



# A Taxonomy of Integration Interventions Between Health Care and Public Health

Deborah S. Porterfield, Lucia Rojas-Smith,  
Megan Lewis, Lauren A. McCormack,  
Thomas J. Hoerger, Debra J. Holden

RTI Press publication OP-0023-1507

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### Suggested Citation

Porterfield, D.S., Rojas-Smith, L., Lewis, M., McCormack, L.A., Hoerger, T.J., Holden, D.J. (2015). *A Taxonomy of Integration Interventions Between Health Care and Public Health*. RTI Press Publication No. OP-0023-1507. Research Triangle Park, NC: RTI Press. <http://dx.doi.org/10.3768/rtipress.2015.op.0023.1507>

This publication is part of the RTI Research Report series. Occasional Papers are scholarly essays on policy, methods, or other topics relevant to RTI areas of research or technical focus.

RTI International  
3040 East Cornwallis Road  
PO Box 12194  
Research Triangle Park, NC  
27709-2194 USA

Tel: +1.919.541.6000  
E-mail: [rtipress@rti.org](mailto:rtipress@rti.org)  
Web site: [www.rti.org](http://www.rti.org)

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<http://dx.doi.org/10.3768/rtipress.2015.op.0023.1507>

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### About the Authors

**Deborah S. Porterfield** is a senior public health research analyst at RTI International and an Associate Professor at the University of North Carolina at Chapel Hill School of Medicine.

**Lucia Rojas-Smith**, DrPH, is a director of the Social, Health, and Organizational Research and Evaluation program at RTI International.

**Megan Lewis**, PhD, is a senior research scientist and leader of the Health Care Communication Team, Health Communication Program, at RTI International.

**Lauren A. McCormack**, PhD, is the senior director of the Health Communication Program at RTI International.

**Thomas J. Hoerger**, PhD, is a senior fellow in the Public Health Economics Program at RTI International.

**Debra J. Holden**, PhD, is the senior director of the Community Health Promotion Research Program at RTI International.

### **Acknowledgments**

This work was supported by internal funding from RTI International

### **Abstract**

Integration among health care professionals, health care systems, and public health organizations to improve population health has recently emerged as a policy priority for federal health and public health agencies. A large gap exists, however, between current policy and program implementation efforts and the existing evidence for integration interventions. The challenges of research into integration effectiveness include lack of a standardized definition of integration and lack of a taxonomy to allow grouping of similar interventions that helps to facilitate an understanding of their effectiveness. We address these challenges and advance research into integration. Drawing from prior evidence syntheses of integration interventions, we provide a recommended definition and a classification scheme for describing and grouping like interventions. Our work can benefit researchers engaged in generating evidence for integration interventions and policy makers; it will help to ensure that the integration policy promoted by health and public health agencies is supported by science.

## Introduction

Integration among health care professionals, health care systems, and public health organizations to improve population health has recently emerged as a policy priority for federal health and public health agencies. Beginning in the 1980s, efforts have sought to define, study, and make recommendations on integration (as described by Lasker<sup>1</sup> and Scutchfield et al.<sup>2</sup>); the most recent example is the work conducted by the Institute of Medicine (IOM) on the integration of primary care and public health.<sup>3</sup>

These efforts have culminated in a current phase of rapid implementation of integration policy. For example, among state chronic disease programs funded by the Centers for Disease Control and Prevention (CDC), integration is now one of four core areas of program implementation.<sup>4</sup> Proponents of integration describe the need for “intersectoral partnerships”<sup>3</sup> to overcome the siloing of medicine and public health practice and to achieve potential gains in efficiency and effectiveness of health care and public health practice, cost savings, and improved health outcomes.<sup>3,5</sup>

A large gap exists, however, between current policy and program implementation efforts and the evidence for integration interventions. Only two formal evidence syntheses for integration interventions have been attempted, and both focused on using integration interventions to deliver preventive services.<sup>6,7</sup> The authors of these studies concluded that the evidence is sparse, and commented on the lack of primary research in this area. The challenges of research into integration effectiveness are many. Four high-priority challenges include: (1) the heterogeneous nature of the interventions that may qualify as “integration,” and the fact that they may not be labeled as an “integration intervention,” in part because of the lack of a standardized integration definition; (2) a lack of standardized metrics for evaluation; (3) the need for a single overarching framework to understand facilitators and barriers to integration; and (4) the need for a taxonomy to allow grouping of similar interventions for facilitating an understanding of their effectiveness. To illustrate the effect of a lack of a standard definition, if we

scan the key works in the field, we get the following terms that are used synonymously for the presently favored term “integration”: linkages,<sup>8</sup> collaborations,<sup>9</sup> relationships,<sup>7</sup> partnerships,<sup>10</sup> and synergies.<sup>1</sup>

This paper addresses two of these challenges—namely, the need for a standard definition and the need for a taxonomy to describe integration interventions—and will benefit multiple entities. A definition of integration and a taxonomy will benefit researchers engaged in evaluation of integration interventions and those conducting systematic reviews. Policy makers will benefit as researchers attempt to use the taxonomy to close the “evidence gap,” ensuring that science supports the integration policy that health and public health agencies promote. Also, organizations (including federal agencies) disseminating information about integration and practitioners—the direct consumers of information about integration interventions—can also benefit from a standard classification scheme.

The extensive breadth of interventions that can be classified as “integration” is likely bewildering for health and public health practitioners who are being encouraged to integrate. For example, searching for “behavioral health” integration interventions on a current website featuring integration success stories<sup>11</sup> revealed three vastly different integration interventions: colocation of a federally qualified community health center and a local health department; a partnership between a local health department and two pediatric practices to incorporate on-site early childhood mental health teams and health navigators; and development of a health information technology system by a nonprofit community health network for Medicaid patients. Health care and public health practitioners need clear guidance demonstrating types and examples of evidence-based integration initiatives, and they need to be able to quickly identify those that are relevant to their settings and their programmatic goals.

Our primary purpose is to advance the discussion about integration by promoting a consistent definition of integration and providing a taxonomy for integration interventions. A taxonomy can be defined as “a system for classifying multifaceted, complex phenomena according to common

conceptual domains and dimensions.”<sup>12</sup> A taxonomy is critical for evidence synthesis because it allows for grouping of like interventions to understand their effectiveness; it can also facilitate clear communication between policy makers and practitioners about what interventions are supported by the evidence.<sup>12,13</sup> We envision the primary users of a taxonomy to be federal agencies and organizations (e.g., CDC, Health Resources and Services Administration [HRSA], Agency for Healthcare Research and Quality [AHRQ], and Centers for Medicare & Medicaid Services [CMS]), foundations (e.g., Robert Wood Johnson [RWJF] and de Beaumont), and other organizations such as the Patient-Centered Outcomes Research Institute (PCORI) that are funding research on integration. Other major end users will be academic researchers engaged in this work. Secondary users of this taxonomy might be federal agencies and others that are promoting integration policy and disseminating integration interventions.

We are aware of only one taxonomy or classification scheme for integration interventions.<sup>1</sup> Although this work was seminal and is cited in the subsequent generation of integration studies, the classification scheme itself has not been widely used in ensuing work (examples of authors who use this classification include Martin-Misener et al.<sup>14</sup> and Porterfield et al.<sup>8</sup>). Other authors have published models or frameworks for integration that focus on describing the facilitators and barriers to integration interventions rather than classifying the interventions themselves.<sup>15, 16</sup> Thus, the heterogeneity of the integration activities and the need for a classification system have not been directly addressed since Lasker's work in the 1990s.<sup>1</sup> For researchers to evaluate and for federal agencies and other bodies to disseminate integration interventions, defining and classifying these interventions are necessary next steps.

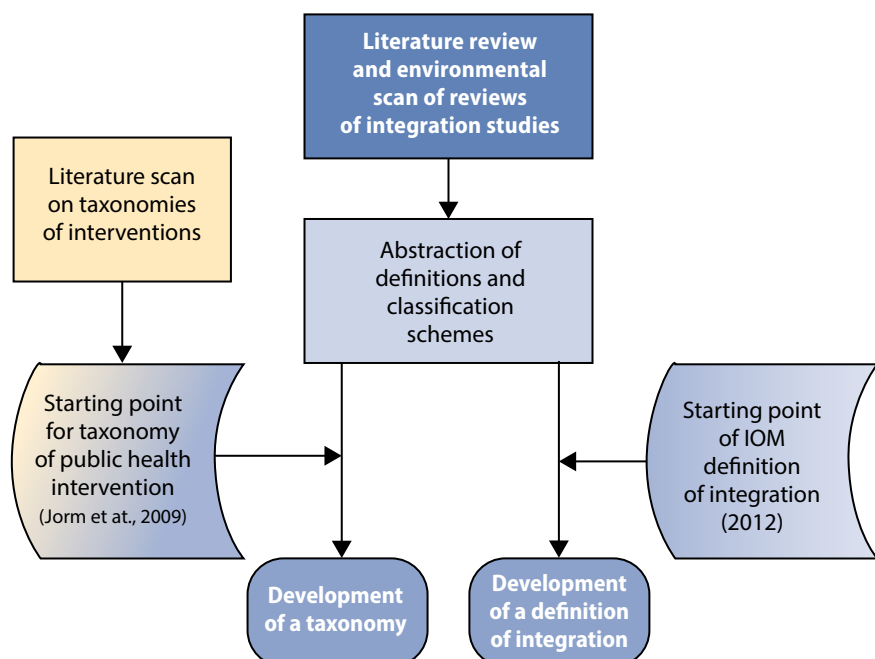
## Methods

Figure 1 shows the process of our environmental scan and gray literature review of integration interventions, a scan of the literature for taxonomies of interventions, and information that contributed to our development of an integration definition and the taxonomy. The following text details these steps.

As Figure 1 depicts, we first conducted a literature review and environmental scan to identify reviews (systematic or narrative) of the published literature or other descriptive studies of integration interventions. This supported developing a definition of integration and a taxonomy. Because resources are limited, we included only works that identified and synthesized information about a set of integration interventions; thus, we excluded single studies, editorials, or commentaries.

We adapted a search strategy used in 2014 in work conducted for PCORI, by removing search terms specific to the integration type of interest in that work (i.e., preventive services delivery).<sup>17</sup> Table 1 presents the search terms used in the literature review. We limited the search to articles published in English during the past 10 years.

**Figure 1. Process for literature review and environmental scan**



**Table 1. Search terms for literature review**

Search Terms	
1	"community health services/organization and administration"[MAJR] AND "delivery of health care, integrated"[MeSH Major Topic]
2	"Public Health/methods"[MAJR] AND "Cooperative Behavior"[MAJR] AND "Primary Health Care/organization and administration"[MAJR]

For the environmental scan for reviews of integration studies, we reviewed a set of 11 documents identified in a gray literature scan in summer 2014.<sup>17</sup> We supplemented this body of work with a review of websites from nine organizations and agencies most involved with integration interventions: CDC, HRSA, AHRQ, CMS, American College of Preventive Medicine, American Medical Association, American Public Health Association, Association of State and Territorial Health Officials, and National Association of City and County Health Officials. We searched each of these sites twice, using the terms "linkages" and "integration," and reviewed at least the first 50 results for each search.

Table 2 presents inclusion/exclusion criteria for the literature review and environmental scan.

**Table 2. Inclusion and exclusion criteria for studies**

Inclusion Criteria	Exclusion Criteria
Review of multiple interventions	Single studies, editorials, commentaries
Includes an abstract (for published literature)	No abstract
Studies conducted in high-income countries (using World Bank income categorization) <sup>18</sup>	Studies conducted in low- or middle-income countries
Includes specific descriptions of organization types	Does not include any specific descriptions of organization types
Health care delivery organizations must be one of the two organizations participating in an intervention; the second must be a public health organization (either governmental or community-based)	The second organization is not a public health organization (either governmental or community-based; e.g., a social service, mental health, or second health care delivery organization)

From these works, we abstracted two types of information: (1) the definition of integration used and (2) any taxonomy or classification of the interventions. Because these works most often did not include a formal taxonomy, we abstracted descriptive information presented by the authors to characterize the interventions. For example, from tables presented in these review articles summarizing the set of interventions, we abstracted the heading and the values in the tables (e.g., "health behavior or condition" and "obesity, physical activity, nutrition, tobacco").

To develop our definition of integration, we used as our starting point the definition in the 2012 IOM report, which is now widely used ("integration of primary care and public health" is "the linkage of programs and activities to promote overall efficiency and effectiveness and achieve gains in population health").<sup>3</sup> We compared the IOM definition with those definitions abstracted from the included studies. Elements or phrases found in the definitions that differed from the IOM definition were identified and categorized. The authors adapted the IOM definition based on these data.

Our goal in developing a taxonomy was to adapt or build off of an existing taxonomy of public health interventions. Therefore, we conducted a brief scan of the literature and the Internet, and we consulted with public health experts to identify existing classification schemes. We identified only a single example of a comprehensive classification scheme of public health interventions,<sup>13</sup> which we have used as the starting point for our taxonomy. Jorm et al. reviewed familiar definitions of public health functions, such as the 10 Essential Services,<sup>19</sup> but identified the limitations of these existing frameworks as follows:

However, all are essentially "flat" lists, or at best hierarchical taxonomies, which conflate discrete dimensions such as the purpose of public health activities, the health issues and problems addressed and the settings in which services are delivered, into single "functions." None presents a well-defined theoretical framework for multiple aspects of effective public health practice.<sup>13</sup>



Using existing definitions and classification schemes, these authors constructed an ontology of public health that formed the basis for their classification scheme, which was subsequently refined by review and feedback by public health experts. In our initial assessment of the Jorm et al. work, we thought that this taxonomy could be used as a basis for a taxonomy of integration interventions. We reviewed numerous other classification schemes, including that developed by the Community Preventive Services Task Force,<sup>20</sup> and examples from the fields of health behavior,<sup>21, 22</sup> HIV,<sup>23</sup> and implementation science.<sup>24, 25</sup> Ultimately, we identified the Jorm et al. work as the most comprehensive (including multiple variables to describe an intervention rather than being a “flat” classification scheme) and, therefore, as the best starting point.

Our next step was to develop an Excel spreadsheet with the six “top-level classes” from this work (*functions, health issues, determinants of health, methods, settings, and resources and infrastructure*) as columns; we entered each article or document reviewed as a row in the spreadsheet. We abstracted and mapped information from each of the included articles in the following ways:

- Where categories or domains of integration interventions described in the article appeared to match one of the six classes, we included that information in the same column under that heading.
- Where categories did not match one of the six domains, we created a new column.

To develop a taxonomy of integration interventions, we reviewed the mapped data and made decisions about whether to include or revise the Jorm et al. “classes” (or in our terminology, “domains”) and what new domains might be necessary. We also adapted or developed draft definitions of these domains and included or identified new examples of subdomains (“subclasses” in Jorm et al. terminology) for some of the domains.

## Results

Our literature search yielded 321 abstracts; we gave six of these publications a full-text review and ended up including two publications. We excluded most of the abstracts because either the organization types did not meet our criteria (e.g., studies excluded integration of health care and behavioral health or social services) or the abstracts described only a single intervention and not a group of interventions. We also included seven documents from our gray literature search (two of which represent the same studies as the two articles initially included) and an additional two peer-reviewed articles from a review of bibliographies of included works. Table 3 describes the 11 included articles or websites, which represent 9 unique studies, presented in chronological order.

### Definition of Integration

The definitions of integration in our included studies have some similarities to each other and to the IOM definition (provided previously). We noted various terms being defined throughout these 11 works: integration, linkages, collaboration, clinical partnerships, clinical–community relationships, and involvement of community.

Three key elements of the definitions emerged in our review: the naming of the organizations involved (in the IOM definition, “primary care and public health”), the articulation of that which is actually being linked or coordinated (in the IOM definition, “programs and activities”), and the goal of the integration effort (in the IOM definition, “to promote overall efficiency”). We reviewed the variation in each of these elements to inform our recommended enhancements to the IOM definition that we present in the “Discussion” section.

### Taxonomy of Integration Interventions

By mapping the classification schemes in our 11 included works (representing 9 unique studies) to the Jorm et al. classes,<sup>13</sup> we found the use of “methods” in seven unique studies<sup>1,6-10,14,26,27</sup> “health issues” in four,<sup>6,8,9,11,14,28</sup> “resources and infrastructure” in four,<sup>6,8,10,28</sup> “functions” in two,<sup>1,6</sup> “settings” in two,<sup>6,7</sup> and “determinants of health” in



**Table 3. Summary of included works**

Included Works	Summary of the Study or Source
Lasker (1997)	This study developed a “practical framework” for understanding and implementing collaborative strategies between medicine and public health, developed from an empirical review of 414 cases. The study identified cases via requests to members of major medicine and public health associations, to officials in government health agencies, and to participants’ foundation-sponsored initiatives. Data were collected using a self-administered written or Internet questionnaire as well as by phone interviews. The framework included a list of six “synergies,” each with a list of “models.” For example, the synergy “improving health care by coordinating services for individuals” included three models: (1) bringing new personnel and services to existing practice sites; (2) establishing “one-stop” centers; and (3) coordinating services provided at different sites.
Halverson et al. (2000) <sup>26</sup>	This study analyzed cross-sectional data on the interorganizational relationships formed among local public health agencies, community hospitals, and community health centers operating in each of 60 geographically and demographically diverse U.S. counties. Halverson et al. surveyed public health directors in these counties by telephone about their relationships with area community hospitals and community health centers.
Sloane et al. (2009) <sup>10</sup>	This study identified partnerships between public health and medicine to increase the effectiveness and efficiency of clinical care, with a particular emphasis on the aging population. It identified themes and lessons that would be useful in the expansion, replication, and broader application of such partnerships. The authors provided descriptive information on a purposive convenience sample of programs, which was identified in a four-step approach: (1) Internet and literature search; (2) survey of public health agencies; (3) e-mail recruitment through the American Medical Association membership; and (4) snowball sampling. The study identified 48 programs.
Martin-Misener & Valaitis (2009) <sup>9</sup> Martin-Misener et al. (2012) <sup>14</sup>	This scoping literature review was performed to determine what is known about (1) structures and processes required to build successful collaborations between primary care and public health; (2) outcomes of such collaborations; and (3) markers of their success. Guided by a framework that identified systemic, organizational, and interactional determinants for collaboration, the review included 114 published quantitative and qualitative primary studies, evaluation research, and systematic and other types of reviews, published between 1998 and 2008.
Porterfield et al. (2010) <sup>6</sup> Porterfield et al. (2012) <sup>8</sup>	Porterfield et al. conducted a literature review and an environmental scan to develop a framework for interventions that use linkages between clinical practices and community organizations to deliver preventive services (tobacco cessation, obesity, nutrition, and physical activity). The review and the scan identified and synthesized 49 interventions.
Lebrun et al. (2012) <sup>27</sup>	This study of nine federally qualified health centers examined primary care and public health activities to better understand their successes, barriers encountered, and lessons learned. Lebrun et al. used qualitative and quantitative methods to collect data, including secondary data from the Uniform Data System, questionnaires, and key informant interviews.
Buckley et al. (2013) <sup>7</sup>	This targeted literature review examined existing evidence related to the effectiveness of clinical–community resource relationships for delivering selected preventive services. The review identified 27 studies and presented very brief summary findings.
Association of State and Territorial Health Officials (ASTHO), 2014 <sup>28</sup>	This website (“clearinghouse”) of primary care and public health integration success stories includes stories submitted via an online form on the ASTHO website and links to stories collected from other partners working in this field.
de Beaumont Foundation et al. (2014) <sup>11</sup>	This web-based resource, <i>A Practical Playbook</i> , features integration stories (approximately 35) that describe primary care and public health partnerships or broader partnerships that contribute to population health improvement.

none. Beyond the Jorm et al. classifications,<sup>13</sup> “target population,” which four studies described,<sup>6,8,9,14</sup> and “organization type,”<sup>1,6,8,10,28</sup> as distinct from intervention setting, emerged as potentially important domains. We also noted examples of categories that could comprise subdomains within an existing

Jorm et al. domain, rather than being a discrete new domain. For example, some studies used the categorizations “use of information technology” and “source of funding”; for our revised taxonomy, these terms would be more appropriate as subdomains of the “resources and infrastructure domain.”

## Discussion

### Definition of Integration

Based on our review of the definitions in the included studies, we propose three substantive changes to the IOM definition of “integration.”

First, the definition should be more specific in naming the types of organizations participating in integration, but also more inclusive in terms of these types. Specifically, we suggest that the modified definition should replace “primary care” with “health care providers, organizations, and systems” to broaden the types of health care partners of interest beyond just primary care clinicians. We also suggest refining the wording so that “public health” explicitly includes community-based (i.e., nongovernmental) organizations.

Second, we suggest a slightly more inclusive list of activities that describe the integration itself. Although linkage of “information” was not explicitly included in the definitions reviewed, we suggest that the definition include this concept as a type of integration activity, given the increasing importance of health information technology and information exchange in health care and public health.

Third, we suggest that an updated definition specify a broader set of stated goals of the integration efforts than articulated in the IOM definition (“to promote overall efficiency and effectiveness and achieve gains in population health”). We found that very few definitions in our included studies stated a goal of integration. We suggest that the IOM goals be refined to name what should become more effective and efficient (the health system) and include wording from the Institutes of Healthcare Improvement's Triple Aim<sup>29</sup> and CDC's mission.<sup>30</sup>

Our proposed definition of “integration” is as follows:

Linkage of programs, activities, and information among health care professionals, organizations, and systems and public health (including community-based organizations) to promote overall effectiveness and efficiency of the health system, improve the health and well-being of populations, and protect populations from health threats.

### Taxonomy of Integration Interventions

Table 4 presents our revised taxonomy, which is a final list of eight domains that we identified by comparing information abstracted from the included works with the Jorm et al.<sup>13</sup> classes. Overall, Jorm et al. had six classes; we combined two of their classes into one: “Determinants of Health” was combined with “Health Issues” to become “Health Issues and Risk Factors Addressed.” We also added three domains—namely, organizations involved, level of integration, and target population. In Table 4, we identify the domains that Jorm et al. used with **BOLD** font in the title. Although we changed some of the titles of the Jorm et al. classifications, we adopted many of the definitions from their work.

Table 4 and the following text describe each of the eight domains. We provide a definition and illustrative subdomains (where relevant) and highlight important distinctions from Jorm et al.<sup>13</sup> We also indicate which of the studies from our review included that domain in its descriptions of integration interventions, informed this domain development, or both.

**Goals.** Our top-level domain is “goals” rather than “functions,” because the former term is more familiar to U.S. public health practitioners than the latter. For goals, we have not used the Jorm et al.<sup>13</sup> subclasses; rather, we created a draft list that builds on the goal of integration stated in the draft definition. The four illustrative subdomains reflect broadly the goals of the health care system and public health; they also emphasize data infrastructure and information exchange; finally, they include a fourth category comprising multiple drivers of health, including policy, education, and research.<sup>32</sup>

**Health Issues and Risk Factors Addressed.** Our second domain, “health issues and risk factors addressed,” represents the diseases and risk factors that integration interventions may address. Our draft list of health-related subdomains (e.g., chronic disease, maternal and child health) is based on the reviews cited in the table. Grouping interventions by health issue or risk factor addressed is critical to understanding effectiveness and providing clear and relevant guidance to practitioners. We may eventually learn that certain integration intervention types are

**Table 4. Taxonomy domains for categorization of integration interventions for purposes of research and evidence synthesis**

<b>Domains</b>	<b>Definition</b>	<b>Subdomain Examples</b>
<b>Goals</b>	The purpose of integration interventions	<ul style="list-style-type: none"> <li>Improving health services delivery (access, quality, cost, equity, which also includes health services delivered by public health agency)</li> <li>Improving population health/public health practice: program planning, implementation, and evaluation</li> <li>Enhancing data infrastructure and information exchange</li> <li>Supporting other drivers of the health system: guidelines, policy, workforce, education, and research</li> </ul>
<b>Health Issues and Risk Factors Addressed</b>	Health and well-being issues that affect health AND Factors that influence health status and determine health differentials or health inequalities	<ul style="list-style-type: none"> <li>Chronic diseases (e.g., cancer, diabetes, cardiovascular disease)</li> <li>Maternal and child health</li> <li>Immunizations</li> <li>Infectious disease</li> <li>Environmental health</li> <li>Bioterrorism and disaster preparedness</li> <li>Injury</li> <li>Alcohol and substance abuse</li> <li>Mental health</li> <li>Chronic disease risk factors (e.g., nutrition, obesity, tobacco, physical activity)</li> <li>Social determinants of health</li> </ul>
Organizations Involved	The types of organizations participating in the integration intervention	<ul style="list-style-type: none"> <li>Health care <ul style="list-style-type: none"> <li>Individual or group of health care professionals</li> <li>Single practice (for-profit or not-for-profit [e.g., federally qualified health center, free clinic])</li> <li>Group of practices</li> <li>Hospital</li> <li>Health system</li> <li>Coalition of health systems</li> <li>Health plan</li> </ul> </li> <li>Public health <ul style="list-style-type: none"> <li>Governmental public health agency</li> <li>Community-based organization</li> <li>Community coalition</li> <li>Educational institution</li> <li>Business</li> </ul> </li> </ul>
<b>Type of Intervention</b>	The methods that interventions use to achieve the stated goal	<ul style="list-style-type: none"> <li>No a priori subdomains</li> </ul>
<b>Resources and Infrastructure</b>	The means available for the operation of health systems	<ul style="list-style-type: none"> <li>No a priori subdomains</li> </ul>
<b>Level of Integration<sup>1, 6, 8, 26</sup></b>	Levels of integration as defined by Himmelman <sup>31</sup> and adapted by the IOM <sup>3</sup>	<ul style="list-style-type: none"> <li>Levels: isolation, mutual awareness, cooperation, collaboration, partnership, and merger</li> <li>Specific items of interest may be included in the above levels or may be defined separately</li> <li>Presence of a memorandum of understanding or contract; coalition or advisory body; administrative systems; or intraorganizational platform</li> </ul>
<b>Settings</b>	Settings in which the integration intervention takes place	<ul style="list-style-type: none"> <li>Types of settings: clinical, community organization, schools, workplaces, etc.</li> <li>Scope of intervention: local, state, national</li> <li>Categorizations such as urban/rural</li> </ul>
<b>Target Populations</b>	The group of persons or organizations that are the intended recipients or beneficiaries of the integration intervention	<ul style="list-style-type: none"> <li>Levels of the social-ecological model<sup>21</sup></li> <li>At the individual level, further specifications of sociodemographic or other variables (e.g., age, sex, race, ethnicity)</li> </ul>

**BOLD** indicates that the domain was included in Jorm et al. (2009) as a top-level class. Definitions are adapted from Jorm et al. (2009).

effective across health conditions (e.g., linking data among public health and health care to establish an immunization registry and a cardiovascular disease surveillance system). We would argue, however, that disease- or risk-factor-specific studies are a priority to establish effectiveness, guide policy, and inform actionable guidance to practitioners.

**Organizations Involved.** For this domain, we developed a list of subdomains based on studies in our review. As in our draft definition, the two categories of involved parties in an integration intervention are (1) health care organizations, which can vary in size from a single private practice to a health system or coalition of health systems, and (2) public health entities. We argue that the “public health” category should include a wide variety of non-health care organizations and not be restricted to governmental public health agencies. In our judgment, the question of whether to include for-profit organizations, such as businesses, in both this category and in the definition of integration interventions warrants broader discussion.

**Type of Intervention.** “Type of intervention” is equivalent to the Jorm et al. “methods” class.<sup>13</sup> The original “methods” class included a list of 35 categories. Some of these categories are common among integration interventions and are relevant for this work (e.g., “monitoring and surveillance”); others, although valid public health activities (e.g., “radiation safety methods”), do not appear to be relevant to integration interventions, based on our findings. This domain illustrates what activities the organizations involved in the integration are pursuing to achieve stated goals. This domain corresponds to many of the more familiar categorizations of public health activity, is perhaps the most important domain in terms of guiding research and practice, and has proved the most challenging to detail. In addition to reviewing Jorm et al.<sup>13</sup> subdomains, we reviewed several frameworks or classification schemes for types of intervention from the literature (e.g., health impact pyramid,<sup>33</sup> behavior change wheel,<sup>22</sup> intervention wheel,<sup>34</sup> and the classification scheme used by the Community Preventive Services Task Force<sup>20</sup>). We also attempted to generate a list of subdomains from four of our included works,

which provided the most detail and offered a categorization of the methods of the interventions (see Table A1 in Appendix A).<sup>1, 8, 9, 26</sup> Types of interventions in these four studies did not overlap much; each study identified types of interventions not described in other studies. Our conclusion is that developing subdomains for this domain will require a comprehensive review of the intervention literature (rather than a review of literature reviews, as we have done), synthesis with existing frameworks for interventions, and more formal processes, including expert feedback, to articulate a definitive set.

**Resources and Infrastructure.** This domain represents the means available for the operation of health systems which, broadly speaking, includes human resources, facilities, equipment and supplies, financial funds, and knowledge. At this point, we do not propose subdomains; rather, we suggest the need for further efforts to elucidate these. Early work describes the “spanning infrastructures”<sup>16, 35</sup> found in integration interventions to facilitate preventive services delivery, such as information systems for patient referral. Identifying and establishing the evidence for spanning infrastructures and other, organization-based resources and infrastructure that support the implementation and effectiveness of integration intervention are rich areas for future research. A first step is to synthesize literature from existing work in integration and from implementation science frameworks<sup>24, 36</sup> to develop a working list of subdomains for future research.

**Level of Integration.** The IOM has proposed levels of integration (isolation, mutual awareness, cooperation, collaboration, partnership, and merger) for this domain; although the IOM does not give detailed definitions, these may prove useful as part of a taxonomy.<sup>3</sup> A standardized set of terms to describe the level of integration has intrinsic appeal in terms of utility, but when using such terms, “more is not always better.” Different levels of intervention are commonly understood to be appropriate and effective in different situations; we need to work to document this contention. As part of defining levels of integration, specific characteristics of integration interventions may be included; alternatively, these characteristics may be useful as stand-alone

elements within this domain (or even included in the resources and infrastructure domain). For example, descriptive work needs to detail whether a contract or a memorandum of understanding (MOU) formalizes the integration<sup>26</sup> or whether a coordinating committee or a coalition guides the integration intervention. Such examples may provide a useful starting point for grouping in an evidence synthesis (e.g., does the presence of an MOU facilitate implementation of an integration intervention and outcomes?). Thus, we need to expand work in this domain, as in the resources and infrastructure domain, to develop detailed definitions of each of the levels of integration and to apply them moving forward in descriptive and research studies.

**Settings.** Settings can describe a type of physical location in which an intervention takes place, such as a school or worksite; a geographic area (e.g., the scope of the intervention, whether local, statewide, or national); or a categorization of that geographic area (e.g., rural or urban).

**Target Populations.** This new domain is informed by our review of the included studies. If the target population of the intervention consists of individuals, then important information about the intervention would include characteristics of that population (e.g., age, sex, race and ethnicity). Targets for integration interventions, however, could also include organizations (e.g., if a health plan and a health department work together to change screening algorithms in primary care clinics). In terms of synthesizing our framework with other frameworks of interventions, we suggest that the levels of the social-ecological model<sup>21</sup> may best fit within this domain; one can think of the targets of the integration intervention being policy-making bodies, the community, organizations, families, or individuals.

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## Conclusion

We present an initial step in developing a new taxonomy of integration interventions between health care professionals and systems and public health organizations. We also offer a new definition of integration (building on that from the 2012 IOM report<sup>3</sup>), which can be used to promote research and evidence synthesis. The very small number of evidence syntheses (even within a specific content area, preventive services delivery) have struggled with heterogeneity of studies and an insufficient number of studies to provide definitive findings on effectiveness. To allow grouping of like interventions to describe them in a standardized way, synthesize findings, and disseminate evidence of intervention effectiveness, researchers, practitioners, and policy makers need a sensible classification scheme that can be applied across integration interventions.

The next step in the development process will be sharing the taxonomy with a broad set of experts for feedback and refinement. To develop the taxonomy further, we will delineate subdomains for the priority domains of intervention types and resources and infrastructure. Also, we plan to develop an abstraction worksheet that other authors could use in conducting systematic reviews (similar to that published by the Community Guide<sup>20</sup>) to facilitate use of the taxonomy.

The research team will disseminate this taxonomy widely to researchers, funders, and policy makers working in integration. We suggest that researchers use the domains in our taxonomy in descriptive studies and evidence syntheses. RTI authors will lead by using the taxonomy in our future work in integration—particularly in systematic reviews of integration interventions. Even with the taxonomy in this draft stage, we believe that taxonomy will be immediately useful to policy makers for providing specificity in guidance to grantees promoting integration interventions.

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## Appendix A

### Table A1. Subdomains within “Types of Interventions” from included studies

Article	Subdomains Within “Types of Interventions” Domain
Lasker (1997) <sup>1</sup>	<ul style="list-style-type: none"> <li>• Improving health care by coordinating services for individuals</li> <li>• Improving access to care by establishing frameworks to provide care for uninsured</li> <li>• Improving the quality and cost-effectiveness of care by applying a population perspective to medical practice</li> <li>• Using clinical practice to identify and address community health problems</li> <li>• Strengthening health promotion and health protection by mobilizing community campaigns</li> <li>• Shaping the future direction of the health system by collaborating around policy, training, and research</li> </ul>
Halverson et al. (2000) <sup>26</sup>	<ul style="list-style-type: none"> <li>• Patient referral arrangements</li> <li>• Personal health services delivery</li> <li>• Population-based programs</li> <li>• Community health needs assessment</li> </ul>
Martin-Misener & Valaitis (2009) <sup>9</sup>	<ul style="list-style-type: none"> <li>• Health services</li> <li>• Evidence-based practice</li> </ul>
Martin-Misener et al. (2012) <sup>14</sup>	<ul style="list-style-type: none"> <li>• Needs assessment and planning</li> <li>• Community activities</li> <li>• Evidence-based practice</li> <li>• Health promotion and education</li> <li>• Prevention</li> <li>• Quality assurance and evaluation</li> <li>• Social marketing and communication</li> <li>• Steering and advisory functions</li> <li>• Information systems</li> <li>• Professional education</li> <li>• Teamwork and management</li> </ul>
Porterfield et al. (2010) <sup>6</sup>	<ul style="list-style-type: none"> <li>• Referral process (to community partner by practice or to practice by community partner)</li> <li>• Clinical partner referral to health resources</li> <li>• Clinical partner volunteers at community program</li> <li>• Coordinated community-wide change initiative that entailed interventions across multiple community partners and organizations</li> <li>• Clinical partners making presentations to schools about nutrition, fitness, and well-being</li> <li>• Referral process (to community partner by practice or to practice by community partner)</li> <li>• Provision of training and resources to improve medical provider practices</li> <li>• Community partners making presentations to schools about diabetes awareness</li> </ul>



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