Developing a Framework and Priorities to Promote Mobility Among Older Adults

Lynda A. Anderson, PhD[1], **Amy Slonim, PhD**[2], **Irene H. Yen, PhD**[3], **Dina L. Jones, PT, PhD**[4], **Peg Allen, PhD, MPH**[5], **Rebecca H. Hunter, MEd**[6], **R. Turner Goins, PhD**[7], **Katherine H. Leith, PhD, LMSW**[8], **Dori Rosenberg, PhD, MPH**[9], **William A. Satariano, PhD, MPH**[10], and **Carol McPhillips-Tangum, MPH**[11]

[1]Centers for Disease Control and Prevention, Atlanta, GA, USA

[2]AARP, Washington DC, USA

[3]University of California, San Francisco, CA, USA

[4]West Virginia University, Morgantown, WV, USA

[5]Washington University in St. Louis, St. Louis, MO, USA

[6]University of North Carolina, Chapel Hill, NC, USA

[7]Western Carolina University, Cullowhee, NC, USA

[8]University of South Carolina, Columbia, SC, USA

[9]Group Health Research Institute, Seattle, WA, USA

[10]University of California, Berkeley, Berkeley, CA, USA

[11]National Association of Chronic Disease Directors, Atlanta, GA, USA

Abstract

Mobility, broadly defined as movement in all of its forms from ambulation to transportation, is critical to supporting optimal aging. This article describes two projects to develop a framework and a set of priority actions designed to promote mobility among community-dwelling older adults. Project 1 involved a concept-mapping process to solicit and organize action items into

domains from a broad group of stakeholders to create the framework. Concept mapping uses qualitative group processes with multivariate statistical analysis to represent the ideas visually through maps. A snowball technique was used to identify stakeholders ($n = 211$). A 12-member steering committee developed a focus prompt, "One specific action that can lead to positive change in mobility for older adults in the United States is …" Project 2 included a Delphi technique ($n = 43$) with three iterations to prioritize four to six items using results from the concept mapping rating process. Project 1 resulted in 102 items across nine domains (Research to Practice, Independence and Engagement, Built Environment and Safety, Transportation, Policy, Housing and Accessibility, Community Supports, Training, and Coordinated Action). The number of items ranged from 6 to 18 per domain. Project 2 resulted in agreement on four items that reflect the importance of promoting environmental strategies through collaborative initiatives aimed at planning and best practices focusing on environmental enhancements or transit, training of professionals, and integration of mobility into state and local public health plans. These findings can be applied to support coordinated, multidisciplinary research and practice to promote mobility among older adults.

Keywords

concept mapping; Delphi; environmental strategies; health education; mobility; older adults

Mobility, broadly defined as movement in all of its forms from ambulation to transportation, is critical to optimal aging (Prohaska, Anderson, Hooker, Hughes, & Belza, 2011; Satariano et al., 2012). Public health can play an important role in helping enhance the health and quality of life for community-dwelling older adults by taking a more comprehensive approach to understanding and promoting mobility. Vital roles for public health include integrating mobility issues into public health programs, research, and policies; helping ensure translation of effective strategies into practice for enhancing mobility; and convening collaborators to focus on mobility.

Mobility is basic to the ability of individuals to meet the challenges of everyday life, such as walking for leisure, completing daily tasks, engaging in activities associated with work and socializing, and using various forms of transport (Satariano et al., 2012). These examples shed light on the complexity of the concept, underscoring its salience to many different disciplines, from exercise physiology to transportation planning, and thereby necessitating a multidisciplinary perspective. Mobility restrictions have consequences for the health and well-being of older adults that often result in a cascade of deterioration (Prohaska et al., 2011; Ragland, Satariano, & MacLeod, 2005; Satariano et al., 2012). Thus, it is imperative to ensure that all community members have the opportunities and support to participate fully in their communities as desired.

Public health could benefit from a unified framework that examines the entire spectrum of mobility concerning individual actions to environmental influences. Without such a framework, researchers and practitioners may fail to fully identify actions needed to comprehensively assess and address mobility challenges and opportunities for older populations. Ideally such a framework applies the social ecological model involving

strategies aimed at individuals to policies affecting whole communities, as articulated in Frieden's (2010) Health Impact Pyramid.

Previous frameworks on mobility and aging have originated largely out of theory (Verbrugge & Jette, 1994; Webber, Porter, & Menec, 2010; Yen & Anderson, 2012). For example, Yen and Anderson developed a conceptual model expanding on an ecological framework, incorporating elements of the International Classification of Functioning (World Health Organization, 2002). Webber et al. (2010) constructed a conical model depicting mobility along a continuum that includes cognitive psychological, physical, environmental, and financial influences. Theory-based frameworks are important in helping bridge disciplines and represent mobility in a holistic manner. However, no specific framework has emerged as a standard or has been created through stakeholder input that captures the wide-ranging potential solutions to promote mobility and consequently could establish priorities to guide future public health research and practice. These projects are intended to fill these gaps.

This article has two major aims focusing on stakeholders' beliefs about actions that could lead to positive change in mobility for older adults in the United States. The first aim is to articulate a framework for promoting mobility among community-dwelling older adults using inputs from diverse stakeholders. The second aim is to report on a set of priority actions identified as achievable in the next 3 to 5 years among public health researchers and practitioners.

Project Overview

The importance of bringing together stakeholders from various disciplines and perspectives to advance mobility is highlighted by Schiller, Winters, Hanson, and Ashe (2013). Soliciting the perspectives of researchers and practitioners offers multiple benefits. First, it brings together multisectorial and transdisciplinary viewpoints that are critical to addressing mobility issues. Second, it permits expansive input to identify relevant domains and priority actions. Finally, it is a practical way to enhance the relevance, ownership, and melding of various perspectives (Rosas & Kane, 2012). Thus, professionals in health education and behavior can benefit from the knowledge and input from a range of perspectives.

This project involves two sequential and interrelated projects. Project 1, conducted from March to October, 2012, involved a concept-mapping process. It is a type of structured analytic approach that has been applied to develop conceptual frameworks and guide planning efforts. Group concept mapping combines the ideas of a broad group of participants to show what they think and value in relation to the specific topic of interest (Trochim, 1989). The method was selected because it is participatory in nature and enables convenient input from participants spanning large geographic distances. As a result, it is more cost-effective (in terms of time and expense) than convening face-to-face meetings (Kane & Trochim, 2007). Unlike other qualitative methods such as focus groups, concept mapping allows participants to have an equal voice and contribute through various sorting and rating processes (Kane & Trochim, 2007). It can also elicit ideas from large and diverse groups about an issue or a topic within a short time period, incorporating statistical tools for

analyzing qualitative data (Kane & Trochim, 2007). Several projects have used concept mapping to create logic models (Anderson et al., 2006), prioritize strategies (Rao et al., 2005), and plan and evaluate programs (Rosas, 2005).

Project 2, conducted from April to July, 2013, involved a Delphi process. Delphi facilitates the development of agreement using a structured analytic approach and feedback to achieve convergence of opinion (Hsu & Sandford, 2007; Yousuf, 2007). This method was first developed in the early 1950s as a tool for setting military priorities and, since then, has been used to solve a variety of problems, such as helping groups develop educational priorities, performance indicators, and treatment guidelines (Clayton, 1997; Tersine & Riggs, 1976). The Delphi process facilitates group consensus on a smaller set of actionable items from among a larger list such as those generated from concept mapping.

Project 1

Method

A 12-member steering committee led this project. Steering committee expertise included public health, aging, built environment, transportation, physical activity, rehabilitation, and injury prevention. Members had affiliations with a variety of relevant local and national groups. The project was conducted under the auspices of the National Association of Chronic Disease Directors (NACDD).

Sample—Snowball sampling was used to identify researchers and practitioners whose knowledge, opinions, experiences, or position could contribute to the resulting framework. Steering committee members suggested potential participants, which was built on by members of the NACDD and the Centers for Disease Control and Prevention's (CDC) project team. In total, 211 researchers and practitioners were invited to participate, representing aging, architecture and engineering, behavioral sciences, community development, disability, family and community health, health education, geriatric medicine, law, occupational therapy, physical therapy, psychology, public health, social work, and transportation, and urban/city planning. All information obtained from participants was completely anonymous, and participants were informed that this was a NACDD public health practice project.

Procedures—Concept mapping is a mixed-methods approach involving qualitative and quantitative methods (Rosas & Kane, 2012). The concept-mapping process included five phases (Rosas & Kane, 2012; Trochim & Kane, 2005). The first phase, preparation, involved determining a "focus" prompt. The focus prompt was developed and pretested with the steering committee. The final focus prompt asked participants to complete the following statement "One specific action that can lead to positive change in mobility for community–dwelling older adults in the United States is …." As part of the project description, mobility was defined as follows:

> Movement in all of its forms, including basic ambulation, transferring from a bed to
> a chair, walking for leisure and the completion of daily tasks, engaging in activities

associated with work and play, exercising, driving a car, and using various forms of public transport. (Satariano et al., 2012, p. 1508)

The second phase, idea generation, included inviting participants to provide specific action items. Stakeholders were invited to submit ideas using a secure website. A keyword-in-context approach (i.e., sorting and aligning the words within the action statements) was used to analyze and systematically code and organize each action item (Krippendorf, 2004) based on the judgment of the project team. The item set was subsequently reduced, including eliminating items that did respond to the focus prompt (e.g., were not related to mobility). This process was designed to create a manageable group of items representative of the ideas generated in this phase.

During the third phase, structuring of statements, there were two levels of involvement of stakeholders. First, a core group of stakeholders, a subset of participants from a cross section of disciplines and perspectives, sorted the items into categories or themes. These data were used to construct the maps. Participants were instructed to use their own criteria to develop the categories and provide a descriptive label for each category. They were also instructed not to place an item into more than one category and not to sort all items into a single category. Second, all participants were asked to rate the action items on the basis of the specified focus prompt. The rating task explicitly addressed participants' perception of items' subjective value along two dimensions. For this project, the two rating values were "potential impact" and "achievability" in next 3 to 5 years. Both ratings used a Likert-type response scale, ranging from 1 to 4, where higher ratings represented higher achievability and greater potential impact. The ratings were used to determine priorities among action items and could be used to contrast priorities among subgroups. Additionally, participants were invited to provide descriptive information about their professional perspective (national, state, local/community), primary affiliation or place of employment, and years involved with mobility issues or work.

The fourth phase, analysis, involved applying multidimensional scaling and cluster analysis. Concept Systems® computer software (Concept System Incorporated, Ithaca, New York) was used to generate the concept maps (Trochim & Kane, 2005). A similarity matrix was constructed for each sorter. A group similarity matrix was then constructed combining the data from all sorters. This matrix was analyzed using multidimensional scaling to create a two-dimensional plot of the final items. The plot resulted in a "point map," with items most often sorted together positioned closer to one another on the map. Hierarchical cluster analysis was used to partition the items into domains. This process produced a map showing the domains while retaining the underlining items. To indicate the goodness of fit of the resultant two-dimensional configuration to the original similarity matrix, a stress value was calculated as part of the multidimensional scaling analysis. A lower stress value indicates a better fit and reflects a stronger relationship between the optimal and actual configurations (Kruskal, 1964). An average stress value of 0.28 (range: 0.17–0.34) was found in a meta-analytic study of previous concept mapping results (Rosas & Kane, 2012).

The final phase, interpretation, involved reviewing and clarifying the findings, relating the findings to what is known, and determining how the information could be used to inform

programs and policies. Initial concept maps were presented to the steering committee members to review the domain labels and provide input on the implications of the findings and next steps.

Results

For the item generation phase, an exact response rate could not be calculated because of respondent anonymity. Based on unique identifiers, an estimated 174 participants (82%) visited the website, with a total of 302 ideas generated. Based on the approach outlined in the method section, a total of 102 action items were retained and used in the sorting and rating tasks.

In the structuring item phase, 85 participants completed the potential impact ratings (40% response rate) and 72 participants completed the achievability ratings. Of the raters, 56% identified themselves as representing a national perspective, 28% a local perspective, and 16% a state perspective. Additionally, 32% of the raters indicated their affiliation or work environment as a not-for-profit organization, 29% a medical or health care organization, 26% a federal agency, 9% other, and 4% a state agency. The average number of years the raters indicated they had been involved with mobility issues was 13.5 years, ranging from less than 1 year up to 42 years. Of the 50 stakeholders invited to sort the 102 items, 33 completed the activity (66% response rate).

Data from the sorting process resulted in a concept map (the mobility framework) with nine domains (Figure 1). Figure 1 shows the cluster map of the nine domains and underlying 102 action items. The list of action items is available from the authors on request. Each domain is made up of a series of points that represent the individual action items. The number of items in each domain ranged from 6 to 18. Items in a domain are more similar to one another than they are to items in the other domains. The domains vary in size, which reflects the similarity of the items as well as the number of items in the domain. The goodness of fit, stress value, was 0.31 and is within the range for a concept map with good fit (Rosas & Kane, 2012).

The map shows the positions of the domains relative to each other. The orientation of the clusters relative to the top or bottom of the map has no particular meaning, but the location of the domains relative to one another helps describe their relationships. The proximity of an individual domain to other domains reflects how similar the items in that domain are to those in nearby domains. The polygonal clusters or domains appear in a circle with one domain near the center. Beginning at the top and reading clockwise, the domain labels are as follows: Research and Practice, Independence and Engagement, Built Environment and Safety, Transportation, Policy, Housing and Accessibility, Community Supports, Training, and near the center, Coordinated Action.

Data from the rating process document participants' perceptions about the achievability and potential impact of the action items (Table 1) and summarized information about the domains. Mean achievability ratings (i.e., ratings averaged across all items within a domain) ranged between 2.30 and 2.88. The Independence and Engagement domain was rated highest on average among the domains on achievability. In contrast, the Policy domain was

rated the lowest in achievability on average among the domains. Mean potential impact ratings (i.e., ratings averaged across all items within a domain) ranged between 2.65 and 2.94. The Built Environment domain was rated highest on average among the domains on potential impact relative to the other domains. The Research to Practice and Coordinated Action domains, were rated the two lowest in potential impact on average among the domains.

Project 2

Method

This project was undertaken because of the fairly narrow range of the ratings within and across domains and feedback from stakeholder groups regarding an expressed request to further narrow the action items to identify specific, top priorities. A five-member project team, led by NACDD, managed this phase. Using results from Project 1, a subset of action items were identified and subjected to an iterative Delphi technique to identify a set of priority actions that state and local public health practitioners could take in order to promote mobility among older adults.

Sample—Seventy potential participants with relevant expertise or experience in mobility were identified by NACCD, including chronic disease directors, collaborators, and select consultants. This was a different group of participants from Project 1, with less than 6% of the participants invited to participate in both Projects 1 and 2. This group of participants was selected so that a subgroup of priorities could be identified for strategic planning purposes, specifically for state and local public health practitioners. Participants were informed that all information was anonymous and to be used for a NACDD public health practice project.

Procedures—The Delphi technique was used to facilitate the identification of the top four to six priority actions. Using the findings from the concept mapping ratings (mean achievability by mean potential impact per domain), the top 20 action items were identified and included in the Delphi process (Table 2). These items fell into eight of the nine domains. Decision rules were established a priori regarding analysis. Multiple data points were used to make decisions within and across each Delphi round (i.e., median ratings, percent selecting top ratings or rankings, and/or total point scores, a summing of each participant's rankings; Altschuld & Thomas, 1991).

Three rounds of the Delphi process were conducted. Round 1 included 20 action items placed in random order. Participants rated each item using a scale from 1 (lowest) to 5 (highest). During Round 1 analysis, items were eliminated if they had a median rating of 3 or less and had fewer than 50% of participants rating the item as a 4 or 5. Round 2 participants received the set of eligible items and were given the percentage of participants rating that item as a 4 or 5 from round one. During round two analyses, items were eliminated if they had a median rating of 3 or less or fewer than 69% of participants rating the item as a 4 or 5. In Round 3, participants ranked the remaining items in order of priority (1 = highest priority). During Round 3 analyses, item selection was based on total point scores and percentage selecting top rankings.

Results

A total of 43 of the 51 invitees who acknowledged the invitation agreed to participate (84% cooperation rate; 61% response rate). Response rates for each round of the Delphi were: 90.7% (39/43), 81.4% (35/43), and 93.0% (40/43).

In Round 1, of the 20 items, 5 items were eliminated because they had a median rating of 3 or less and fell below the 50% threshold of participants rating the item a 4 or 5. In Round 2, of the 15 items, 8 items had a median rating of 3 or less or fewer than 69% of participants rating the item as a 4 or 5. In Round 3, of the 7 items, 3 items were eliminated because the total point score for that round fell below 150. The four items retained had combined total point scores for all three rounds greater than 450 (Table 2). These four items also had more than 80% of participants rating the item as a 4 or 5 in round 2 and no other items achieved that percentage agreement. Given the use of multiple data points and the stability of agreement among the top set of items, a fourth round was not undertaken.

Discussion

This article describes the perceptions of stakeholders regarding specific actions that can lead to positive change in mobility for older adults in the United States. Engaging a group of more than 200 stakeholders provided breadth in the perspectives integrated into the resulting framework and actions identified. This series of projects is unique because it includes the use of systematic input from a broad group of stakeholders to develop a concept map as well as priorities for addressing the unique challenges and opportunities related to older adult mobility in community settings.

The actions identified through the concept-mapping process best fit within nine domains. The resulting map can serve as a framework to enhance understanding of the range of domains in which researchers and practitioners address mobility for older adults. With regard to specific domains, it is interesting that the Built Environment and Safety was rated as having the greatest potential for impact but fell in the middle in terms of perceived achievability. The potential impact ratings likely reflect the recognition that changing environmental contexts can have greater population impact relative to actions directed to individuals (Frieden, 2010). At the same time, such contextual changes may be more complex and controversial and may take longer to achieve relative to other domains (Frieden, 2010). Other priority domains reflect this same recognition, which include the Transportation domain and Housing and Accessibility domain. On the other hand, the domains rated as the most achievable were Independence and Engagement domain and Coordinated Action domain, with actions more closely aligned with individual and group-oriented activities. Thus, they likely reflect what was perceived as achievable in the near term given current strategic priorities and budgetary constraints. Moreover, achievable priorities were likely selected for their potential to be implemented with existing resources and allow for some early successes in these areas.

The highest ratings on achievability and potential impact by domain were used to determine the top 20 action items to apply an iterative Delphi process. These action items range from system-level actions involving environmental strategies such as implementing complete

streets policies to individual efforts such as supporting implementation of exercise programs to maintain strength and improve balance. Thus, they align with various levels of the social ecological framework (Frieden, 2010; McLeroy, Bibeau, Steckler, & Glanz, 1988). It is also notable that the 4 top action items come from four different domains, Built Environment and Safety, Policy, Coordinated Action, and Community Supports. These actions reflect the importance of promoting environmental strategies through collaborative initiatives aimed at planning and best practices focusing on environmental enhancements or transit, training of professionals, and integration of mobility into state and local plans.

Several factors need to be considered when reviewing these findings. First, they should not be interpreted as representing all views of those who work and focus on mobility issues. Second, researchers and practitioners recruited for these projects had experiences with or expertise in various fields or initiatives related to mobility and older adults. Although the concept mapping resulted in a list of items too numerous for action, a second project was developed that employed the Delphi process to prioritize and narrow actionable items. Variation in professional disciplines, education, work experience, and affiliations may have affected which areas participants deemed important, but diversity of perspective was critical to this project (Schiller et al., 2013). Furthermore, developing the list of priority actions is an important first step for guiding subsequent work involving the broader community. The importance of engaging diverse representation and input is clearly needed. Moreover, future efforts should engage a diverse community sample including a range of ages, sociodemographic characteristics (i.e., gender, race/ethnicity, income, education), and functional abilities.

There were a number of factors that could have influenced participation, such as timing of the concept-mapping project during the summer months and busy stakeholders who have numerous, competing priorities. According to Rosas and Kane (2012), however, participation rates were good (66% response rate for sorting, 34% for achievability, and 40% for potential impact ratings) compared to other concept-mapping projects that averaged between 20% and 30%. Furthermore, use of a web-based activity provides little control over who actually participates, and this may have also influenced participation rates as well as the content of the submitted ideas. Another consideration is the use of a single focus prompt in order to elicit the actions to promote mobility among older adults in the United States. The use of multiple questions or inclusion of multiple rounds to allow for refinement of the individual items might help sharpen the action items.

The framework domains and the priority action items provide a useful way to conceptualize priorities to promote mobility among older adults. Because the process involved stakeholders from multiple relevant sectors who work on different aspects of mobility (i.e., research, policy, practice), the framework is both comprehensive and unified. The resulting domains and priority actions also reveal the complex nature of promoting mobility in all its forms. Furthermore, the actions offer valuable and concrete direction to public health practitioners interested in promoting mobility and positive aging, especially with regard to the challenging task of developing environmental-level interventions. Notably, the nine domains are consistent with assessment elements for developing livable communities across the lifespan that should be considered by communities and in states' planning. The findings

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point to an initial set of priorities to help ensure mobility and social engagement among older adults and the dissemination of evidence-based programs.

Findings were disseminated to various groups. For example, a presentation was made at the CDC Healthy Aging Research Network partner meeting, which also included a subsequent series of small group activities focusing on the use of the action items in framework. A webinar was also presented to the membership of the NACDD and AARP state offices. Additionally, several face-to-face meetings were held with other key stakeholder groups to share results and discuss ways to bolster implementation of priority actions. Furthermore, the priority actions are being used to inform future initiatives being developed under the auspices of CDC's Healthy Aging Program.

Researchers and practitioners need to assess the relevance of these priorities related to their unique missions and the communities they serve. Such initiatives can best be achieved through collaborative actions across multiple sectors such a city planning, aging organizations, and public health entities. Another benefit of this work is that practitioners can begin implementing the initial priority actions and address longer range actions identified in the domains over time. These finding will hopefully encourage those focused on promoting mobility to include an array of dimensions in their work and inform others to begin to engage in this important area. In doing so, they will contribute to optimal aging and to the health of the overall community.

Acknowledgments

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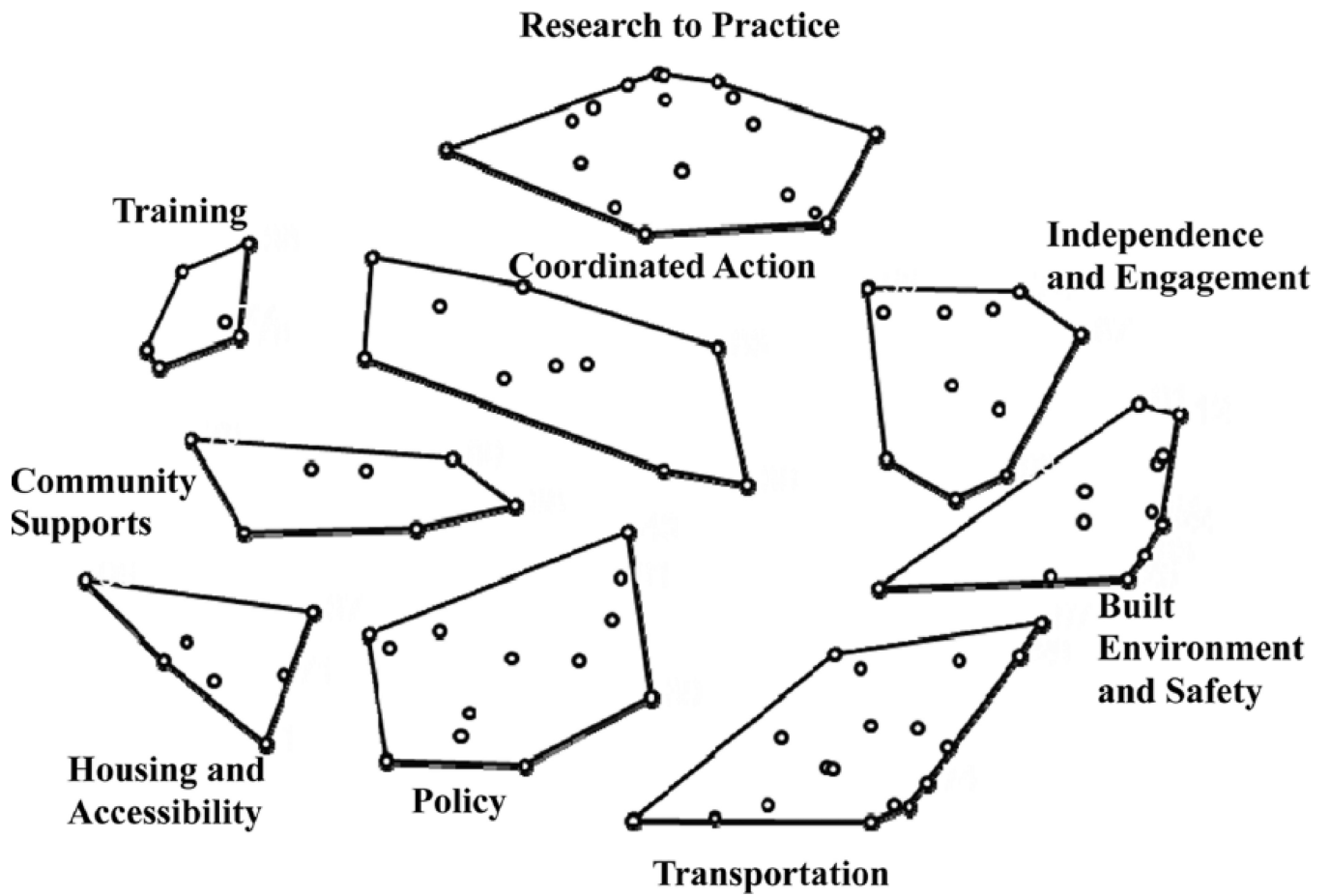
Figure 1.
Framework on mobility among older adults, based on concept mapping.

Table 1

Achievability and Potential Impact Ratings and Rankings for the Nine Domains From Concept Mapping.

Domain	Achievability		Potential Impact	
	Mean Rating[a]	Ranking	Mean Rating[b]	Ranking
Independence and Engagement	2.88	1	2.76	6
Built Environment and Safety	2.51	5	2.94	1
Transportation	2.35	8	2.92	2
Policy	2.30	9	2.91	3
Housing and Accessibility	2.44	7	2.83	4
Community Supports	2.49	6	2.71	7
Training	2.63	4	2.82	5
Research to Practice	2.66	3	2.65	8
Coordinated Action	2.72	2	2.65	8

[a] Achievability was rated on a 1 to 4 scale, with higher scores reflecting greater achievability relative to other domains.

[b] Potential impact was rated on a 1 to 4 scale, with higher scores reflecting greater potential impact relative to other domains.

Table 2

Top 20 Items From Concept Mapping*a* by Domain and Four Priority Items From Delphi Process.

Domain: Action Item	Total Point Score Across Rounds*b*
Independence and Engagement	
Support the use of programs for exercise to maintain strength and improve balance	275
Identify one or more communities to serve as environmental models or as examples of mobility-sensitive or -friendly communities	240
Identify and promote critical programs related to driving and older adults, including persons with cognitive and physical limitations	119
Built Environment and Safety	
Implement Complete Streets, traffic calming, and continuous sidewalks to promote safer, more functional and more aesthetically pleasing walking and wheeling environments	**492**
Increase use of pedestrian-friendly walkways in all areas with expanded use of crosswalks and extended traffic lights to assure safety	402
Implement strategies known to make street crossings safer for crossing assistance	245
Transportation	
Improve the accessibility of public transportation for people with mobility, sensory, physical, and cognitive disabilities	410
Support the design of public transportation to reduce the challenges of older adults taking public transit	265
Policy	
Require coordination and integration among local, county, regional, and state entities responsible for pedestrian, cycling, and transit to ensure planning and use of best practices	**491**
Create state-specific guidance for Complete Streets to encourage planning and transportation funding reallocation for a range of transportation modes	412
Form coalitions of community groups with mutual interests, to develop and help adopt complete street policies that include road, sidewalk, lighting and shade polices, and other supports to encourage walking while providing a safe and healthy area	278
Include requirements to ensure that publically funded agencies responsible for providing transportation also participate in the local mobility planning process	276
Community Supports	
Support and implement training for city planning and public health government staff on model legislation, projects, and programs to enact and maintain Complete Streets plans	**492**
Promote technology, way-finding tools, and environmental cues that help individuals, including older adults, to better know where they are and how to find their way to where they want to go	126
Training	
Support and provide advocacy training for older adults to be involved in improving their environments	119
Research to Practice	
Develop a list of best practices to identify and promote mobility for older adults	267
Conduct community level assessments to identify older adults' mobility deficits and needs	260
Promote the use of multiple mobility assessments and strategies into health promotion programs	131
Coordinated Action	
Include mobility in coordinated chronic disease prevention and health promotion state plans	**460**

Domain: Action Item	Total Point Score Across Rounds[b]
Engage older adults, though interactive participatory methods, in voicing their strengths and priorities in promoting mobility	122

Note. Items in boldface indicate top items.

[a]Items were identified by examining a bivariate plot of ratings from the concept-mapping process; the top 20 items with the highest achievability by potential impact rating across all domains were selected for inclusion in the Delphi process.

[b]Total point score is a sum of each participant's rating and rankings across the three rounds.