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SGS SOUTHERN GERONTOLOGICAL SOCIETY

Journal of Applied Gerontology
2021, Vol. 40(4) 404–413

DOI: 10.1177/0733464819898643
journals.sagepub.com/home/jag
SAGE

Using Concept Mapping Methods to Define "Healthy Aging" in Anchorage, Alaska

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Abstract

This exploratory research project captured a multidimensional model of healthy aging in Anchorage, Alaska, by utilizing the Concept Mapping (CM) methodology with a sample of 53 older adults (aged 55+), aging advocates, public health professionals, and senior service providers. Multidimensional scaling and cluster analyses were conducted to map the relationship between 100 aspects of healthy aging, resulting in 12 distinct concepts of healthy aging. Study participants identified both lifestyle factors and aspects of their environment, providing results that can inform future research and policy development. The perspectives of older adults are scarce in the literature, but how they conceptualize the factors that contribute to healthy aging can have profound influence on behaviors and health outcomes. In addition, CM is a little-used methodology in gerontology that fosters community capacity building, meaningful contributions, and trusting research partnerships. We also provide recommendations for using these methods with older adults.

Keywords

mixed-methods, successful aging, urban, methodology, social support

Introduction

Although the term is used frequently in the gerontological literature, there is no universal definition of exactly what is meant by *healthy aging*. The phrase *successful aging* is often used to describe healthy aging in terms of three main components: low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life (Rowe & Kahn, 1987). However, this definition has been criticized for focusing too heavily on physical functioning and individual lifestyle choices rather than social inequalities that contribute to health disparities (Katz & Calasanti, 2014). Lewis (2010) states that since the Rowe and Kahn model was developed by non-minorities, it does not include localized or Indigenous perspectives and "runs the risk of contributing to inappropriate classification of ethnic minority elders by declaring them as aging less successfully than their non-minority counterparts."

Research shows that successful, or healthy, aging is defined differently by medical professionals and older adults who tend to put more or less weight on the physiological, psychological, societal, and personal aspects of aging (Hansen-Kyle, 2005). Most medical definitions of successful aging eliminate those with disability, but older adults do not necessarily see their disabilities as barriers to healthy aging (Reichstadt et al., 2010; Tkatch et al., 2017). Instead, older adults tend to focus on self-acceptance and engagement with life activities to define healthy aging (Bowling, 2007). Research has shown that important domains of healthy aging to older adults can be so different from the domains created by researchers that no overlap or agreement may exist between the two models (Kusumastuti et al., 2016).

However, older adult definitions may not provide a full picture of the factors of healthy aging, either. Research shows that including community-based professionals, such as aging advocates, researchers, and service providers, in such conversations with older adults can provide a holistic model of healthy aging that demonstrates a more robust foundation for supporting aging and addressing health disparities (Soellner et al., 2017; Trevino et al., 2020). As various stakeholders may

Manuscript received: August 12, 2019; **final revision received:** December 3, 2019; **accepted:** December 4, 2019.

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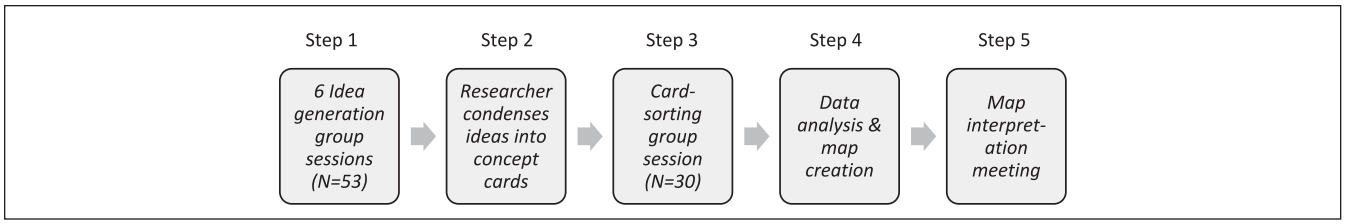


Figure 1. Phases of the Concept Mapping project on healthy aging.

hold differing views on the subject, a participatory approach is needed to integrate the multiple perspectives of stakeholders.

This exploratory project was the first phase in a larger community-based participatory study utilizing principles of a mixed-methods approach called Concept Mapping (CM). CM integrates both qualitative and quantitative data and is well-suited for research with diverse stakeholders (Kane & Trochim, 2007; Vaughn & McLinden, 2016). The method has been applied in public health (van Bon-Martens et al., 2017) and the study of aging (Conrad et al., 2011; Kazeminia et al., 2015). Because CM is often used for conceptualizing difficult health problems (Trochim & Kane, 2005), it is an ideal participatory framework for the investigation of how stakeholders perceive healthy aging in their community (Rosas, 2012; Vaughn et al., 2017).

Research Site

Much of Alaska, part of the Circumpolar North, contains underserved populations who experience a variety of resource constraints. For example, with only one, small university medical program in the state, Alaska experiences some of the greatest medical and geriatric provider shortages in the country (Kaiser Family Foundation, 2018). Alaska also has the highest cost of medical care in the nation; residents spend more than double the national average on health care (Passini et al., 2018).

Anchorage is home to 40% of Alaska's population, including approximately 70,000 adults above the age of 55 years, comprising 11% of the municipality's residents (State of Alaska, 2018). This, coupled with the fact that Alaska has the fastest growing proportion of older adults per capita in the country, makes Anchorage the ideal location to study healthy aging in the urban Circumpolar North (Administration on Aging, 2018). However, little previous research has sought to understand how older adults define healthy aging, what factors they prioritize, and what opportunities and barriers to healthy aging older adults believe exist in Alaska's largest city.

Method

This exploratory study utilized principles of CM methodology to address the research question: *How do older adults and other stakeholders view healthy aging in Anchorage?* The phases in this project included (see Figure 1):

1. Preparation: Identified a diverse community of stakeholders and developed a prompt that will elicit their perspective on the issue;
2. Idea generation: Participants generated factors of healthy aging in group sessions;
3. Organization: Participants worked individually and sorted the ideas into a smaller number of conceptually similar groupings;
4. Analysis:
   a. Mapping the ideas: Individual sorting results were analyzed using multidimensional scaling (MDS) to create a single aggregated map of the ideas, which produces an *x,y* coordinate for each idea that illustrated the conceptual similarity among the ideas, and
   b. Identifying the concepts: Cluster analysis (CA) was applied to the *x,y* coordinates of the ideas to partition them into a smaller number of clusters of related concepts; and
5. Interpretation: Although CM involves sophisticated multivariate statistics, the results were maps that can be easily interpreted by stakeholders.

Study Participants

Research participants were recruited via nonrandom, purposive, and convenience sampling via invitation from the researchers, word-of-mouth from other participants, flyers at two local community centers and two senior living communities, and an advertisement in the local *Senior Voice* newspaper. Study participants ($N = 53$) were older adults 55 to 94 years of age who lived in Anchorage (14 males and 39 females). Eight ($N = 8$) of these participants were specifically recruited as subject-matter experts in aging, since they were also employed as aging advocates, public health professionals, or senior service providers.

Research permissions and oversight were obtained from the University of Alaska Anchorage (UAA) Institutional Review Board (IRB). Written informed consent was obtained from research participants at the beginning of the session (IRB 1353737). As monetary remuneration demonstrates gratitude and a commitment to ongoing relationships between researchers and participants (Mduluza et al., 2013), research participants were compensated US$10 for participating in a group session and US$20 for participating in the final card-sorting session.

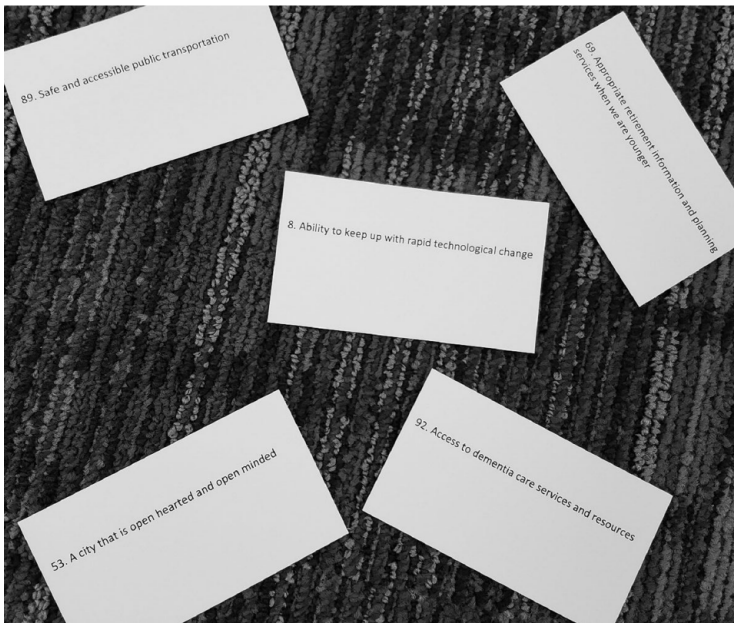


Figure 2. Examples of the numbered concept cards for the Concept Mapping sorting task.

Group Sessions for Idea Generation

Throughout February and March 2019, the researchers held a total of six group sessions to generate ideas on healthy aging at four different locations around Anchorage. Sessions were facilitated by the lead author and two to four student research assistants took notes for facilitation assistance, response verification, and analysis. Following the CM methodology, participants were given one overall question to answer (*what are the factors that contribute to healthy aging in Anchorage?*), with the facilitator occasionally prompting individuals for more description or clarification. Participant responses were typed by a student research assistant and displayed on a projector screen so the facilitator could engage in real-time member checking of results for accuracy with participants (Kidd & Parshall, 2000).

The group sessions yielded 234 ideas about what contributes to healthy aging. After all group sessions were completed, the research team collaborated to reduce the number of ideas (research step 2, Figure 1) to manage the response burden. We followed the structured process outlined by Kane and Trochim (2007) by removing duplicative responses and items that did not align with the focus prompt. We aimed for a final set of ideas that approximated the median value of 98 as outlined in other CM research (Rosas & Kane, 2012), with the result being 100 ideas for sorting.

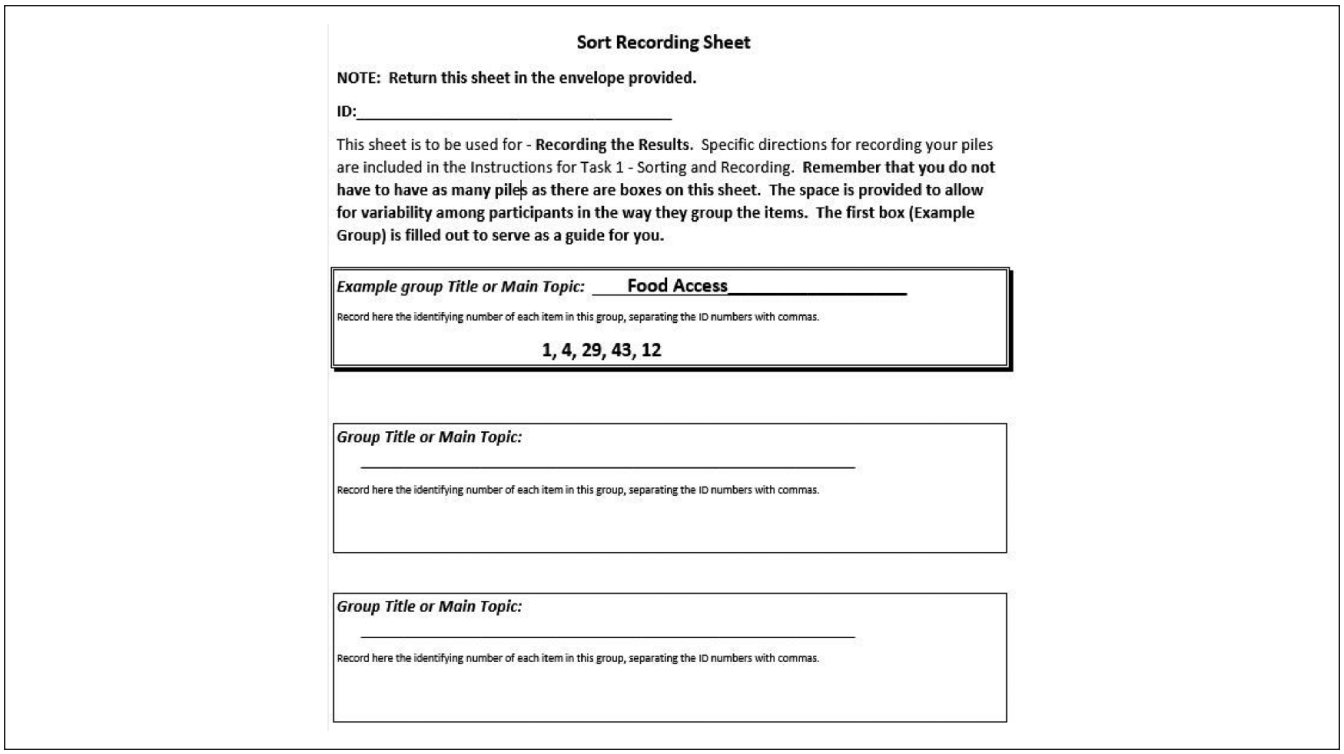
Card-Sorting

The 100 ideas were numbered and printed onto cards, one idea per card. Forty-two group participants returned for the card-sorting session (research step 3, Figure 1). Participants were each given a stack of the 100 numbered cards (see Figure 2) and asked to sort these cards into a smaller number of stacks, such that each stack contained cards that expressed similar ideas (Wood & Wood, 2008). After sorting was complete, each participant was asked to record the card numbers in each stack and provide a title or caption that expressed the common theme of the ideas in each pile of cards. Participants had as few as four and as many as 13 different stacks of cards.

With the assistance of five student research assistants, 30 of the 42 participants accurately completed the worksheet (see Figure 3). For example, one participant stacked cards 6, 7, 26, 27, and 69 together and labeled the pile "Access to Medical Care" as a component of healthy aging.

Analysis

MDS and hierarchical CAs were used to convert the sorted cards into a visual representation, where each idea is a point with an x and y coordinate on a map (research step 4, Figure 1). MDS computed the location of each idea based on how often ideas were sorted together; ideas positioned closer together were often sorted into the same stack by multiple participants. Likewise, the distance between points on the map increased when ideas were not often (or ever) sorted together by participants. CA was applied to the location of points on the map to parse the 100 ideas into a smaller number of conceptually similar ideas. CA computes from 1 to N clusters, meaning that the minimum number of clusters is one and the maximum occurs when each idea is considered



Sort Recording Sheet

NOTE: Return this sheet in the envelope provided.

ID:_____

This sheet is to be used for - **Recording the Results.** Specific directions for recording your piles are included in the Instructions for Task 1 - Sorting and Recording. **Remember that you do not have to have as many piles as there are boxes on this sheet. The space is provided to allow for variability among participants in the way they group the items. The first box (Example Group) is filled out to serve as a guide for you.**

Example group Title or Main Topic: **Food Access**

Record here the identifying number of each item in this group, separating the ID numbers with commas.

1, 4, 29, 43, 12

Group Title or Main Topic:

_____

Record here the identifying number of each item in this group, separating the ID numbers with commas.

Group Title or Main Topic:

_____

Record here the identifying number of each item in this group, separating the ID numbers with commas.

Figure 3. Excerpt from the Concept Mapping recording worksheet.

an individual cluster. In practice, the minimum and maximum have been identified as between six and 14 inclusive (Rosas & Kane, 2012). The analysis software used in this study, *IdeaNet* (McLinden, 2019), provides solutions for five to 15 clusters. An interpretive task is necessary to choose the appropriate number of clusters such that the "cluster solution has a balance of sufficient yet manageable detail in order to have a clear understanding of the issue" (Vaughn & McLinden, 2016, p. 307). In a final analytical step, the location of each person's label for every card stack they created was computed based on the *x,y* coordinates of each item in a stack.

Validity of the resulting map was assessed through a measure of the fit of the map to the input data. In computing the model, there is a loss of information as the MDS algorithm fits the model to the data and that loss is computed as a measure termed *stress*. High stress values indicate a lack of structure and hence questionable validity of the map. Stress varies from zero to one and lower values indicate better fit. Reliability in CM is concerned with the reproducibility of structure by different card stacks of similar participants and was evaluated using the split-half method. Participants were split into two groups through random assignment; input matrices were created for each group and an MDS solution was computed for each group that resulted in an output matrix of interpoint distance (Drost, 2011). Split-half reliability was obtained by computing the Pearson correlation between the input matrices for each group and then between the two output matrices and correcting the resulting value with the Spearman-Brown Prophecy Formula (de Vet et al., 2017).

Findings

Although 42 individuals participated in the card-sorting session, 12 had trouble with this cognitive task, resulting in a total of 30 card-sorters who accurately completed the activity for analysis. This completion rate of 71% is well above the average completion rate for similar studies (Rosas & Kane, 2012) and is sufficient for uncovering conceptual similarity of items (Wood & Wood, 2008). The stress value for the two-dimensional MDS solution was 0.28, this value was about average and well within the range of stress values in other CM studies (Rosas & Kane, 2012). Also, the stress value was below 0.39, a value that might be expected if the structure was random, and is evidence the map has meaningful structure (Sturrock & Rocha, 2000). Split-half reliability of the data structures was 0.75 and 0.70 for the input and output structures, respectively. A concept map with 12 clusters (see Figure 4, top) was chosen as the appropriate solution. Each of the 12 clusters was labeled based on its component concepts (see Figure 4, bottom).

This concept map visually depicts similar ideas as grouped together, and disparate ideas as far apart on the map. For example, Cluster 3 consists of 11 concepts,

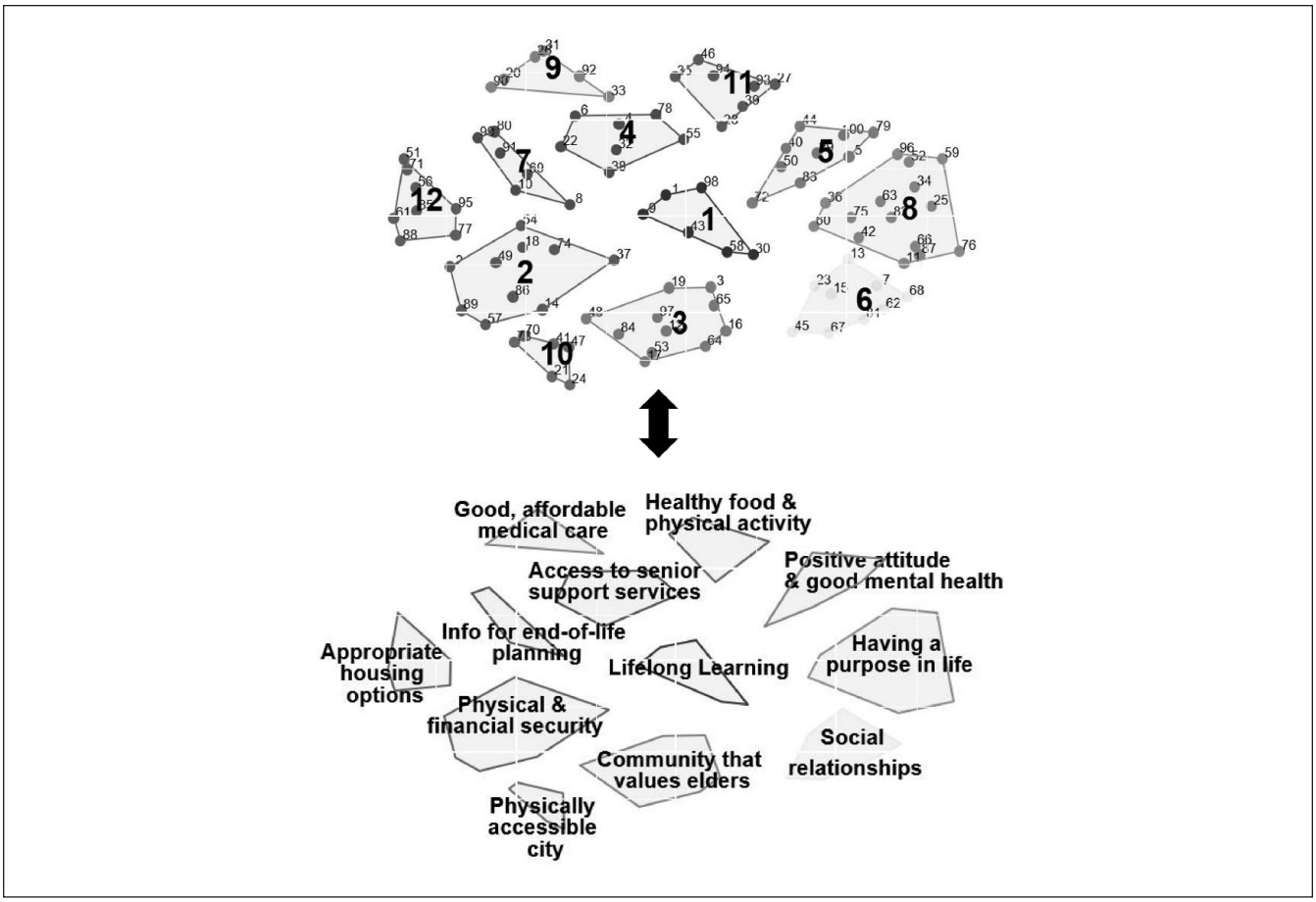


Figure 4. The concept map produced from multidimensional scaling and cluster analysis revealed several clusters (top) that elucidated 12 central concepts of healthy aging (bottom).

depicted as 11 points on the upper map (Figure 4), related to living in a community that respects and supports their elders (see Table 1). These map clusters were titled based on participant labels and quotes from group session participants.

Good, Affordable Medical Care

Concepts grouped into this cluster included the need for help navigating health care insurance systems. Participants claimed that Medicare is confusing and cumbersome for people to navigate on their own. Participants reported few primary care physicians who accepted Medicare, resulting in extreme provider shortages statewide. Participants in group sessions were frustrated when this topic came up, often indicating disbelief regarding the many services that did not seem to be covered by Medicare. Having accessible, affordable, and stress-free access to medical care was stated by participants as an important aspect to healthy aging in every group session; however, few participants felt that this was an achievable goal in Anchorage. Indeed, health care costs in Alaska are double the national average (Grazko, 2017).

Access to Senior Support Services

Participants grouped ability to age-in-place and avoid vulnerability, frailty, and risks of falls in this cluster with concepts like access to person-centered caregivers and having appropriate physical supports like assistive devices and ramps in their homes. It is important to note that older adults recognize that they may need supports or assistance, but these services should not preclude them from aging-in-place, feeling in control of their own lives, or achieving healthy aging. Participants also linked these ideas to programs that can help keep their minds and bodies active, demonstrating the connections between maintaining activity and engagement, cognitive health, and autonomy.

Appropriate Housing Options

Several factors appeared in this cluster, including safe, affordable housing and assisted living options utilizing universal design for accessibility. Cooperative housing was mentioned, which usually involves residents cooperatively owning and running a housing community with communal

Table 1. Example of Concepts in a Cluster (Community That Values Elders).

Card no.	Card concepts from Cluster 3
3	Having resources like the Senior Voice newspaper, Anchorage Senior Activity Center, AARP, public radio, public TV, etc.
12	A community that respects and utilizes the skillsets of older adults
16	The ability to include diverse elders in our activities with interpreters, invitations, accessibility, etc.
17	A kind community that cares about other people
19	Positive societal attitude toward aging
48	Political and economic environment that respects and supports aging
53	A city that is open-hearted and open-minded
64	Job-sharing services and work programs for seniors
65	Having senior centers in the community
84	A neighborhood that comes together to help seniors with chores and daily tasks
97	Need job-sharing opportunities in Anchorage

living and other spaces to facilitate social interaction among residents (Abramsson & Andersson, 2016). Alaska is experiencing a severe housing shortage, especially for older adults (Barnes, 2019), resulting in the priority of this cluster. Participants also grouped several financial concepts into this cluster, linking the importance of financial literacy, planning, and budgeting assistance for seniors to be able to afford acceptable (and often expensive) housing options.

Physical and Financial Security

Participants grouped a variety of related ideas together including safe, affordable, accessible, and reliable public transportation featuring door-to-door assistance. Although public transportation options exist in Anchorage, residents voiced a variety of complaints, including that bus drivers cannot get out to help seniors safely navigate the sidewalk, curbs, and/or steps into and around the vehicle. Study participants were also concerned that the eligibility requirements (income and disability-based) for reduced-fare or free on-demand transportation were too limiting, so this cluster also contained the idea that expanded eligibility criterion are needed for more older adults to qualify for such programs. Participants also grouped together access to emergency planning resources and geriatric workforce development to overcome provider shortages in this cluster. In addition, Anchorage's recent earthquake (November 2018) has put emergency planning in the forefront of people's minds regarding their physical safety and security (Brooks & Hopkins, 2018).

A Physically Accessible City

Participants sorted items together that had to do with pedestrian walkways, feeling safe in areas with sidewalks, adequate street lighting, and removal of winter weather barriers. Many of Anchorage's neighborhoods do not have sidewalks, and those that do are often used for snow storage from street sweeping. In fact, Anchorage municipal code specifically allows for snow storage on sidewalks during the winter (Municipality of Anchorage, 2018), making the city's few sidewalks virtually impassable much of the winter. Older adults also linked physically accessible public buildings and spaces into this cluster with an elder disabled registry for residents who need special assistance during a natural disaster. Participants generally agreed that healthy aging is facilitated by a city that prioritizes accessibility in public spaces.

A Community That Values Its Elders

Participants indicated that resources like a senior newspaper, local senior centers, and other resources were important for healthy aging. They also included concepts into this cluster such as a community that respects and utilizes the skillsets of older adults, with a political and economic environment that supports aging, and ideas related to job-sharing and work opportunities for seniors. The treatment of older adults in society was of great concern for Anchorage's seniors. Participants linked positive societal attitudes toward aging and "a city that is open-hearted and open-minded" as requirements for healthy aging.

Healthy Food and Physical Activity

Anchorage seniors indicated several ways they could take care of their own health, often revolving around access to healthy food and safe physical activity. If fruits, vegetables, and safe exercise opportunities were more accessible on their limited incomes, older adults indicated they would be able to better maintain their cognitive health, physical mobility, and avoid depression. Importantly, seniors sorted "staying independent" in this cluster as well, demonstrating their perceived connection between healthy lifestyle factors now that could increase independence later.

Positive Attitude and Good Mental Health

Participants grouped several items together under labels such as goals, spirituality, mental health, and self-help. These

concepts included being ready for retirement and finding structure for their daily activities to stay busy after retirement, which can also reduce loneliness and depression. They voiced the importance of having skills and time to advocate for themselves, as well as being able to recognize their limits as they age. Participants placed a central role on the concept of having control over their own lives as a facilitating factor to achieving a positive attitude.

Maintaining Social Relationships

Participants linked volunteering in the community, civic engagement, and participating in local events to the notion that maintaining social connections is important for healthy aging. They prioritized not just family and friends but also church membership, intergenerational mentoring opportunities, and engaging with people of various age groups. Participants also tended to group the acceptance of everyone as they age (LGBT [lesbian, gay, bisexual, and transgender], disability, ethnicity, etc.) with opportunities to pass on knowledge as ways to maintain a variety of social relationships that can lead to healthy aging.

Lifelong Learning

A recurring topic in each group session was that many senior participants claimed to not know much about the aging process and felt poorly equipped to deal with their changing bodies, nutritional needs, and health. Additional concepts in this cluster included access to programs for seniors to audit university classes, receive reduced tuition rates, or take specialized classes for older adults. Other common concerns in this cluster included being able to discern false information online, and the ability to use technology appropriately and efficiently. Finally, "having our voices heard" appeared in this cluster since many seniors felt they did not know how to reach out to policymakers and effect change, something that could be remedied by further education on the topic.

Information for End-of-Life Planning

Participants related the need to find assistance with errands and domestic tasks to their equal need for appropriate retirement information and end-of-life planning resources. Also in this cluster was the concept of financial security. It is noteworthy that so many clusters in this study contain at least one concept related to monetary resources, demonstrating that older adults view finances as a major thread running through most aspects of healthy aging in Anchorage, where cost of living is notoriously high (Fried, 2017).

Having a Purpose-in-Life

This last cluster contained a variety of statements that coalesced around having meaning in life. Such concepts included building new friendships, opportunities to creatively express themselves, participation in outdoor activities, traveling, pursuing hobbies, and visiting family. Also linked were concepts including the ability to engage in meaningful solitary activities when desired, maintaining optimism, and social support networks of family and friends. Research indicates that these ideas are all ways in which seniors may find purpose-in-life, which is linked to better health outcomes across a variety of settings (Boyle et al., 2010; Pinquart, 2002).

Study Limitations

As the group sessions yielded many different ideas about healthy aging that were condensed to a manageable number of concepts for card-sorting and analysis, some findings may be obscured in these 12 clusters. In addition, most of our participants were women, although this is not uncommon when utilizing a convenience sample of older adults for community-based research (Ahn et al., 2017; Trevino et al., 2020). Moreover, all research materials and tasks were conducted in English. This CM project also revealed challenges to conducting a multistep organizational task for some participants, where we experienced some loss-to-follow-up and confusion about the purpose of card-sorting. Twelve individuals, as mentioned above, found it too difficult to sort 100 cards into conceptual groupings. We recommend researchers using principles of CM with older adults utilize fewer than the 98 to 100 cards for sorting recommended in other literature (Rosas & Kane, 2012).

Discussion

Our results show some similarities to other research in which older adults define factors of healthy aging. For example, research supports our findings that engagement with social opportunities, lifelong learning, having a purpose-in-life, and maintaining a positive attitude are among the most important characteristics of healthy aging (Phelan et al., 2004; Reichstadt et al., 2007, 2010). In addition, Black and Hyer (2020) demonstrate that Baby Boomers in the American Southeast also prioritize accessible city amenities and access to volunteer and employment opportunities as desirable components of healthy aging, which is corroborated by our findings.

Tkatch et al. (2017) found that older adults define healthy aging as maintaining functioning and psychosocial well-being, despite potentially living with illness or disability. However, Phelan et al. (2004) conclude that living a long time, remaining free of chronic disease, and remaining in good physical health were important components of healthy aging among Japanese American and White participants. Although the Anchorage participants expressed a desire to ward off illness for as long as possible, it was not considered a necessary requirement for healthy aging in this sample.

Maintaining independence is a major factor in healthy aging for older adults in a variety of locations around the world. For example, research among Chinese older adults demonstrated that self-reliance was the overall goal of healthy aging, with emphasis on the concepts of physical activity, financial security, community connectedness, and willing acceptance of the declines brought about by aging (Chen et al., 2020). Although some of these concepts arose in Anchorage, our sample was unique because research participants were much less focused on self-reliance and instead focused on psychosocial factors of healthy aging.

Our results support other findings in the United States about the importance of appropriate housing options for seniors. Research has indicated that older adults, especially those with lower income, may be more reliant on their physical surroundings (Rowles & Bernard, 2013) and that supportive housing environments can serve a compensating role by providing social and material resources (Ahn et al., 2017; Park et al., 2017). Similar to Black and Hyer's (2020) study, Anchorage participants recognize that their ability to age at home may be limited, instead expressing a desire for alternative safe and affordable senior housing options that provide a socially integrated environment in the community.

Research participants viewed healthy aging as more of a community effort involving positive local perceptions of aging, respect for older adults, and receiving social and material supports from friends, family, and paid caregivers. Although autonomy is important for all people, older adults in our sample and across Alaska appear to more greatly value community perceptions and supports in their local definition of healthy aging (Hopkins et al., 2007; Lewis, 2011, 2013), which makes these results relatively unique in the healthy aging literature.

These study results may be applicable to other urban Circumpolar environments. Although this study contains a convenience sample, research suggests there are common threads in the factors that contribute to aging across the Circumpolar North (Emelyanova et al., 2010; Howell & Peterson, 2019). Therefore, these results may be helpful in similar locations. The seasonality of the physical environment may present similar barriers to affordable food, physical activity opportunities, and available housing as well as reduced social opportunities, potentially leading to outcomes such as homelessness, poverty, malnutrition, and depression (Dionigi et al., 2011; Emelyanova & Rautio, 2013; Hanson et al., 2013; Waldbrook, 2015). The perspectives of older adults in urban Circumpolar environments are scarce in the research literature, but how they view healthy aging can have profound influence on their behaviors and health outcomes (Torres, 2003).

Finally, this study demonstrates the utilization of CM methods in a community-engaged research setting. Our experience has been that participants are excited about research that they can contribute to directly. The engaging nature of the group sessions, card-sorting activities, and resulting concept map generated a great deal of interest in the community. We recommend that gerontological researchers consider using CM as a way to structure mixed-methods data collection, analysis, and reporting back to the community.

Authors' Note

This study involves human subjects and was approved by the University of Alaska Anchorage IRB project 1353737.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by a University of Alaska Anchorage (UAA) Faculty Development Grant from the Office of Academic Affairs and a CESA Award from the UAA Center for Community-Engagement and Learning.

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