

Research Article

Exploring University Age-Friendliness Using Collaborative Citizen Science

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Abstract

Background and Objectives: Since the launch of Dublin City University's Age-Friendly University (AFU) Initiative in 2012, relatively little empirical research has been published on its feasibility or implementation by institutions of higher learning. This article describes how collaborative citizen science—a research method where professional researchers and community members work together across multiple stages of the research process (e.g., data collection, analysis, and/or knowledge mobilization) to investigate an issue—was used to identify barriers and supports to university age-friendliness at the University of Manitoba (UofM) in Canada.

Research Design and Methods: Ten citizen scientists each completed 1 data collection walk around the UofM campus and used a tablet application to document AFU barriers and supports via photographs and accompanying audio commentaries. The citizen scientists and university researchers then worked together in 2 analysis sessions to identify AFU priority areas and brainstorm recommendations for institutional change. These were then presented to a group of interested university stakeholders.

Results: The citizen scientists collected 157 photos documenting AFU barriers and supports on campus. Accessibility, signage, and transportation were identified as being the most pressing issues for the university to address to improve overall age-friendliness.

Discussion and Implications: We suggest that academic institutions looking to complete assessments of their age-friendliness, particularly those exploring physical barriers and supports, could benefit from incorporating older citizen scientists into the process of collecting, analyzing, and mobilizing findings.

Keywords: *Our Voice* Framework, Discovery tool, Age-friendly university

In 2007, the World Health Organization (WHO) launched the Global Age-Friendly Cities guide in an attempt to inspire municipalities around the world to work toward creating

more inclusive and accessible communities for individuals of all ages (WHO, 2007a). Shaped by the guide and the subsequent accompanying checklist (WHO, 2007b), which

details a variety of suggested age-friendly community features (e.g., outdoor spaces, transportation, social participation, civic participation, communication, and information), the WHO's initiative has arguably fueled the creation of an age-friendly global movement (Barusch, 2013; Liddle, Scharf, Bartlam, Bernard, & Sim, 2014; Menec & Brown, 2018). Today, age-friendly community initiatives are helping to critically reposition our thinking about aging as a cultural, rather than a physical, phenomenon (Stafford, 2019), while also working to expand our understanding of the unique experiences of older people within their everyday environments (Buffel, Handler, & Phillipson, 2018; Menec, Means, Keating, Parkhurst, & Eales, 2011; Novak & Menec, 2014; Stafford, 2019). Combined with a growing interest in a universal design approach to public spaces (i.e., spaces that can be accessed, understood, and used by all people), age-friendly concepts are also helping to shape how we conceptualize and construct public spaces to allow them to function for the greatest number of people in the future (Ruptash, 2011).

Responding to the WHO's call for increased community age-friendliness, Dublin City University (DCU) launched the Age-Friendly University (AFU) Initiative in 2012 with the intention of charting a new course for institutions of higher learning (Dublin City University, n.d.). Informed by researchers and older persons, as well as an external advisory board comprising adult learning organizations, advocacy groups, recreation and leisure associations, and city councils in Ireland, DCU has constructed a list of 10 principles to inspire colleges and universities to become more age-inclusive spaces. DCU's principles (see Table 1 for a complete list) include a range of practices designed to allow older individuals to feel valued, heard, welcomed, and included on campuses (Dublin City University, 2016).

While support for the concept of AFUs and DCU's principles has been building in recent years (Montepare, 2019; Morrow-Howell, Laylor, Macias, Swinford, & Brandt, 2019), empirical research exploring their feasibility and uptake by institutions of higher learning has been relatively sparse and has, for the most part, focused on specific campus

programs targeting older people. Pstross and colleagues (2017), for example, examined the experiences of learners at DCU with an intergenerational noncredit course program aimed at diverse learning interests (e.g., everyday science, life writing, and genealogy). Through focus groups, interviews, and blog entry analysis, these researchers found older learners reporting several benefits from participation in this program, including mental stimulation and the opportunity to meet other older people. Moreover, Vrkljan and colleagues (2019) used the focus group data to explore the perceptions of older people about a potential intergenerational learning hub at McMaster University in Ontario, Canada. While the older participants in the McMaster study expressed interest in engaging with younger people and learning about new cultures on campus, they described concerns about transportation to and from the university and a lack of safe campus walking routes as potential barriers to their engagement. Finally, in a study spanning multiple campuses, Hansen, Talmage, Thaxton, and Knopf (2019) used national survey data from the Osher Lifelong Learning Institute Network in the United States to investigate barriers to lifelong learning institute participation by older persons. These researchers found time, costs, transportation, physical mobility, hearing issues, and health to be the barriers to participation most commonly mentioned by the older respondents.

Published accounts of specific institution's journeys toward adopting DCU's AFU principles have just recently begun to appear in the literature (Clark & Leedahl, 2019; Luz & Baldwin, 2019; Silverstein, Hendricksen, Bowen, Fonte Weaver, & Whitbourne, 2019). Luz and Baldwin's (2019) case study, for example, describes Michigan State University's AgeAlive program and its goal of expanding the institution's portfolio, communication network, and community partnerships related to aging. Similarly, Clark and Leedahl (2019) describe the conceptual planning and strategizing that was necessary for the University of Rhode Island to become an AFU. Finally, Silverstein and colleagues (2019) described a campus age-friendly audit at the University of Massachusetts Boston completed through

Table 1. Ten Principles of an Age-Friendly University, as Defined by DCU (Dublin City University, 2016)

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|-----|--|
| 1. | To encourage the participation of older adults in all the core activities of the university, including educational and research programs. |
| 2. | To promote personal and career development in the second half of life and to support those who wish to pursue "second careers." |
| 3. | To recognize the range of educational needs of older adults (from those who were early school-leavers through to those who wish to pursue Master's or PhD qualifications). |
| 4. | To promote intergenerational learning to facilitate the reciprocal sharing of expertise between learners of all ages. |
| 5. | To widen access to online educational opportunities for older adults to ensure a diversity of routes to participation. |
| 6. | To ensure that the university's research agenda is informed by the needs of an aging society and to promote public discourse on how higher education can better respond to the varied interests and needs of older adults. |
| 7. | To increase the understanding of students of the longevity dividend and the increasing complexity and richness that aging brings to our society. |
| 8. | To enhance access for older adults to the university's range of health and wellness programs and its arts and cultural activities. |
| 9. | To engage actively with the university's own retired community. |
| 10. | To ensure regular dialogue with organizations representing the interests of the aging population. |

interviews with 19 stakeholders. This audit found educational programming, accessibility (i.e., physical, digital, and learning support), and inclusivity to be the themes most frequently discussed by volunteers related to university age-friendliness.

While these types of studies have helped to paint a general picture of the experiences of older people and other university stakeholders with specific aspects of higher education, what appears to be missing from the literature are comprehensive explorations of the overall age-friendliness of university campuses, programming, and culture. Such information could be argued to be of particular utility to colleges and universities looking to plot their own unique paths toward becoming more age-friendly.

The University of Manitoba: Canada's First Age-Friendly University

Work to make the University of Manitoba (UofM) an AFU first began in 2012, but it was not until 2016 that the UofM broke new ground by becoming the first university in Canada to endorse DCU's 10 AFU Principles (Chesser & Porter, 2019; Dublin City University, 2016). Following this commitment, the UofM formed an AFU Committee with, among others, mandates to assess both how the UofM is currently aligning with AFU principles and to brainstorm possible future age-friendly institutional opportunities. Photovoice (Wang & Burris, 1997), a research method that asks individuals to document issues of critical interest in photographs, was initially used in a pilot study to assess the current age-friendliness of the UofM (Chesser & Porter, 2019). In this pilot work, individuals documented AFU features and barriers in photographs and discussed them in subsequent interviews with a researcher (Chesser & Porter, 2019). However, as this pilot investigation had a relatively small participant size ($n = 3$) comprised of members of the university's AFU Committee, a larger-scale project that would include a larger, more diverse group of older campus users was deemed necessary. This follow-up project, whose preliminary findings were mentioned previously in published work by Chesser and Porter (2019), is described in comprehensive detail in this article. Specifically, the project sought to include participants not only in an assessment of university age-friendliness, but also involve them in the process of cultivating institutional change via a technologically assisted participatory research method—the *Our Voice* collaborative citizen science framework.

Collaborative Citizen Science and the *Our Voice* Framework

Researchers at Stanford University originally developed the *Our Voice* Framework to allow everyday individuals to investigate the health of their communities, as well as to foster learning, growth, and decision making at a grassroots level (King et al., 2016). The framework seeks to capitalize

on community-oriented participatory research—sometimes also referred to as “collaborative citizen science” (Bonney et al., 2009)—to empower everyday individuals to improve the possibilities for healthy and inclusive communities. Specifically, Wiggins and Crowston (2011, p. 1) have described citizen science as “a form of research collaboration involving members of the public in scientific research projects to address real-world problems.” Within citizen science, the citizen scientists themselves can be involved in any stage of the research process (e.g., project design, data collection, data analysis, and data mobilization). Within collaborative citizen science projects (Bonney et al., 2009), including those carried out using the *Our Voice* Framework, citizen scientists work in partnership with university investigators across multiple stages of the research process including data collection, analysis, and the presentation of findings to relevant community stakeholders.

The Framework is designed to be used with a complementary data collection mobile application—the Discovery Tool (DT). Accessed via smartphone or tablet technology (Buman et al., 2013, 2015; King et al., 2016), the DT allows citizen scientists to document barriers and supports to community health during data collection walks via photos, short explanatory audio commentaries, and a rudimentary photo rating system (i.e., ☺ and ☹ symbols). Walks completed using the DT are also mapped using global positioning system technology. Following the completion of a walk, the DT asks citizen scientists to provide some basic demographic information (e.g., sex, age, educational level, and self-reported health status).

Previous international pilot studies have already demonstrated the ability for the *Our Voice* approach to enable community residents from diverse backgrounds to collect and analyze data about their local physical and social environments. Specifically, *Our Voice* has been applied to investigations of resources for active community living (Rosas et al., 2016; Winter et al., 2016), access to healthy food environments (Buman et al., 2015; Sheats, Winter, Romero, & King, 2017), and safer walking routes to school (Rodriguez et al., 2019). In the past several years, investigators have also begun to use the framework to explore age-friendliness within communities (Moran et al., 2017; Tuckett, Freeman, Hetherington, Gardiner, & King, 2018); however, the approach has not previously been used for any explorations of university age-friendliness. With greater numbers of older people currently engaging with higher education programming and services (Montepare, 2019), these spaces have become necessary sites for age-friendly assessments and, subsequently, informed community change.

Following up on the UofM's journey toward becoming Canada's first AFU (Chesser & Porter, 2019), the purpose of this project was to have older people assess the age-friendliness of the institution using a collaborative citizen science. In this article, we will provide a detailed description of exactly how we managed data collection, analysis,

and mobilization activities with the citizen scientists and offer a presentation of the AFU barriers, supports, and priorities identified by the group. It should be noted that this project did not seek to assess for the presence or absence of any of the 10 DCU AFU principles at the UofM. Instead, we encouraged the citizen scientists to explore the UofM campus through their own perspectives as older persons and to assess what they themselves thought was age-friendly or unfriendly.

Methodology

This project was carried out at the UofM, located within the city of Winnipeg (population = 753,000) in Manitoba, Canada (City of Winnipeg, 2019). The university, the oldest in western Canada and the largest in the province, has reported having an undergraduate and graduate student population of 29,620, supported by approximately 9,530 academic and support staff members (Office of Institutional Analysis—University of Manitoba, 2019). With regard to age breakdown, data published in 2019 by the university's Office of Institutional Analysis reported 39 undergraduate and 12 graduate students were over the age of 65, in addition to 417 currently employed faculty and staff members. Data on the number of older persons who used the campus for recreational purposes (formal and informal) were unavailable.

Teaching, research, and recreational activities at the UofM are divided across two campuses: the larger Fort Garry campus located in the suburban southern end of the city and the smaller Bannatyne campus located in the downtown core (University of Manitoba, 2019). For this project, recruitment and data collection were confined to the Fort Garry campus, as it houses the majority of the university's facilities and programming. It should be noted that much of the Fort Garry campus can be traversed underground through a series of tunnels with direct building access.

Prior to beginning recruitment, approval for this project was obtained by the UofM's Education/Nursing Research Ethics Board. To be eligible to participate, citizen scientists needed to be 65 years of age or older and English speaking. Potential citizen scientists were also required to be physically present in some capacity—either regularly or periodically—on the Fort Garry campus (e.g., a student, faculty or staff member, campus volunteer, community member who visited campus for recreational purposes). Recruitment efforts involved placing posters in well-trafficked locations around campus, as well as sending targeted emails to the membership of the university's retirees association and a nearby leisure organization for older persons.

Description of Citizen Scientist Group

Ten citizen scientists (eight women, two men) participated in this project. This group had an average age of 71.5 years (ranging from 68 to 78 years) and included a current

student, retired faculty and staff members, and several community members who were users of university programming and/or recreation facilities. The group reported having completed an average of 17.9 years of education, which included primary school through to postsecondary degrees. When asked about how they would self-rate their health compared to others their age, two citizen scientists reported being in excellent health, four in very good health, and three in good health. One participant did not report their health status. While specific information was not collected about specific health-related issues, certain physical and mild cognitive impairments were informally shared by several of the citizen scientists over the course of the project.

Data Collection

After providing written consent and prior to completing their data collection walk, each citizen scientist received instructions about safe walking and ethical photography procedures (i.e., not documenting individual spaces or private spaces such as locker rooms or occupied washrooms). They were also given two additional documents that provided information about AFUs and age-friendly community features [i.e., DCU's AFU principles and the World Health Organization's (2007b) age-friendly cities checklist]. These latter two documents were provided to encourage the citizen scientists to think holistically about AFU features, particularly those that might fall outside the domain of physical accessibility. The WHO's checklist, while designed for cities, contains sections related to outdoor spaces and buildings, transportation, social participation, respect and inclusion, civic participation and employment, and communication and information that are also relevant for AFUs. Additionally, although the AFU principles were supplied primarily to help contextualize the concept of AFUs for the citizen scientists, they were not specifically requested to investigate the presence or absence of any of the AFU principles.

During the late fall through early spring of 2017/2018 (i.e., December through April during regular academic terms when classes, exams, and recreational programs were running), each citizen scientist completed one 30- to 90-min daytime walk around the Fort Garry campus to document—via photographs and short explanatory audio commentaries—age-friendly/unfriendly campus features using the DT app. The data collection devices used (i.e., 7" Samsung Galaxy Tab A tablets with accompanying neck straps, and antiglare screen protectors) were chosen for their manageable size, overall user-friendliness, as well as their ability to be used with gloves (via a stylus) on colder days. Immediately prior to data collection, each citizen scientist received approximately 15 min of training in how to use the DT app by the first author. See [Supplementary Appendix 1](#) for a more detailed description of citizen scientist training.

For the purposes of safety and occasional technical support, the first author also accompanied the citizen

scientists on their walks, but was careful not to influence the AFU barriers and/or supports that the individuals chose to document (Tuckett et al., 2018). The walking route that each citizen scientist followed was unique and freely chosen based on the areas of campus that each person typically frequented. Most walks included both indoor (e.g., classrooms, recreational spaces, empty bathrooms, food service spaces, libraries) and outdoor components, as well as stretches in the university's tunnel system. See [Supplementary Appendix 2](#) for a more detailed account of data collection walking conditions.

Finally, it should be noted that to protect the anonymity of the citizen scientists in this work, pseudonyms were assigned to all audio commentary quotes for reporting purposes.

Data Analysis and Presentation to Stakeholders

For a detailed description of data formatting for this project, see [Supplementary Appendix 3](#). Data analysis for this project, which involved two 2-hr on-campus sessions, took place between May and June 2018, shortly after the completion of the data collection walks ([Figure 1](#)). Each session was attended by six of the citizen scientists; however, the combination of individuals who attended each was slightly different due to their availability. For a description of the specific activities that took place in the data analysis sessions, see [Supplementary Appendix 4](#).

As the AFU Committee at the UofM is comprised of key decision makers from a variety of campus units (e.g., the Physical Plant Department, Career Services, Extended Education, Human Resources, Recreational Services, the UofM Retirees Association, Office of Human Rights and Conflict Management), it was an ideal stakeholder group to whom the citizen scientists could present their findings, as outlined within the *Our Voice* Framework ([King et al., 2016](#)). This stakeholder meeting took place in June 2018 on the UofM's Fort Garry campus.

Two citizen scientists volunteered to present the group's findings to the AFU Committee and worked with the first author prior to the meeting to create a PowerPoint presentation documenting the three identified AFU priority areas. This presentation included numerous supporting

photographs and transcribed commentary quotes. Ideas for AFU change brainstormed during the data analysis sessions were also included in the presentation slides, which were circulated to the full citizen scientist group prior to the stakeholder meeting for feedback. Suggested changes by the citizen scientists were incorporated into the final version of the presentation.

The stakeholder presentation itself was attended by four AFU Committee members, the two volunteer presenters, four additional citizen scientists, and the first and second authors (the latter of whom is the current chair of the AFU Committee). During and after the presentation, the stakeholders and the citizen scientists were able to engage in some back-and-forth discussion and the committee members were able to ask questions in relation to the presented data. In total, the stakeholder presentation meeting lasted 75 min.

Results

Over the course of their walks, the citizen scientists documented AFU features at the UofM in a total of 152 photographs and 154 explanatory audio commentaries. During the data analysis sessions, the theming process by the citizen scientists resulted in the identification of numerous themes/subthemes related to AFU barriers ([Supplementary Appendix Table 1](#)) and supports ([Supplementary Appendix Table 2](#)). Based on the total number of photos coded for each, the top AFU barriers identified by the citizen scientists were signage issues, walking conditions, accessibility issues, and campus resources. Conversely, the top AFU supports identified were presence of accessibility aids (e.g., the presence of benches along walking paths, ramps, handrails, seating with armrests that was helpful for standing), signage/information resources, campus resources, campus environment, walking/cycling routes, and libraries.

During the analysis sessions, the citizen scientists reached consensus in prioritizing accessibility, signage, and transportation as the three areas they felt were the most important for the university to address to increase campus age-friendliness. These group prioritization decisions were not based simply on how often an issue was documented, but were instead influenced by what areas the citizen scientists felt were the most pressing, plausible, and/or impactful from an age-friendly perspective. Each priority area encompassed both specific areas of concern (i.e., barriers), as well as supports that already existed that the citizen scientists thought could be improved or expanded upon. Some of the priority areas were also amalgamations of multiple themes/subthemes that were identified and combined by the citizen scientist group during analysis. For example, the citizen scientists felt that the priority areas of "accessibility" should include the presence of accessibility aids (e.g., handrails, ramps), as well the need for safe walking routes for individuals to access areas of campus.

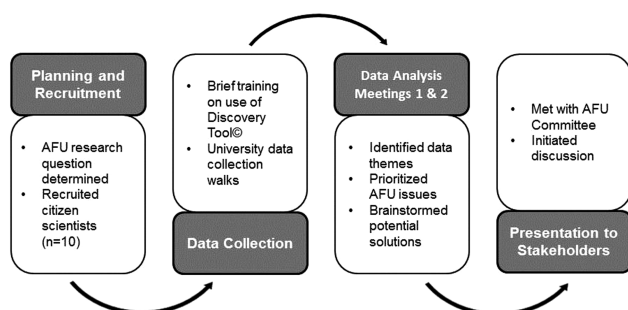


Figure 1. The *Our Voice* Citizen Science Framework as used in this project. AFU = Age-Friendly University.

Thinking surrounding three priority areas, described in greater detail below, was anchored to an overall vision statement that was crafted at the urging of the citizen scientists themselves, which stated, “we envision a campus where learners/community members of all ages are welcome, and where individuals can get from place to place easily and accessibly.”

Accessibility

While the citizen scientists documented several of the age-friendly supports provided by accessibility aids, they also highlighted specific locations where these aids were missing (e.g., along long stretches of the tunnel system; in-between buildings). Consequently, the group recommended that the university complete a comprehensive physical accessibility scan of the campus to identify (and eventually,

address) any overlooked areas in order to improve campus age-friendliness.

With regard to outdoor walking surfaces, the group documented uneven surfaces, large gaps and cracks in sidewalks, as well as missing paver bricks in walkways (Figure 2a and b) that they felt posed a challenge to traversing the campus. In particular, the citizen scientists felt that these barriers could pose as potential tripping hazards for older people. Indeed, one such incident was described by Linda in a photo audio commentary:

I had a very bad fall here just by tripping on the cracks and actually did a face plant and got picked up by a truck driver and driven home. [The university] actually came and patched it. As you can see, it’s still in lousy shape.

Additionally, several citizen scientists expressed concerns that insufficient drainage for melting snow along walkways

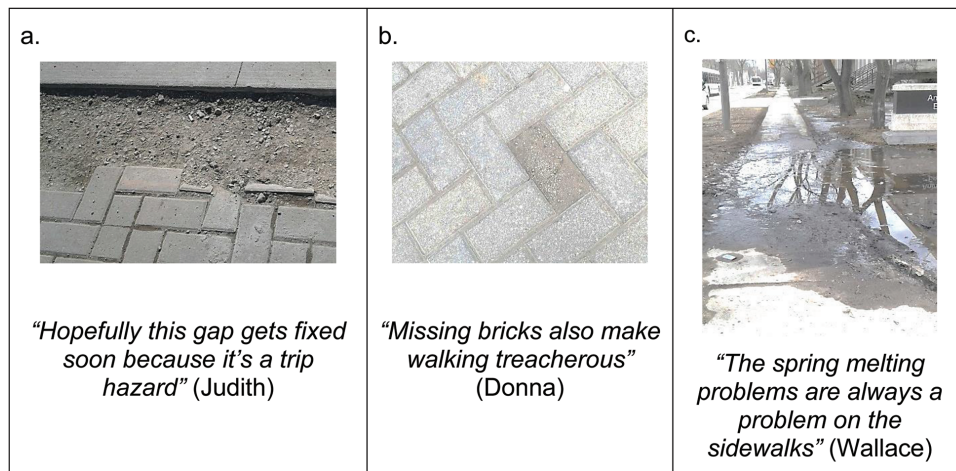


Figure 2. Examples of unsafe walking surfaces on campus documented by citizen scientists.

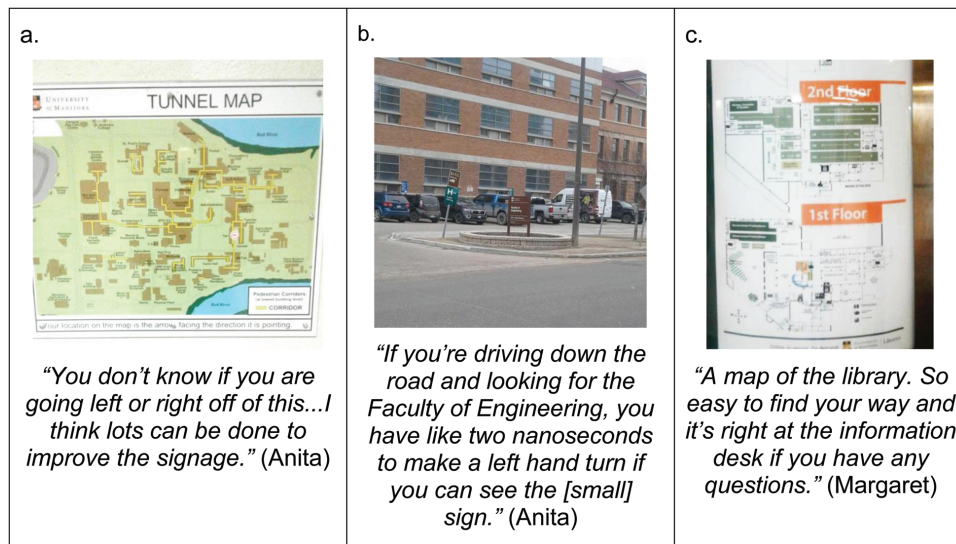


Figure 3. Examples of barriers and supports surrounding campus signage documented by the citizen scientists.

in the spring was leading to the formation of large patches of ice and mud (Figure 2c). Such obstacles were felt to make it difficult for older individuals to walk around campus, in part because they posed a risk for falls. As a result of these identified barriers to overall campus walkability, the group recommended that the UofM increase the budget for outdoor walkway maintenance and reconstruction, particularly during the spring months.

Signage

Campus signage that was difficult to read (e.g., small print, was poorly placed) and/or missing completely was the second issue identified by the group as a prominent barrier to university age-friendliness. Specifically, confusing/difficult to read campus maps and tunnel navigation signs (Figure 3a) and missing/poorly placed parking and campus road signs (Figure 3b) were highlighted as being particularly problematic. However, signage that contained large print and was strategically positioned (e.g., at building or parking lot entrances, in places that gave drivers enough time to react safely) was viewed as helpful for campus age-friendliness by the group (Figure 3c).

As a result, the citizen scientists recommended that the university add more signage to building entrances, along pedestrian walkways, in the university tunnel system, along roadways, and in parking lots. They specifically suggested that this signage should be both large in size and easy to read in terms of font (e.g., font choice and size).

Transportation

Overall, the citizen scientists documented campus features that supported individuals walking and cycling around and

through campus (Figure 4). However, there was consensus among the group that a more distinct separation between pedestrians, cyclists, and drivers on campus was warranted, primarily to prevent collisions. For example, Douglas and Linda described specific safety concerns for pedestrians in heavily trafficked areas of campus:

The walkway [near the gym] has a lot of traffic in the summer, some of which is on bicycles and there's no separation of bicycles from pedestrians. Some of the cyclists I've seen use it like a slalom course. The problem here is if a bicycle hits an older person, for instance my wife who has osteopenia, it's a death sentence if their hip is broken. (Douglas)

The other problem with this sidewalk is that cyclists use it. They're coming up behind us and their bikes are quiet and they're not letting us know they're there. I feel very unsafe with all the cyclists. ... I don't blame them for riding on the sidewalk, but it becomes a safety issue for seniors. (Linda)

Due to this finding, the group suggested that the university add more pedestrian crossings, bike lanes, and posted bike routes to increase safety for both pedestrians and cyclists alike.

Additionally, the group identified parking as a serious barrier to university age-friendliness, citing the cost, availability, and towing/parking tickets (e.g., Elizabeth: "They are very strict. When someone goes over the [time] limit ... they tow them away!") as specific areas of concern. To address these issues, the citizen scientists suggested that the university implement a parking grace period, increase short-term parking availability, and increase accessible parking spaces. Finally, the citizen scientists felt that campus parking lots, which posed challenges to walkability and drivability in the



Figure 4. Examples of transportation supports on campus documented by citizen scientists.

winter months, could be improved if the university were to commit to clearing snow and sanding icy areas in a timely fashion after storms or large temperature swings.

Discussion and Implications

The purpose of this article was to describe our approach to AFU research using collaborative citizen science, as well as to comprehensively convey the results of an assessment of the age-friendliness of the University of Manitoba. Overall, the findings from this project suggest that physical accessibility-related supports and barriers are of particular importance to older persons who utilize university campuses. Unfortunately, these features are not explicitly included in the current AFU principles created by DCU. Specifically, the themes of transportation, safe walking routes, and campus navigation concerns identified by the citizen scientists at the UofM echo several themes identified in previous investigations of university age-friendliness (Hansen et al., 2019; Silverstein et al., 2019; Vrkljan et al., 2019). In particular, the findings from the UofM directly mirror those identified in Silverstein et al.'s AFU audit at the University of Massachusetts Boston, mainly in areas relating to poor signage and campus map placement, parking garage and lot access, and uneven pavement.

It is worth noting that the priority areas identified by the citizen scientists in this project are decidedly more focused on the physical accessibility of the UofM campus than those outlined in DCU's AFU principles (2016), despite the citizen scientists being encouraged to think about university age-friendliness in holistic ways. Specifically, aspects of physical accessibility (e.g., presence or absence of accessibility aids, walkway condition aids) were among the top three barrier and support issues identified by the citizen scientists, based on the total number of photographs taken. Several accessibility-related issues (e.g., uneven walking surfaces, presence of benches with arms) were also among those identified by the greatest number of citizen scientists within the group. We believe that there are two potential explanations for this emphasis on the physical accessibility of the campus.

First, it could also be argued that, from the perspective of inclusivity and universal design (Ruptash, 2011), physical barriers and supports may be a more fundamental hindrance or help to older individuals on campuses than the AFU principles currently reflect. As a result, it seems logical to believe that an older person might not be as focused on psychological, social, and/or spiritual aspects of campus age-friendliness if they are already facing physical barriers to even accessing university buildings and programming. Realistically, these same barriers could also be said to apply to campus users of all ages, as the physical accessibility needs of each individual will vary.

Presently, the AFU principles outlined by DCU do not explicitly address the important role physical campus accessibility likely plays in overall university age-friendliness

and we would stress that it cannot be assumed that all institutions will begin their AFU commitment process with campuses that are completely physically accessible. Consequently, we believe that an update to the current AFU principles to include greater emphasis on the need for a fully physically accessible campus—both indoors and outdoors—is warranted. Specifically, we would suggest that the AFU principles could be redrafted to include a greater emphasis on universal design—a notion reflected in part of the vision statement created by the citizen scientists in this project: “[we envision a campus] ... where individuals can get from place to place easily and accessibly.” Additionally, we would suggest that universities wishing to become more age-friendly might want to first undertake an extensive environmental assessment with older persons in order to identify (and hopefully, address) any physical barriers to campus accessibility and navigation before tackling more comprehensive age-friendly initiatives and/or programming. Changes made in response to such assessments to improve the overall physical accessibility of institutions would help to improve the campus experience for both older and younger users alike.

Second, it could be contended that the choice to collect photographic data related to university age-friendliness (using either the DT or another participatory method such as photovoice) could influence what issues are documented and, subsequently, prioritized. Specifically, physical campus features could be viewed as being more straightforward to document via photographs (as opposed to social, psychological, or spiritual barriers/supports). For example, a crack in a sidewalk is, debatably, easier to capture in a photograph than ageist cultural attitudes, as the latter would likely need to be captured more abstractly in image form. Indeed, similar findings have been reported previously in a photovoice project investigating community age-friendliness that found older people frequently documented tangible features of their physical environment (Novek & Menec, 2014; Novek, Morris-Oswald, & Menec, 2012). As a result, it is possible that the use of photovoice in age-friendliness university assessments, particularly those projects that discourage volunteers from documenting people's faces, may fail to capture age-friendly barriers or supports that exist in crowded or more social campus spaces. To address this issue of representation in the future, we would suggest that those institutions looking to assess university age-friendliness beyond merely documenting physical barriers and supports consider pairing photographic data with a second data collection method (e.g., focus groups or interviews) that might be better able to capture the nuances of many nonphysical community features. Those seeking to use only photovoice to document age-friendly features would be advised to provide research participants with sample photographs to show the ways more abstract age-friendly features and concepts could be documented.

Additionally, the age-friendly priority areas identified by the citizen scientists in this project (i.e., accessibility, signage, and transportation) align with the findings from

previous *Our Voice* studies investigating community age-friendliness, as well as studies reporting barriers to more general community age-friendliness (Novek & Menec, 2014; WHO, 2007a). For example, in their exploration of supports and barriers to physical activity for older persons in Brisbane, Australia, Tuckett and colleagues (2018) reported that citizen scientists included both footpaths and traffic-related safety/parking among their top three priority issues. Furthermore, Moran and colleagues (2017) found that older person citizen scientists documented sidewalk conditions, blocked sidewalks, and general street conditions most frequently in their investigation of walking routes for older persons. Such findings support the notion that, for older people, there may be overlap between the age-friendly priorities of academic institutions and local neighborhoods.

In the time since data collection and analysis for this project took place, the UofM has undergone some changes that have helped to improve overall campus accessibility. In May 2019, for example, the university was required to be in compliance with the Accessibility Standard for Employment under the Accessibility for Manitobans Act—legislation that details required provincial standards related to customer service, communication, built environments, transportation, and employment (Accessibility Manitoba, 2017). In the lead up to this deadline, the UofM's Physical Plant Services department (represented on the AFU stakeholder committee) was able to supplement more generalized campus environmental scans with the data collected by the citizen scientists to pinpoint places where accessibility improvements have already been made, as well as areas where more efforts are still required.

Additionally, the signage concerns highlighted by the citizen scientists in this project are presently helping to inform a larger project to improve campus wayfinding. This wayfinding project has also involved some of the stakeholders from the AFU project (i.e., members of the university's AFU Committee). Finally, the second author has adapted the photovoice methodology used in this project for use as an undergraduate classroom activity exploring university age-friendliness (Chesser & Porter, 2019). The general findings from this activity, though not part of a formal research study, were compiled by the first author and provided to the AFU Committee for review, suggesting that age-friendliness campus assessments could be carried out by citizen scientists of all ages. Additionally, while the recommendations generated by the older citizen scientists in this AFU project have not yet been incorporated by the UofM into its strategic planning, the perspectives of the citizen scientists are, nonetheless, being heard. In some cases, they are also being acted upon through the work of the AFU Committee, and its members who represent University units like Campus Planning, the Office of Sustainability, Physical Plant, and the Office of Human Rights and Conflict Management.

All of these outcomes suggest that the data collected through a collaborative citizen science approach can help to inform age-friendly university changes, even in small or seemingly indirect ways. Further research, however, is required to assess the long-term impact of citizen scientist approaches (such as the *Our Voice* Framework) on the age-friendly change process within communities (e.g., what direct and/or indirect changes might come about as the result of engaging in data collection, analysis, and mobilization; the overall sustainability of these changes), as well as to explore the individual experiences of citizen scientists with the process. Investigations into the age-friendly university needs of suburban versus urban campuses, differences, if any, between institutions in different regions of the world, as well as possible age-friendly needs that might differ depending upon the season or academic term are also likely needed.

Conclusion

The findings from this project suggest that a collaborative approach to citizen science that incorporates older individuals in the data collection, analysis, and mobilization process may be useful for academic institutions seeking to identify and address barriers and supports to campus age-friendliness. While physical barriers to campus access were identified as significant priorities for older people at the UofM (an issue that, at present, is not explicitly addressed in DCU's AFU principles), we would suggest that institutions approach their own investigative processes in a manner that acknowledges the unique programming and service needs of the community populations that they serve.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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Conflict of Interest

While the second author serves as the Chair of the Age-Friendly University Committee at the University of Manitoba, she acted in a very limited role in all analysis sessions (i.e., primarily as

an observer). The fact that the citizen scientists drove the decision-making regarding the priorities and recommendations for this project limited any bias that might exist with regard to the findings, conclusions, or implications presented in this article. There are no conflicts of interest to report with any of the other authors.

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