The US health care delivery system plays a critical role in helping patients address unhealthy behaviors, such as tobacco use, unhealthy diet, and physical inactivity, which are the leading causes of preventable morbidity and mortality in the United States. The US Preventive Services Task Force provides specific recommendations for the delivery of clinical preventive services, such as screening, behavioral counseling, and referral to behavioral change programs, to support patients in behavior change and decrease their risk for chronic disease and death. Despite these recommendations, patients are not receiving the appropriate clinical preventive services in their doctors’ offices. A large national study reported that patients receive only about half of the recommended clinical preventive services overall and less than 20% of recommended counseling or education services.

The alternative to delivering preventive services such as counseling in a clinical setting is to provide referrals to outside providers, such as local health departments, tobacco quitlines, or community-based organizations. However, available evidence suggests that this practice is also not common. This may be a result of limited and variable access to such services. Even when available, services may be underutilized because clinicians are unaware of the resources or because they face numerous barriers related to reimbursement, organizational structure, and interorganizational linkages. Although recent studies have suggested that linkages between organizations for referrals may be facilitated by advanced communication technologies, these changes may be difficult for the average practice to implement. In general, little is known about these linkage interventions and whether they represent an effective and efficient mechanism for delivery of preventive services.

### Objectives

We conducted a literature review and environmental scan to develop a framework for interventions that utilize linkages between clinical practices and community organizations for the delivery of preventive services, and to identify and characterize these efforts.

### Methods

We searched 4 major health services and social science electronic databases and conducted an Internet search to identify examples of linkage interventions in the areas of tobacco cessation, obesity, nutrition, and physical activity.

### Results

We identified 49 interventions, of which 18 examples described their evaluation methods or reported any intervention outcomes. Few conducted evaluations that were rigorous enough to capture changes in intermediate or long-term health outcomes. Outcomes in these evaluations were primarily patient-focused and did not include organizational or linkage characteristics.

### Conclusions

An attractive option to increase the delivery of preventive services is to link primary care practices to community organizations; evidence is not yet conclusive, however, that such linkage interventions are effective. Findings provide recommendations to researchers and organizations that fund research, and call for a framework and metrics to study linkage interventions.


### Methods

To improve our understanding of linkages between clinical practices and community or public health organizations, we conducted a scoping literature review and an environmental scan. A scoping review, unlike a systematic review, broadly surveys the literature, but does not evaluate articles for methodological quality. An environmental scan examines unpublished literature and publicly available program information. We convened an expert steering committee of 7 individuals with extensive experience researching and implementing linkage interventions to inform the methods and assist with interpretation of the findings.

We developed a conceptual model to guide and focus this work, synthesizing a number of theoretical models, planning frameworks, and outcome measures. Key models and frameworks included partnership and integration.

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**Porterfield et al. | Peer Reviewed | Research and Practice | S375**

### References

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**Deborah S. Porterfield, MD, MPH, Laurie W. Hinnant, PhD, Heather Kane, PhD, Joseph Horne, BA, Kelly McAleer, MSPH, and Amy Roussel, PhD**

**Linkages Between Clinical Practices and Community Organizations for Prevention: A Literature Review and Environmental Scan**
The team searched English-language articles published during 1999 through 2009, including those articles describing international program efforts. We developed search terms in 3 categories: terms relating to program content (nutrition, physical activity, and tobacco), terms relating to primary care, and terms describing the community health or public health component of the intervention (see the box on the next page). We searched for articles that included 1 Medical Subject Headings (MeSH) term or keyword in each of the 3 columns. We searched the following major health services and social science electronic databases: PubMed (MeSH terms), CINAHL (Cumulative Index to Nursing and Allied Health Literature; MeSH terms), ISI Web of Science (author-determined keywords), and PsychInfo (author-determined keywords).

We reviewed articles to determine whether they were eligible for inclusion. Inclusion criteria were the following:

- Articles contain a linkage between a clinical practice and a public health or community health organization.
- Articles address counseling or other activities to promote healthy diet, exercise, or tobacco cessation. Delivery of clinical preventive services as recommended by the US Preventive Services Task Force was desirable, but was not an inclusion criterion.
- We excluded articles describing clinical practices that were primarily increasing their capacity to provide preventive health services through expanding clinic staff and program offerings.
- We only included articles describing more than a nominal involvement by both a clinical and a community partner. For example, we did not consider serving on an advisory committee a substantial involvement by a partner.

Questions about inclusion were addressed by a second reviewer’s assessment and the 2 reviewers achieving consensus.

We screened a total of 745 abstracts; 73 articles underwent full text review, and 19 articles met all criteria and were included in the review (Figure 2). Included in these 19 articles was a total of 36 examples of linkages. Most
commonly, we excluded articles because they addressed issues that were outside the content areas being examined (e.g., HIV, mental health, or maternal and child health issues) or they did not describe an intervention that included sufficient involvement of both a clinical and a community partner.

For the environmental scan, the project team conducted general and targeted Internet searches to identify examples of interventions that met the inclusion criteria. In the general search, we entered various configurations of a search term list (based on those used in the literature review) into Google. Team members used a protocol to determine the number of links that were examined for each combination. For the targeted search, we examined Web sites of 14 organizations or agencies recommended by AHRQ, the steering committee, and RTI experts. The environmental scan yielded an additional 13 interventions.

Using the conceptual model, our definition of linkages, and research questions, we developed an abstraction form to identify key information about each intervention. We abstracted information about the partners, the interventions, the populations served, nature of any evaluation and outcomes measured, facilitators and barriers, and intervention sustainability (only some of which is included in this article). We then used a corresponding Microsoft Access 2007 database (Microsoft, Redmond, WA) for data entry and analysis.

**RESULTS**

We identified 49 interventions (36 through literature review and 13 through the environmental scan). Table 1 provides overview information about the types of interventions and the types of clinical and community partners involved. The linkages identified included a variety of clinical partners, including single-provider practices, health care systems, and community health centers. Community partners included educational institutions, community-based organizations, community coalitions, and governmental public health agencies, among others. The interventions being implemented most often included provision of training for medical providers by community organizations to improve medical provider practices (31%), referral of patients from a clinical practice to a community partner (29%), or referral of patients from a community partner to a clinical practice (29%).

The intervention setting was most often a community organization office or facility in the community (39%) or a clinical care office (33%).

**Outcomes**

In Table 2 we display the types of outcomes being measured in this sample of interventions. A wide variety of outcomes were measured across the interventions examined. Evaluations focused on a mix of process, impact, and outcome indicators, as presented in Table 2. Almost all of the outcomes in this sample measured patient characteristics, such as enrollment or attendance in interventions, self-efficacy, health behaviors, or health outcomes. We identified very few outcomes that measured provider or program characteristics (such as fidelity to a protocol), and found no outcomes that examined organizational change or characteristics of the linkages themselves (although the number of referrals can be considered both an individual-level outcome and a measure of linkage effectiveness).

**Data Sources and Methods Used**

Evaluation methods and findings were described by 18 of 49 linkages. However, 19 of the interventions, without a description of their evaluation efforts, were identified through a description of large national initiatives of which they were a part (namely Prescription for Health and Building Community Support). So, although evaluation of specific efforts may not have been described in the articles reviewed,
evaluations of both individual programs and the overall coordinated efforts were likely conducted. For articles that did describe evaluation efforts, a wide variety of evaluation methods, outcomes, and data sources were described. Data collection tools and methods were not as well described as the outcomes being measured. The evaluation methods used varied significantly from relatively simple process evaluations of program implementation to more complex measurement of program impacts and outcomes. Impact and outcome evaluation strategies included self-report data from program participants and pre–post intervention studies. A small number of interventions included more complex evaluation studies that included randomized control group comparisons. Several evaluations included some form of postintervention follow-up, which varied from immediately following the intervention through 1 to 2 years after intervention.

Primary data collection methods described included surveys of participants via written survey instrument or via e-mail, interviews with participants conducted in person or over the phone, and review of patient medical charts or electronic medical records.

Evaluation appears to have been conducted by some program staff; however, in a large number of interventions, an external evaluation partner, most commonly a university partner, was responsible for evaluation design and implementation.

### Results of Intervention Evaluations

Eighteen interventions included a description of evaluation outcomes and methodology, and a subset of these reported impact or outcome results that extended beyond general process measures of involvement, enrollment, or attendance. The 3 interventions that used a comparison group design found significant differences between intervention and control groups in impact or outcome measures. Outcomes reported by these studies included significant improvements in perception of physical condition, physical self-worth, and physical health25 and significant improvements in tobacco use abstinence rates among self-reported smokers.26 A third study, the Norsjo Intervention Program in northern Sweden, which involved a

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**TABLE 1—Characteristics of 49 Intervention Studies of Clinical Practice and Community Organization Linkages for Prevention Found in Literature Review and Environmental Scan Performed in 2009 and 2010**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical practice type</strong></td>
<td></td>
</tr>
<tr>
<td>Unspecified clinical partner</td>
<td>22 (45)</td>
</tr>
<tr>
<td>≥ 1 single practice</td>
<td>10 (20)</td>
</tr>
<tr>
<td>Health care system</td>
<td>7 (14)</td>
</tr>
<tr>
<td>Community health center</td>
<td>7 (14)</td>
</tr>
<tr>
<td>Hospital</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Group practice</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>5 (10)</td>
</tr>
<tr>
<td><strong>Community partner type</strong></td>
<td></td>
</tr>
<tr>
<td>Unspecified community partner</td>
<td>14 (29)</td>
</tr>
<tr>
<td>Educational institutions or universities</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Community-based organization</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Community-based organization and community coalition</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Community-based organization and governmental public health</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Governmental public health</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Community coalition</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Commercial weight loss programs</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Businesses</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Other, which includes other combinations of &gt; 1 community partner</td>
<td>11 (22)</td>
</tr>
<tr>
<td><strong>Type of linkage intervention</strong></td>
<td></td>
</tr>
<tr>
<td>Training for medical providers by community organizations to improve medical provider practices</td>
<td>15 (31)</td>
</tr>
<tr>
<td>Referral of patients from clinical practice to community partner</td>
<td>14 (29)</td>
</tr>
<tr>
<td>Referral of patients by clinical practices to health resources</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Referral of patients from community partner to clinical practice</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Volunteer work by clinical partners at community organizations</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (6)</td>
</tr>
<tr>
<td><strong>Health issue addressed</strong></td>
<td></td>
</tr>
<tr>
<td>Nutrition, physical activity, and obesity</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Nutrition, physical activity, and tobacco cessation</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Nutrition and physical activity</td>
<td>7 (14)</td>
</tr>
<tr>
<td>Physical activity</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Nutrition, physical activity, tobacco avoidance, and tobacco cessation</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Tobacco cessation</td>
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</tr>
<tr>
<td>Obesity</td>
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</tr>
<tr>
<td>Nutrition</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Other</td>
<td>9 (18)</td>
</tr>
<tr>
<td><strong>Intervention setting</strong></td>
<td></td>
</tr>
<tr>
<td>Community organization office or facility or meeting place in the community</td>
<td>19 (39)</td>
</tr>
<tr>
<td>Clinical care office (clinic, primary care office, hospital)</td>
<td>16 (33)</td>
</tr>
<tr>
<td>School</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Worksite</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Not stated</td>
<td>18 (34)</td>
</tr>
</tbody>
</table>

*aThe total percentage exceeds 100% because some interventions engaged multiple types.
long-term community-wide intervention that included linkages between community and clinical partners, found significant changes in total cholesterol levels and systolic blood pressure between the intervention and reference population and a 36% reduction in predicted coronary heart disease mortality (by using the North Karelia risk equation) after adjustment for age and education, compared with 1% in the comparison community.27

Six studies reported some changes in participant behaviors and characteristics when pre–post intervention comparisons were made. Behavior changes included

- Improvements in diet (fruit, vegetable, water, and low-fat dairy product consumption),28,29
- Improvements in physical activity (number of days, duration or intensity of physical activity, and number of days with limited activity),28,30,31
- Improvements in diabetes self-management behaviors,32 and
- Increased numbers of smokers who have quit.26,28,33

Six studies reported some improvement in clinical health outcomes. Study designs varied across the interventions but consisted primarily of pre–post intervention. One project collected data 6 months after intervention, and another project collected data 12 months after intervention. Improvements in the following clinical health outcomes were reported:

- blood sugar levels,32
- cholesterol levels,27
- blood pressure,27,29
- predicted coronary heart disease mortality,27 and
- body mass index (defined as weight in kilograms divided by the square of height in meters) and weight (often 5% or more of preintervention weight lost).28,29,34,35

Finally, 2 interventions that sought to change clinical provider behaviors to improve delivery of clinical preventive services noted improvements in related behaviors by providers, although these changes did not necessarily translate into changes in patient health behaviors. These outcomes included the following:

- Improvement in clinician referral of patients to community programs for health behavior change and improvements in rates of discussion of diet, exercise, and weight management were seen.26 Although the evaluation noted increased rates of provider discussions in these key areas, the evaluation also noted that there was no difference in patient motivation to modify behavior 8 weeks after the clinical visit was made, compared with motivation before seeing the doctor.
- Improvement in clinician behaviors to measure body mass index, provide healthy messages, and follow-up with patients were seen.37

Although a few interventions conducted evaluations and reported evaluation findings, a far greater number either did not conduct evaluations of their interventions or did not describe evaluation findings in the articles and materials reviewed. A key question in this field is whether provision of clinical preventive services through linkages is a more effective approach compared with service delivery
solely through a clinician’s office. None of the evaluations conducted sought to understand or measure whether there is an added benefit to patients or providers when a linkage is in place.

**DISCUSSION**

We provide an overview of 49 interventions that linked primary care and community organizations for the delivery of preventive services in the areas of tobacco cessation, obesity, nutrition, and physical activity. We identified these interventions through a scoping literature review and environmental scan. The major finding of this work is that, although these interventions are an attractive option to increase the delivery of preventive services, the evidence of effectiveness for these linkage interventions remains limited. Although 18 interventions described either or both their evaluation methods and outcomes, few appear to have conducted evaluations that were rigorous enough to capture changes in intermediate or long-term health outcomes. Given the small number of reports, a likely bias exists in the outcome information that is being reported in the literature or gray literature, with only the interventions with positive outcomes reporting their results. In addition, a significant number of examples were conducted as part of research studies intended to evaluate a specific intervention design. Therefore, although some evidence of effectiveness of certain interventions is available, little evidence is provided that indicates that these linkages and the associated interventions are generalizable to other settings.

A second finding is the lack of evaluation of organizational outcomes and evaluation of the linkages themselves. Outcomes examined were near-universally participant process or short-term outcomes, with a minority of projects examining other types of process measures. As reflected in our framework (Figure 1), outcomes at multiple levels, including the intervention or organizational level and short-term outcomes, will be useful to study linkage interventions to determine effectiveness. A framework, such as the one drafted by this project, and associated metrics are needed to stimulate research that will advance our understanding of these linkage interventions. We suggest that additional work be conducted to examine and test the proposed framework by applying it to additional linkage examples within the broader field of chronic disease and public health. It will be important to assess the impact of the linkage itself and its added benefit to patients and providers, beyond standard delivery of services by either a clinical or community partner alone.

The findings have numerous implications for organizations that wish to fund these types of interventions, including federal agencies and foundations. Much of this work is already being coordinated by these organizations, as indicated by the fact that more than half of the interventions identified belonged to 1 of 3 major initiatives: Prescription for Health and Building Community Support initiatives, both funded by the Robert Wood Johnson Foundation, and the Health Resources and Services Administration’s Women’s and Children’s Health Program Healthy Behaviors in Women effort. The funding of larger initiatives provides an opportunity to examine individual program success as well as to conduct cross-case analyses that may yield beneficial evaluation data from across different intervention examples. For example, the Prescription for Health initiative provided important qualitative findings to inform models for achieving practice redesign for the delivery of preventive services and evaluations of individual programs achieving successful linkage interventions. The findings of this work underscore the importance of requiring evaluation as a condition of program funding and providing dedicated funding and support specifically for evaluation activities. They also indicate the need for a core set of common program and evaluation measures to help standardize the way linkages are assessed, including outcomes that measure organizational changes and features of the linkage itself (as depicted in Figure 1). Evaluations of the effectiveness of linkages should employ the most rigorous feasible design, with pre- and postmeasurement and a control group. Because many of these interventions are conducted by community and clinical organizations that may be unfamiliar with the design and implementation of rigorous evaluation, this will likely require assistance to increase the evaluation capacity of funded organizations.

The small number of programs identified through the literature review and environmental scan is the main limitation of this work and threatens the validity of our conclusions. This sample of linkage interventions may not be representative of all such interventions. Although the search terminology and methods developed for this project may be useful to future efforts, it is suggested that future work in this area use alternative or additional methods to identify interventions, because many programs appear to not have the capacity and resources to publish their work. The steering committee that guided this project strongly recommends that future work use snowball sampling and other methods to help identify the many smaller programs that are implementing linkage interventions. This could include launching a Web site where programs can self-register their interventions. Whether these smaller programs have the capacity to conduct evaluations, and whether data from evaluations of these programs would change our findings, is, however, not known.

Also, although future efforts to identify linkage interventions may benefit from enhanced methods to identify programs, at some point, when a greater number of interventions have been evaluated, a systematic review should be conducted to directly address questions of effectiveness of these interventions, at which point interventions with lesser-quality evaluations would not be included in a synthesis of results. A barrier to this work is that these linkage interventions are not homogenous and are being developed to address a variety of health issues. Building upon the categories of linkage types used in this study as well as Lasker’s work, description and categorization of linkage interventions should be a major focus of such a review. Given the work in linkage interventions done outside the field of preventive services delivery, this systematic review would benefit from including studies in other fields—for example, mental health, substance abuse, and HIV services. This would greatly increase the scope and make the intervention categorization even more challenging. Finally, it is not just linkage interventions (and categories thereof) that must be established and evaluated; other work suggests that characteristics or specific strategies included in a linkage intervention can be
identified and evaluated (e.g., strategies for sustaining referrals). Future work should seek to identify and evaluate the evidence for these strategies in addition to the linkage interventions themselves. Although these challenges to conducting such a review are real, other work suggests that similarly challenging constructs can be successfully defined and studied by using systematic review methodology.

An additional limitation of this work is that, by focusing on 1 particular set of behaviors and using a narrow definition of linkage interventions, we excluded a significant body of work in other fields. We focused on the actual delivery of preventive services specific to tobacco, nutrition, and physical activity, excluding other types of partnerships between clinical practices and community or public health interventions designed to change, for example, the physical environment in which patients live. Such linkages designed to have an impact on these more upstream determinants of health represent an additional area for further exploration.

These findings can best be used to inform recommendations for researchers and organizations that fund research on how to improve identification and evaluation of linkage interventions. Results of this work were shared in 2010 at a summit convened by AHRQ with more than 50 participants from 36 organizations. The summit yielded a concrete set of recommendations for components of a national strategy to facilitate linkages between clinical practices and community organizations. Based in part on the findings of this work, the following 2 prioritized areas were recommended:

1. Identifying research gaps and funding research: Critical areas for future research identified were evaluating the effectiveness of clinical community linkages, describing costs, identifying facilitators and barriers specific to linkages for the delivery of clinical preventive services and specific to the organization types, and understanding mechanisms to enhance sustainability.

2. Developing metrics to measure successful linkages: Funding organizations can play a key role in facilitating the evaluation of linkages by defining outcome measures and evaluation metrics for linkages. Summit participants recommended that AHRQ convene a workgroup to develop metrics related to linkages between clinical practices and community organizations.

Funding agencies in addition to AHRQ can draw on these project findings and recommendations in their continued efforts to identify, develop, and evaluate these types of linkage interventions.

**About the Authors**

At the time of the study, all authors were with RTI International, Research Triangle Park, NC. Deborah S. Porterfield was also with the Department of Social Medicine, University of North Carolina School of Medicine, Chapel Hill.

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**Contributors**

D.S. Porterfield led the overall study, including study design and implementation, and data analysis and interpretation, and drafted the article. L.W. Hinnant and A. Roussel contributed to study design and data interpretation, and L.W. Hinnant led data analysis. H. Kane contributed to study design and oversaw study implementation. J. Horne and K. McAleer contributed to study design and implementation and data interpretation. All authors contributed to review and revisions of drafts of the article.

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**Human Participant Protection**

This research did not involve the use of human participants.

**References**


