



## Concept mapping methodology and community-engaged research: A perfect pairing



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### ABSTRACT

Concept mapping methodology as refined by Trochim et al. is uniquely suited to engage communities in all aspects of research from project set-up to data collection to interpreting results to dissemination of results, and an increasing number of research studies have utilized the methodology for exploring complex health issues in communities. In the current manuscript, we present the results of a literature search of peer-reviewed articles in health-related research where concept mapping was used in collaboration with the community. A total of 103 articles met the inclusion criteria. We first address how community engagement was defined in the articles and then focus on the articles describing high community engagement and the associated community outcomes/benefits and methodological challenges. A majority (61%;  $n=63$ ) of the articles were classified as low to moderate community engagement and participation while 38% ( $n=39$ ) of the articles were classified as high community engagement and participation. The results of this literature review enhance our understanding of how concept mapping can be used in direct collaboration with communities and highlights the many potential benefits for both researchers and communities.

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## 1. Introduction

Concept mapping (CM) is a research methodology that is uniquely suited to engage many types of communities in broad aspects of research from project set-up to data collection to interpreting results to dissemination of results (Burke et al., 2005; Walker, Jones, & Burke, 2014). Since Trochim's 1989 article where he outlines the refinement of CM as a research methodology, CM has been applied in numerous fields and various contexts (Behar & Hydaker, 2009) and has received growing attention as a participatory research method useful for community health (Burke et al., 2005). An increasing number of research studies of health topics have utilized the methodology for exploring complex health

issues in various communities [i.e., cancer screening (Ahmad, Mahmood, Pietkiewicz, McDonald, & Ginsburg, 2012), strategies to increase physical activity (Kelly, Baker, Brownson, & Schootman, 2007), youth development programs (Urban, 2008), health disparities (Risisky et al., 2008), obesity and bullying interventions for youth (Vaughn, Jacquez, & McLinden, 2013), strategies to address HIV/AIDS (Abdul-Quader & Collins, 2011; Szafarski, Vaughn, McLinden, Wess, & Ruffner, in press), and immigrant experiences (Haque & Rosas, 2010)]. However, to date, there has been no review of peer-reviewed CM literature in health research across the continuum of community engagement in terms of application and methodological challenges.

How "community" is defined in community-engaged approaches to research can be a point of much confusion. The most basic definition is "those who have a shared unit of identity" and describes community as an expansive and inclusive concept (Burke et al., 2013). For example, under this definition, patients with a shared experience (e.g. seniors living with chronic pain) are

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considered a community. In addition, those who live in the same neighborhood or geographic location are considered a community. Communities can be affluent or disadvantaged, small or large. The word “stakeholder” may sometimes be used interchangeably or simultaneously with “community” in research. A stakeholder may be part of a community, or an entire community may be considered a stakeholder. As Burke et al. note, defining who a stakeholder is in research is difficult—there is no standard definition and definitions range widely (2013). In research, and in CM, it is necessary to define community and/or the range of stakeholders to be included at the onset of the project.

Community engagement and participation in research can be considered to occur along a continuum (Clinical and Translational Science Awards Consortium (CTSA) & Community Engagement Key Function Committee Task Force on the Principles of Community Engagement, 2011; Winer & Ray, 2000). Depending on the project and the stakeholders, community engagement in research varies in the community’s level of involvement, decision-making about project design and process, and communication. The continuum ranges from *outreach* (some involvement, one-way communication) to *consultation* (more involvement, two-way communication, connections), to *involvement* (participatory communication, partnership), to *collaboration* (community involvement, partnership/trust building), to *shared leadership* (strong bi-directional relationship, joint decision-making, trust) (Clinical and Translational Science Awards Consortium (CTSA) & Community Engagement Key Function Committee Task Force on the Principles of Community Engagement, 2011). Another model of participation in research is comprised of four modes: *contractual* (people in the community are contracted to take part in researchers’ experiments); *consultative* (people in the community are asked for their opinions by researchers); *collaborative* (researchers work with the community on projects that are researcher-driven and designed); to *collegiate* (researchers work with the community as colleagues in a process of mutual learning with the research process driven and controlled by the community) (Biggs, 1989).

On the partnership, collegiate, and shared decision-making end of the continuum lies community-based participatory research (CBPR). CBPR is a collaborative approach to research that equitably involves all partners, including researchers and community members, in all aspects of the research process (Blumenthal, 2011; Israel et al., 2005; Minkler & Wallerstein, 2008). Over the past decade, it has become increasingly apparent that a CBPR approach is critical to the translation of research findings into action and practice (Wallerstein & Duran, 2010). Though often incorrectly classified, CBPR is not actually a specific research method. Rather, CBPR is an approach to research that seeks to

empower communities and stakeholders as partners in the entire research process, from idea generation and data collection to dissemination and implementation of research findings (Minkler & Wallerstein, 2008). CBPR stands in stark contrast to many traditional research approaches which are researcher-driven and lack shared decision making with community partners (Minkler & Wallerstein, 2008; Szaflarski & Vaughn, 2014). Compared to research that is conducted on the community by outsiders (usually well-intentioned academic researchers), CBPR emphasizes co-research, empowerment and capacity building, partnership, and bi-directional leadership and decision-making in collaboration with communities who have traditionally had little input to the research process (Vaughn, 2015). In CBPR, the community members are viewed as valuable experts instead of being seen as disinterested or unqualified to partner in research due to lack of formal research training (Vaughn, 2015).

Community members have unique insights that should be used to enhance our understanding of a given phenomenon. Involving community members from the start of a research project also helps to ensure that the data collected reflects their lived experiences and can be effectively translated into practice (Jagosh et al., 2012). According to Burke, Trauth, and Albert (2014) “when appropriate, based on the intent of the project, enhanced community inclusion into the research process can enrich a study” (p. 14). Many studies use the nomenclature of CBPR and community-engaged research. However, there is wide variability in the extent to which the community serves as a reciprocal partner with the academic researchers (Jacquez, Vaughn, & Wagner, 2013). In addition, the confusion is amplified due to terms that are often used synonymously in the literature—community-based participatory research, action research, citizen science, community-engaged research, community-partnered research, participatory action research, and participatory research (Jacquez et al., 2013; Jagosh et al., 2012; Viswanathan et al., 2004). See Table 1 for definitions of these related terms.

CM is uniquely suited to directly engage multiple types of community members at each step of the process “so that they become research collaborators, contributing more than responses to questions” (Burke et al., 2005, p. 1394). Beginning with the preparation step in CM, community members can be partners who share leadership with researchers to define the community/appropriate stakeholders and decide on a focus prompt that will answer the research questions and fulfill project aims. In the subsequent steps of CM, community members can collect, organize, analyze, interpret and prioritize data. Stakeholders can provide data in both individually and in group settings. The visual representations of CM data (e.g. point maps, cluster maps, pattern

**Table 1**  
Nomenclature and definitions of various models of community inclusion in the research process.

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Action research is a broad family of social research methodologies that aim “to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework” (Rapoport, 1970; p. 499). Introduced by Kurt Lewin in 1946, action research was intended to generate theory while the researcher simultaneously acting on or in to change the social system (Susman & Evered, 1978).
Citizen science is the involvement of the public or nonscientists in research (Bonney et al., 2009; Purdam, 2014). Citizen science ranges in the degree to which the public actually participates in research (contractual, contributory, collaborative, co-created, collegial) (Shirk et al., 2012).
Community-based participatory research is a collaborative approach to research that equitably involves all partners, including researchers and community members, in all aspects of the research process (Blumenthal, 2011; Israel et al., 2005; Minkler & Wallerstein, 2008).
Community-engaged research involves “inclusive participation that supports mutual respect of values, strategies, and actions for authentic partnership of people affiliated with or self-identified by geographic proximity, special interest, or similar situations to address issues affecting the well-being of the community of focus” (Ahmed & Palermo, 2010, p. 1383).
Community-partnered research is an approach to research that involves academic researchers working in collaborative partnership with communities with the emphasis on community perspectives, recommendations, and goals for research (Barnett et al., 2003).
Participatory action research is an approach to addressing societal issues by adapting to the needs of marginalized communities, enhancing knowledge and facilitating action (Brydon-Miller, 1997; Kemmis, 2010; Kidd & Kral, 2005).
Combining social investigation, educational work and action (Hall, 1985), participatory research is a “bottom-up” approach to research that focuses on “knowledge for action” and active engagement of local priorities and perspectives (Cornwall & Jewkes, 1995). Jagosh et al. (2012) define participatory research as “the co-construction of research through partnerships between researchers and people affected by, and/or responsible for action on, the issues under study” (p. 312)

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matches) are particularly useful for the purpose of exploring and interpreting the data. These participant data-driven maps allow all members to see the same results and to collectively respond to the presented data. In addition, easy to use software programs such as those developed by Concept Systems, Inc. facilitate a real-time analytic process.

In the current manuscript, we present the results of a literature search of peer-reviewed articles in health-related research (broadly defined) where CM was used in collaboration with the community. We first address how community engagement was defined in the articles and then focus on those CM articles that described participatory and community-engaged studies and projects. Specifically, we focused on the following three research questions and paid close attention to potential differences by level of community engagement:

- 1) How was concept mapping executed?
- 2) What are the community-engaged outcomes and community benefits associated with concept mapping?
- 3) What are the methodological challenges of using concept mapping in a community-engaged manner?

## 2. Methods

### 2.1. Peer-reviewed literature search strategy

To identify relevant peer-reviewed manuscripts, we searched PubMed, Scopus, and Web of Science databases using MeSH heading, keyword, and topic searches. Search terms included 'concept mapping' AND 'community-based participatory research'; 'community engagement'; 'community partnerships' and 'community'. Using these search terms; the research team manually inspected the record of each identified article for relevance.

### 2.2. Selection criteria

Inclusion criteria included English-language articles published from 1989 through the end of November 2014 that referenced concept mapping and at least one of the above search terms. Only published articles in peer-reviewed journals were included.

### 2.3. Data screening and extraction

From each manuscript identified in the literature search, we extracted author(s), title, journal name, and year of publication. We first eliminated all manuscripts that did not meet the inclusion criteria (e.g., conference proceedings, non-English language, book chapters, etc.). The identified abstracts were then divided and reviewed by the authors. If one author was unsure that an abstract met the search criteria, it was notated and discussed until 100% consensus was reached across the research team about which manuscripts appeared to represent CM methodology and thus would be retained. Next, we divided the remaining articles among the research team and assigned 25% to each member of the team. After careful review of 12 randomly selected articles the team created an extraction form to be used during the summary process. Information included on the form were columns regarding the type of CM methodology used, how it was used, and the degree of engagement/participation in the CM process. Each of the authors reviewed approximately 50 articles. During this in-depth exploration of the articles, an additional 98 were removed because they were found not to meet the inclusion criteria. Any uncertainties about how to classify the article information (e.g., level of

engagement/participation) were discussed among the authors until agreement was reached.

Initially, a total of 1150 records were retrieved from the literature search. Of these records, 949 were duplicates and/or did not meet inclusion criteria. The primary reasons that articles were not retained were because: 1) they were using CM but not focused on a health-related area; 2) they were not actual studies/projects; 3) they were not peer reviewed articles but rather book chapters, conference proceedings, etc.; and 4) they were not in English. For each of the records retained, examination of the full articles and data synthesis was conducted. See Fig. 1 for more details on the literature search process.

### 2.4. Data synthesis

Due to the diversity and breadth of the CM literature retrieved and the nature of the review aims, a qualitative synthesis (rather than a meta-analysis) of the data was conducted. Patterns in the data across CM studies were summarized inductively to examine the continuum of community engagement in terms of application, level of engagement, outcomes and community benefits associated with CM, and methodological challenges using CM in a community-engaged manner.

## 3. Results

### 3.1. Community engagement and concept mapping

A total of 103 articles, covering a wide range of health related issues, met the criteria for inclusion in this review. Health issues identified in the identified CM literature included specific health

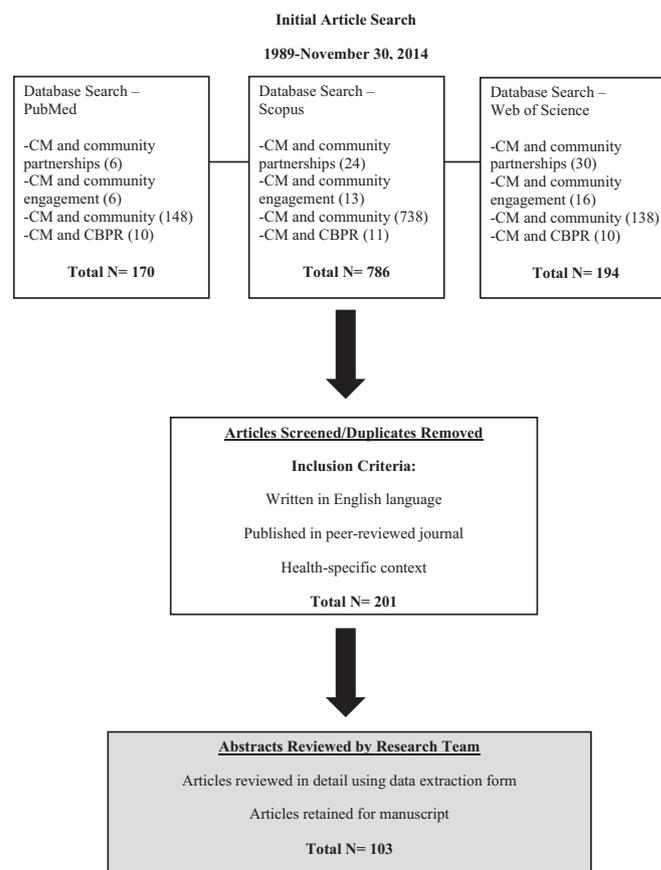


Fig. 1. Literature review process and extraction of articles.

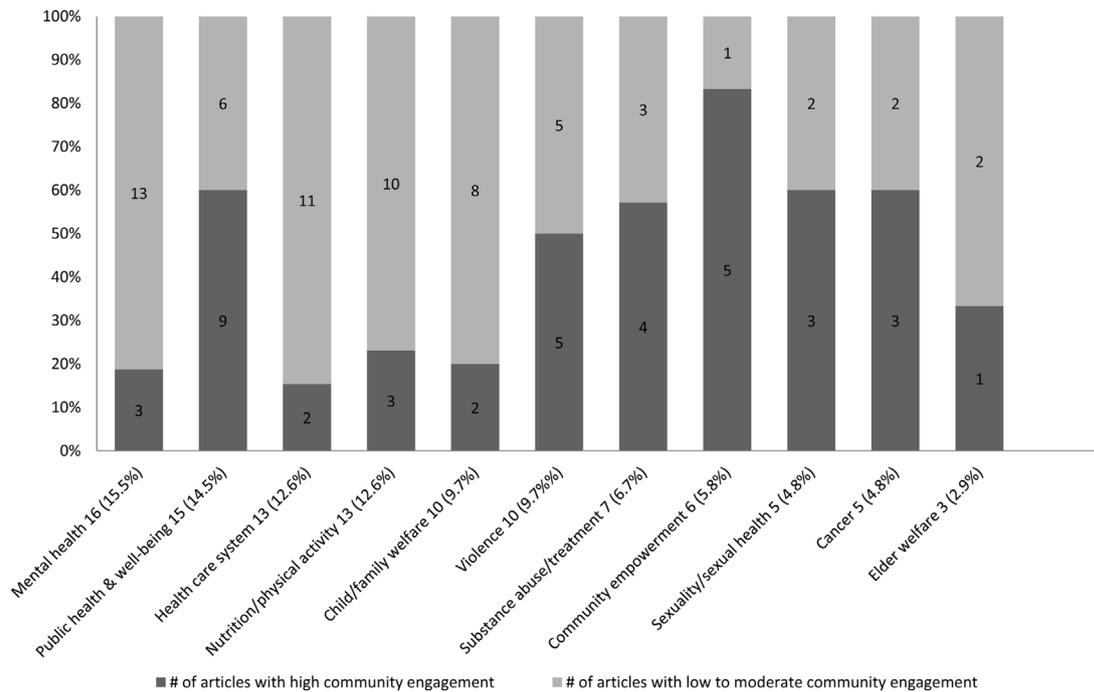


Fig. 2. Number and percentage of health topics and level of community engagement in 103 articles reviewed.

topics such as cancer and more ambiguous health topics such as community empowerment and public health/well-being. Fig. 2 presents information about the health topic addressed in each of the 103 articles.

For a majority of the articles the level of community engagement used was not clearly articulated and explicitly identified by authors. However, using information extracted from the methods section of each reviewed article, two categories of community engagement could be distinguished (low to moderate = outreach, consultation and involvement only; high = collaboration and shared leadership). A majority (61%;  $n=63$ ) of the articles were classified as low to moderate community engagement and participation (Fig. 2). Articles of this type typically treated community members and stakeholders as consultants who participated in the CM process, but did not directly inform the project or have ownership, meaning they did not take part in shared decision making and had no specific investment in the project and its related findings. For example, Rowe et al. (2012) recruited participants with recent mental health services experience and used CM to create a measure of “citizenship outcome”. Studies in this low to moderate engagement category typically did not include the participants or other stakeholders in the initial research question generation and data analysis process. Instead, they relied solely on a researcher-driven approach.

Thirty-eight percent ( $n=39$ ) of the articles were classified as high community engagement and participation (Fig. 2). Such articles described CM projects with shared leadership and decision making and included collaborative, community-engaged dialogues about the implications of the research findings and associated next steps. For example, Abdul-Quader and Collins (2011) used CM as part of a project with subject matter experts in HIV and public health experts in other fields (e.g. tobacco) to identify structural interventions to address HIV/AIDS, and Crawford-Browne and Kaminer (2012) worked with women living in high violence areas of South Africa and used CM to identify the factors that influence violence. Articles in this high community engagement category

employed active engagement of the participants (i.e. stakeholders) throughout the CM process, and the authors emphasized the importance of community partnerships and deep engagement of stakeholders in order to develop meaningful interventions, policies, programs and services that would be contextually and culturally relevant to those most affected. Windsor and Murugan (2012) noted that participants were invested in the CM study because they knew it could lead to important changes in their community. Table 2 presents a detailed overview of the identified high community-engaged CM articles and includes information about the specific content area, the nature of the community partnership, and outcomes and benefits resulting from the CM project.

The types of stakeholders (but not limited to) involved in the CM research included health care professionals, community residents, staff from local community agencies, clients/service users, patients, academic researchers, youth, public health professionals and policy makers. Across the 103 articles, stakeholders were diverse with regard to age, race, and gender. One particularly noteworthy finding is that one third (36%) of all the articles exclusively included end-users/members of the target population (community members, youth, clients, patients) in the CM process and that their inclusion did not vary by level of overall community engagement (22 of 63 (35%) low to moderate community engagement; 15 of 39 (37%) high community engagement). Across the articles, sample sizes differed for CM steps with the generation phase typically having a larger sample and the sorting/rating phases having smaller numbers. In the generation phase, some of the larger sample sizes were over 200 participants (e.g., Mpofu, Nkomazana, Muchado, Togarasei, & Bingenheimer, 2014; Rosas, Behar, & Hydaker, 2014) and the smallest sample size was 8 participants (Mercier, Piat, Peladeau, & Dagenais, 2000). Typically, the sorting/rating phases involved fewer participants than the generation phase. No qualitative differences were found between the types, numbers, and diversity of stakeholders engaged in articles classified as high versus low to moderate community engagement.

**Table 2**  
Detailed Overview of 39 High Community-Engaged Concept Mapping Articles.

Reference Grouped by Health Topic	Specific Content Area	Nature of Community Partnership	Outcomes/Benefits of Project
<b>Mental Health</b>			
1. Burke, O'Campo, Salmon, and Walker (2009)	neighborhood influences and mental well-being	low income and non-low income men and women in Toronto	lay perspective about the relationship between neighborhood context and well-being
2. Green, Fettes, and Aarons (2012)	understanding dissemination and implementation	county mental health officials, agency directors, program managers, clinicians, administrative support staff, and mental health service consumers with children receiving services	to help agencies target areas to address prior to implementation; greater collaboration and understanding among the stakeholder groups
3. Herman, Onaga, Pernice-Duca, Oh and Ferguson (2005)	sense of community in clubhouse programs	members and staff from different clubhouse programs	way to improve the relationship between members and staff
<b>Public Health and Well-Being</b>			
4. Arrington et al. (2008)	dissemination of research into practice	academics/researchers, health service deliverers, community organizations, funders, public health practitioners, community members	shared agenda for the dissemination of research into practice
5. Barker and Ziino (2010)	community rehabilitation	health professionals and consumers	development of indicators and guidelines for the optimal treatment location
6. Haque and Rosas (2010)	immigrants' perceptions of neighborhood influences on health	immigrant residents from urban, inner-city, low-income neighborhood	developed framework of factors influencing health and well-being to use in future action steps
7. Miller, Rosas, and Hall (2011)	public health and school nursing	public health nurses	identified priority areas of information access to use for future action
8. Poole, Duvall, and Wofford (2006)	state nursing home-to-community transition project	community participants with prior knowledge and experience in long-term care or services for persons with physical disabilities	identified key elements and performance measures in a state nursing home-to-community transition project
9. Rao et al. (2005)	public health priorities for end-of-life initiatives	stakeholders associated with health departments	understanding of state health department potential role in addressing and prioritizing end-of-life issues/activities
10. Risisky et al. (2008)	health disparity identification	community members	action plan to address health disparities
11. Schell et al. (2013)	public health program capacity	experts in public health and program sustainability	shared understanding of sustainability among stakeholders
12. Trochim, Milstein, Wood, Jackson, and Pressler (2004)	planning a statewide health improvement initiative	Hawaiian health professionals/leaders and colleagues outside of Hawaii with special expertise in community and systems change	official plan for state of Hawaii of how Hawaii's tobacco settlement resources could be used to create sustainable changes in population health
<b>Health Care System</b>			
13. González-Block, Rouvier, Becerril, and Sesia (2011)	maternal health in Mexico	community members from each of 4 states in Mexico	better integrated, adaptive maternal health systems
14. Sooksai, Kessomboon, Chaiyakum, Johns, and Supapol (2010)	diabetes primary care planning	head of community medical department, primary care professionals, type 2 diabetes patients, community representatives, care givers	identification and prioritization of diabetes care activities
15. Brownson et al. (2012)	evaluating Active Living by Design	community partnership members, staff, and community members	an evaluation and better understanding of Active Living by Design program
16. Kelly, Baker, Brownson, and Schootman (2007)	intervention strategies to increase physical activity	African Americans from four church congregations and the surrounding neighborhoods	intervention strategies to increase physical activity; community forums that led to policy briefs
17. Walker et al. (2011)	food buying practices	people living within two zip codes	better understanding of food buying practices within areas of limited supermarket access
<b>Child/Family Welfare</b>			
18. Johnson (2012)	needs of adolescent children of prisoners	youth, parent/caregivers and community based service providers related to incarcerated parents	better understanding of the needs of adolescent children of incarcerated parents and their caregivers
19. Vaughn, Jacquez, and McLinden (2013)	intervention strategies for physical and mental health	elementary school students, college students, parents, academic partners, teachers/staff	identified intervention strategies to address bullying and obesity across all levels
<b>Violence</b>			
20. Burke, O'Campo, and Peak (2006)	intimate partner violence	women from urban and suburban neighborhoods	comparison of urban and suburban neighborhoods
21. Crawford-Browne and Kaminer (2012)	factors influencing violence	women living in high violence area	better understanding of factors that influence violence in order to prioritize issues and plan interventions
22. Jonker, Jansen, Christians, and Wolf (2014)	care for shelter-based abused women	clients and professional staff in Dutch women's shelters	improved quality of services to abused women
23. O'Campo, Smylie, Minh, Omand, and Cyriac (2014)	intimate partner violence	mostly African American and low income women	results informed the design of intimate partner violence intervention programs

**Table 2** (Continued)

Reference Grouped by Health Topic	Specific Content Area	Nature of Community Partnership	Outcomes/Benefits of Project
<b>Substance Abuse/Treatment</b>			
24. Dawson, Cargo, Stewart, Chong, and Daniel (2012)	smoking cessation strategies	Aboriginal health workers, other health service employers, tobacco control personnel	guidance for development of smoking cessation programs geared toward Aboriginals
25. Roeg, Van de Goor, and Garretsen (2008)	care programs for substance abusers	service providers, managers, head of college	identification of the perceived structural quality indicators for intensive community-based care for substance abusers
26. Windsor and Murugan (2012)	substance abuse services	substance users, service providers, African American community members	development of a new community-based intervention to reduce substance use
27. Windsor (2013)	substance abuse intervention	substance users, service providers, community residents	community-based intervention to target the individual and community factors identified in the research
<b>Community Empowerment</b>			
28. Miller et al. (2012)	community coalition development	community partners from three counties, coalition staff and academic professors	results informed planning and formation of the coalition
29. Ridings et al. (2008)	African American community building	adults, teenage girls and boys	program design in the community
30. Ridings et al. (2010)	building a Latino youth program	Latino youth and adult community members	program design for a nonprofit organization; partnerships with local colleges
31. Surko, Pasti, Whitlock, & Benson (2006)	youth development outcome indicators	policy makers, program providers, young adults (aged 18–21)	development of indicators toward increased youth well-being and positive youth development
32. Wiener, Wiley, Huelsman, and Hilgemann (1994)	needs assessment	service users, clients, funder groups, staff members, board members	3-year plan for agency
33. Abdul-Quader and Collins (2011)	structural interventions for HIV/AIDS prevention	global stakeholders and subject matter experts	identification of structural interventions to implement
34. Bayer et al. (2010)	adolescent sexuality	15–17 year olds from a low income community near Lima, Peru	informing future action with adolescent voice; use results for survey to validate findings in a larger sample
35. Davis, Saltzburg, and Locke (2009)	sexual minority youths	gay, lesbian, and bisexual youth	identification and prioritization of program and outreach initiatives for the particular youth center
<b>Cancer</b>			
36. Ahmad et al. (2012)	barriers to mammography and solutions	South Asian immigrant women	community-based solutions from the women; empowerment of women
37. Lobb, Pinto, and Lofters (2013)	cancer screening among South Asians	potential decisions makers, program implementers, and program participants from South Asian community service and health organizations	working with advisory group to implement interventions
38. Stillman, Schmitt, and Rosas (2012)	tobacco control and cancer prevention	cancer prevention and tobacco control program grantees and stakeholders	identification of common ground between research and practice communities to benefit future collaborations
<b>Elder Welfare</b>			
39. Iris, Ridings, and Conrad (2010)	understanding elder self-neglect	content experts and practitioners in gerontology	creation of framework for elder abuse

### 3.2. Community-engaged concept mapping process

The first several steps associated with CM, as defined by Kane and Trochim (2007), were followed in most of the articles. A majority of the articles (61%) discussed generating items through brainstorming sessions and structuring the items through sorting and rating activities, but did not engage the stakeholders in dialogues regarding how to best utilize the findings and the appropriate next steps. A slightly higher proportion of the high versus low to moderate community engagement articles (35% versus 25%) included interpretation and utilization activities. For example, Windsor (2013) explicitly used a CBPR approach to CM and incorporated community interpretation groups (which included two researchers, five service providers, seven community residents and 10 substance users) in discussions of the preliminary results and how the community would use the concept map results. Kelly et al. (2007) implemented a community forum, attended by 50 stakeholders, to develop action steps to address the identified barriers to being physically active and as a result “policy briefs are currently being developed to disseminate the

recommended strategies back to the community in an effort to stimulate change” (p. 289).

### 3.3. Community-engaged concept mapping outcomes and community benefits

As noted above, few of the articles explicitly addressed the outcomes and community benefits associated with their research findings. While a majority of the low to moderate community engagement articles (78%) did not address the implications of the findings and made only vague references to the findings having general programmatic and policy related implications, a majority of the high community engagement articles did address the community-related outcomes and community benefits (67%). Outcomes of the high community-engaged CM projects ranged from specific intervention development to community-driven solutions, policies, and action plans. For example, according to Windsor (2013), “after the conclusion of [the] study, NCCB successfully obtained funds to develop a community-based intervention that will target the individual and community factors

identified in this research” (p. 18). Several of the articles noted that they used CM as a “first step” or initial process for gaining a better understanding of a particular issue or phenomena and that the results could be used to inform future research efforts. Community benefits as a result of CM included improved programs and services and greater collaboration, understanding, and common ground among stakeholders. See [Table 2](#) for more detail on the benefits and outcomes of the high community-engaged CM articles.

### 3.4. Methodological challenges of community-engaged concept mapping

A majority of the articles included fairly standard language regarding the limitations and methodological challenges of using CM. For example, small sample size and inability to generalize was mentioned by a majority of the articles, and several mentioned that the process of CM is time and labor intensive. Those articles that were more participatory in nature (i.e., high community engagement) tended to include additional information about the challenges of using CM in an engaged approach. For example, [Bayer et al. \(2010\)](#) included concerns about how the process of CM may encourage a tendency towards group think and result in biased results. [Haque and Rosas \(2010\)](#) remind readers that CM results are context specific and that those who participate in CM processes may be different than those who do not participate. In addition, [Windsor \(2013\)](#) and [Arrington et al. \(2008\)](#) noted that in-depth and nuanced information can be lost during the structured brainstorming process, and that CM lacks clear guidelines about how to reduce the number of items generated during the process to produce a final master list. [Brownson et al. \(2012\)](#) included a thoughtful discussion of how the CM process can be conceptually challenging especially when there are large numbers of items to sort and rate.

### 3.5. Discussion and lessons learned

Despite being well-suited for use in community-engaged and various forms of participatory research, CM is not a methodology that has received wide spread attention and use among such projects. The results of this literature review enhance our understanding of how the methodology has been used in community-partnered research and highlight the scientific and community benefits of using it in health research.

Across the 103 articles included in this qualitative synthesis, CM was typically executed following the traditional steps as outlined by [Kane and Trochim \(2007\)](#). The 103 articles fell along the continuum of community engaged research, yet classification into more nuanced subcategories within the continuum (such as CBPR) was not possible due to the lack of details provided by most articles and/or the page limit and format constraints of the traditional research manuscript. The majority of the 103 articles fit into the low to moderate community engagement category and did not include stakeholders as shared decision-makers/collaborators in the research process but rather were typically solicited to give input about a particular topic and asked to generate, sort, and rate items. In the low to moderate engagement studies, the research process was driven by the researchers, and stakeholders/participants usually worked as individuals not as part of an engaged group of stakeholders. In contrast, the articles categorized as high community engagement described CM studies where stakeholders were direct collaborators working alongside researchers usually from the start of the project through the end and into next steps associated with the results of the study. Stakeholder involvement in research has been shown to have benefits in the quality of decisions, an increased capacity for managing the targeted issue,

increased social capital among stakeholders, increased sustainability of project goals, and overall improvements in the targeted outputs and outcomes ([Beierle & Konisky, 2001](#); [Jagosh et al., 2012](#); [Maak, 2007](#); [Newman et al., 2011](#)). Engaging diverse stakeholders in research provides a means for collaboration and has the potential to mobilize the efforts of many more stakeholders toward a common purpose ([Ganz, 2010](#)).

Specifically within the CM process, community engagement can build cohesion among community members and contribute to more relevant and targeted interventions and outcomes of the research ([Windsor, 2013](#)). When CM is conducted in a community engaged manner, there are many potential benefits to both researchers and the community. With CM, researchers have a way to start the conversation, define the research problem, gain valuable insights, and identify relevant solutions, all with the direct involvement of end-users/members of the target community or population. There is likely to be higher participatory engagement in the research process and thus increased ownership of and “buy-in” to the research and subsequent findings. Researchers are likely to have an enhanced understanding of community needs and thus develop more relevant research questions that have meaning for the community. For community members, including those who may be disengaged and distrustful of academic research endeavors, CM offers a way to be an active part of the research process from start to finish, develop working relationships with researchers, and be directly involved in a process that could potentially lead to positive change in their community. Community-engaged CM shifts the research enterprise and corresponding power dynamic from a top-down inquiry of researchers conducting research on or about communities to research with and by communities. Indeed, “this integration of participants throughout the process is possible since concept mapping draws on methodologies that are part of the participatory learning and action tradition, which enable participants to share, analyze and enhance their knowledge of their own lives and prioritize and act on this knowledge” ([Bayer et al., 2010](#); [Bayer et al., 2010](#), p. 2087).

Several of the methodological challenges identified (e.g., small sample size and concerns about group think) in this review are issues commonly associated with qualitatively oriented research and are not specific to community engaged CM research. Others challenges, including how to synthesize and condense brainstorming results are more specific to the CM process and present opportunities for more structured guidelines to be developed and used. In addition, using CM within a CBPR approach requires that researchers and their community partners integrate the two through the use of team building, group dynamics and leadership skills. According to [Burke, Jones, and Meissner \(2014\)](#) “the development of such leadership and engagement skills could complement methods-specific training and support community health researchers in their efforts to conduct action oriented, community engaged and contextually specific research” and help to address several of the challenges associated with using CM within a community engaged approach (p. 254).

## 4. Conclusions

The current literature review was conducted with the aim of exploring how CM has been used in community-engaged research. There are several limitations that are worth noting. By only searching PubMed, Scopus, and Web of Science databases for peer-reviewed literature we may have missed relevant articles from journals indexed in other databases. Exclusion of gray literature, such as organizational reports, could have resulted in missed relevant research. While our community engagement dichotomy was a useful tool for categorizing articles, not all the articles

presented the same level of information about community and stakeholder engagement, and as a result, classification required a degree of subjectivity from the reviewers so it is possible that some articles may have been misclassified based on available information.

Used in a participatory and community-engaged manner, CM promotes the multiple and diverse perspectives of all stakeholders throughout the research process. Without the inclusion of relevant community stakeholders in all steps of the CM process, research outcomes and resulting interventions may miss the contextual and cultural nuances of the community and as a result, the research is less likely to be of lasting benefit (Vaughn et al., 2013). Without community engagement, the sustainability of projects can become compromised and the external validity questionable. The inclusion of community in all steps of the CM process can strengthen the research and contribute to the long-term applicability and potential sustainability of the findings for the community.

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