			
Uwemedimo (2018)[38]	X			
Swavely (2019)[54]	X			
Power-Hays (2019)[34]	X			X
Bottino (2017)[29]	X			X
Fiori (2020)[39]	X	X		
Garg (2015)[59]	X	X		
Nguyen (2016)[40]	X	X		
Fox (2016)[31]	X	X		
Knowles (2018)[52]	X	X		
Palakshappa (2017a)[56]	X	X		
Marpadga (2019)[46]	X	X		
Smith S (2017)[37]	X	X		
Fritz (2020)[42]	X	X		
Martel (2018)[41]	X	X		
Smith A (2020)[36]	X	X		
Polk (2020)[33]	X	X	X	
Manian (2020)[35]	X	X	X	
Hassan (2015)[32]	X		X	
Berkowitz (2019)[57]			X	
Gottlieb (2020)[58]			X	

Author Manuscript   Author Manuscript   Author Manuscript   Author Manuscript

Author/year	Whether made contact with a service / organization	Whether enrolled in or received new services	Whether social needs were addressed	Participants' ratings of their experiences with resources
Gottlieb (2018)[61] Gottlieb (2016)[60]			X	

Table 3.

Participant-Reported[a] Barriers and Facilitators to Resource Connections (n=13)

Barriers
Inadequate, Irrelevant, Restrictive
• Inadequacy or irrelevancy of the resources offered and/or existing resources in the community.[44-46,48,50-52,54,57]
• Restrictive eligibility criteria.[44,45,48,54]
Inaccessible
• Navigating complex systems.[44,45,48,49,51,54]
• Physical inaccessibility (e.g., transportation barriers, medical complexity).[43,45-47,50,57]
• Language and/or literacy barriers.[45,50,54,57]
• Competing demands (e.g., work, childcare).[43,46,47,49,50,54,57]
Stigma, Discrimination, Fear
• Concerns related to stigma and/or discrimination.[43,45,46,52]
• Immigration policies causing fear.[45,46]
Staff Training & Resource Information Sharing
• Unsatisfactory experiences with healthcare and/or social services personnel (e.g., impersonal handoffs, staff lack of knowledge about resources).[44,45,49,52]
• Losing, forgetting, or not learning about resources.[43,44,46,47,49,53,54]
• Inaccurate information provided about resources.[45,57]

Facilitators
Relevancy
• Aligning referrals with participants' social needs and contexts.[46,48,50,51,53,54,57]
Support, Simplicity
• Help navigating complex systems (e.g., establishing rapport, answering questions, help filling out forms).[44-46,48-50,52,54]
• Prompt and simple follow-up processes.[44,46,51]
• Electronic resources easier to access.[43,44]
Comprehensive, Inclusive
• Focusing on multiple social needs.[57]
• Offering referrals to everyone versus only those who disclose social needs.[43,53]

[a]Refers to patients or caregivers, specifically.