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UNIVERSITY OF CALIFORNIA, SAN DIEGO
SAN DIEGO STATE UNIVERSITY

Senior Change Makers Pilot Study:
Improving Physical Activity Environments through Intergenerational Advocacy

A dissertation submitted in partial satisfaction of the
requirements for the degree of Doctor of Philosophy

in

Public Health (Health Behavior)

by

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2017

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University of California, San Diego

San Diego State University

2017

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Vita

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Abstract of the Dissertation

Senior Change Makers Pilot Study:
Improving Physical Activity Environments through Intergenerational Advocacy

by

Christina M. Thornton

Doctor of Philosophy in Public Health (Health Behavior)

University of California, San Diego, 2017

San Diego State University, 2017

Professor James Sallis, Chair

As the US population ages, communities must adapt to help older adults thrive. Built environment features, like safe sidewalks, provide the foundation for age- and physical activity-friendly communities. The Senior Change Makers Pilot Study tested an eight-week intergenerational program that taught seniors and college students to perform audits of their pedestrian environments, identify barriers, and advocate for improvements.

Four low-income senior housing sites in San Diego, CA were randomly assigned to an advocacy program or physical activity control (n = 50 seniors, 20 students). A mixed methods evaluation used pre-post surveys, focus groups, and direct observation. The primary outcome was changes in seniors' advocacy confidence and skills. Other outcomes included advocacy actions and outcomes, changes in intergenerational attitudes, study feasibility, and physical activity measured via accelerometer. Main analyses were conducted using repeated measures ANOVAs to examine time by condition interactions.

Results showed that seniors in the advocacy condition increased their advocacy outcome efficacy ($p = .03$) and knowledge of resources ($p = .04$) more than seniors in the physical activity condition. Most seniors completed an audit of nearby streets (84%), submitted an online advocacy request (79%), or made an advocacy presentation (58%). Immediate results included repairs to three crosswalks, a sidewalk, and a water meter box. The City approved requests for additional lighting, curb cuts, and crosswalk markings. Seniors in the advocacy condition improved their attitudes about younger adults ($p = .02$). Students in both conditions reported increased respect for older adults and desire for future intergenerational work. Students in the physical activity condition decreased ageism ($p = .02$). Seniors' accelerometer-measured physical activity did not significantly increase, but self-reported transportation activity increased in the physical activity condition ($p = .04$). Students in the physical activity condition decreased sedentary behavior ($p = .05$). Process evaluation showed feasibility of recruitment, 89% attendance across conditions, and intervention fidelity and quality.

This pilot study showed the potential of intergenerational advocacy to empower participants and make communities more age- and activity-friendly. Longer studies are needed to undertake larger advocacy projects and quantitatively assess environmental changes and health benefits.

Introduction

Physical activity can have powerful benefits for older adults' health and quality of life (Chou, Hwang, & Wu, 2012). Older adults who do 150 min/week of physical activity have 28% lower mortality compared to their sedentary counterparts (Hupin, et al., 2015). Fewer than 3% of seniors meet physical activity guidelines (Haas, Krueger & Rohlfen, 2012; Troiano, 2008), which recommend at least 150 minutes of moderate intensity physical activity per week (USDHHS, 2008). Approximately one-third of adults over age 50 report they do not engage in any physical activity outside of work (Watson, et. al., 2016). In San Diego, almost one-third (31%) of seniors report difficulty walking (SANDAG, 2012).

Applying the ecological framework, strategies aimed at increasing physical activity among older adults should address factors at the individual, social, and environmental levels (Sallis & Owen, 2015; Thornton, et al., 2016). At the individual level, much research has explored the effectiveness of behavioral strategies, such as goal setting and self-monitoring, to increase older adults' physical activity (French, Olander, Chisholm & Mc Sharry, 2014; Taylor, et al., 2004; Van Der Bij, et al., 2002). At the social level, research has shown that social support, such as group-based physical activity programs, can increase physical activity (Van Der Bij, Laurant, & Wensing, 2002), though many older adults prefer to be active on their own (King, 2001). Compared to other levels of the ecological framework, the least research has been conducted on interventions aimed at environmental determinants of older adults' physical activity (Cunningham & Michael, 2004; King, 2001).

The World Health Organization and AARP recognize that built environment features, such as safe sidewalks, crosswalks, and recreation areas, may affect older adults' physical activity and are foundational to age-friendly communities (AARP, 2012; WHO, 2007). Research shows that activity-friendly built environment features correlate with greater physical activity (Sallis,

Cain, et al., 2015) and may confer economic, social, and environmental benefits to the community (Sallis, Spoon, et al., 2015). *The Surgeon General's Call to Action to Promote Walking and Walkable Communities* highlights the relationship between the built environment and physical activity behaviors (USDHHS, 2016). The *Call to Action* endorses evidence-based strategies for making communities more activity-friendly, such as engaging community members as advocates. The *Call to Action* urges community members to work with their local transportation or planning departments to address pedestrian issues such as crosswalk and sidewalk safety (p. 32). The *Call to Action* also encourages universities to “educate and train future professionals to recognize their role in promoting walking and walkable communities for people of all ages” (p. 22). Finally, the *Call to Action* asks researchers to continue evaluating built environment strategies to increase walking, especially in physically inactive populations such as older adults (p. 29).

The Senior Change Makers Pilot Study was developed in response to the critical need to create age- and physical activity-friendly communities that allow seniors to thrive as healthy and engaged community members. Community advocates can work toward that aim by collecting data identifying local barriers to physical activity, providing relevant data to local agencies, and advocating for change. Intergenerational groups may be effective advocates since both older and younger adults are major stakeholders in their communities' physical activity environments, and both groups can contribute unique skills and experiences to the advocacy process.

The Senior Change Makers Pilot Study compared two, eight-week, intergenerational programs. The advocacy program taught seniors and college students to perform audits of their physical activity environments, identify barriers, and advocate for improvements. The physical activity program aimed to increase participant physical activity through education and guided exercise. The programs were delivered by a team of researchers at four low-income senior

housing sites in San Diego, CA (n = 50 senior participants; n = 20 student participants). Sites were randomly assigned to the advocacy program with “high” intergenerational contact, or the physical activity program with “low” intergenerational contact. Randomization at the site level was necessary to avoid contamination across study conditions. A follow-up was conducted at four months to assess advocacy activities completed after the 8-week intervention.

Study Aims and Hypothesis

The primary aim of the pilot study was to assess the efficacy of an advocacy program in comparison to a physical activity program to increase seniors’ advocacy skills and confidence. We hypothesized that the advocacy program would produce greater improvements in seniors’ advocacy skills and confidence at eight weeks as compared to the physical activity program.

We also examined the following exploratory aims:

Aim 2. Assess completion of advocacy group actions (e.g., presentations, emails, petitions) and resulting environmental changes (e.g., sidewalk or crosswalk repairs) at eight weeks and four-month follow up. *Hypothesis: the advocacy groups would each select advocacy issues and take action to improve their community’s physical activity environment.*

Aim 3. Assess changes in seniors’ and students’ intergenerational attitudes at eight weeks. *Hypothesis: the “high contact” advocacy program would produce greater improvements in participants’ intergenerational attitudes as compared to the “low contact” physical activity condition.*

Aim 4: Assess feasibility of pilot study methods including recruiting college students and low-income seniors, implementing advocacy program with fidelity, creating high-contact intergenerational groups, and seniors’ use of the Microscale Audit of Pedestrian Streetscapes “MAPS-Mini” audit tool. *Hypothesis: process measures of intervention recruitment, dose, and*

fidelity, intergenerational contact, and participant feedback on program and audit tool, would show study methods are acceptable and replicable.

Aim 5: Assess the efficacy of the advocacy and physical activity programs to increase seniors' physical activity. *Hypothesis: the physical activity program would produce greater increases in seniors' physical activity at 8 weeks as compared to the advocacy condition.*

Innovations

The Senior Change Makers Pilot Study contributes to the field by presenting a mixed methods approach for assessing the processes and outcomes of an intergenerational advocacy program. Many intergenerational programs exist, but few have been systematically evaluated (Jarrott, 2011). To address gaps in the evaluation of intergenerational programs, Jarrott (2011) highlighted the need for studies that:

- use mixed methods approach, and do not rely solely on qualitative data,
- assess multiple generations of participants,
- use objective measures of health outcomes and program impact (and not just soft measures of participants' perceptions),
- follow-up to capture more distal program effects, and
- use standardized, validated measures.

Similar research gaps exist in the literature evaluating the potential benefits of volunteering among older adults (Anderson, et al., 2014). Since the participants in the Senior Change Makers Pilot Study volunteered their time to work on community advocacy projects, literature on volunteering is informative. A literature review by Anderson, et al., (2014) highlighted the need for studies to use mixed methods research designs and more objective, standardized measures to assess the outcomes of volunteering. Since benefits of volunteering may depend on the specific volunteering activities, roles, and dose, Anderson suggested use of process

evaluation measures that capture key aspects of the older adult's volunteer experience (Anderson, et al., 2014).

The present study developed and applied a comprehensive evaluation plan to address previous limitations in intergenerational research. A mixed methods approach was used, employing surveys, direct observation, and focus groups. Both generations of participants were assessed. The field of intergenerational research began with studies focusing solely on how intergenerational programs affected youth; less is known about how intergenerational programs affect older adult participants (Lawrence-Jacobsen, 2005). By understanding generational differences in the advocacy process, we can inform development of future advocacy programs to meet needs of both age groups. The Senior Change Makers Pilot Study assessed objective outcomes and program impact. Most research of intergenerational programs focus solely on “soft” outcomes, such as change in attitudes or academic performance (Lee, Morrow-Howell, Jonson-Reid & McCrary, 2010). The present study assessed accelerometer-measured physical activity, advocacy actions, and advocacy outcomes. We performed a four-month follow-up to track actions taken by participants and outcomes achieved. Since advocacy outcomes can take time to materialize, follow-up data are critical.

The pilot study focused on sound measurement, including the use of validated instruments, such as the Microscale Audit of Pedestrian Streetscapes-Mini (MAPS-Mini; Sallis, Cain, et al. 2015), youth advocacy measures (Millstein, Woodruff, Linton, Edwards & Sallis, 2016a), and the Fraboni Scale of Ageism (Rupp, Vodanovich & Credé, 2005). Previously tested items were used without change when possible. Measures assessing changes in participants' advocacy skills and beliefs were based on a validated survey (Millstein, et al, 2016a) with minor changes to make items applicable to younger and older adults. The pilot study contributed to the field by testing the validated advocacy measures and MAPS-Mini tool in a previously untested

population of older adults living in senior housing. We used a validated tool, the Fraboni Scale of Ageism (Rupp, et al., 2005), to assess changes in intergenerational attitudes. Research findings are mixed regarding how intergenerational programs affect ageism. Discrepancies may be attributable to poor measurement, such as measures that use vague language or conflate constructs of attitudes, stereotypes, ageism, and/or beliefs (Meshel & McGlynn, 2004).

Finally, the Senior Change Makers Pilot Study was innovative because it was intergenerational. The Study heeds a call by the United Nations' Assembly on Aging "to strengthen solidarity . . . and encourage mutually responsive relationships between generations" (United Nations, 2002: Article 16). Evidence has shown reciprocal benefits of intergenerational relationships such as improved physical health, mental health (Chung, 2009; de Souza & Grundy, 2007) and increased quality of life (George, 2011). San Diego County's Aging and Independence Services' website indicates that "Intergenerational programs are not a luxury; they're a necessity. Tapping into the strengths of each person, no matter the age, should be a community goal" (AIS, 2014). In the Senior Change Makers Pilot Study, college students were recruited and trained to help deliver the intervention. Thus, the students had dual roles: as researchers carrying out the intervention and as participants working alongside the seniors. Students in the advocacy condition helped brainstorm possible advocacy projects, assisted the older adults with the field audit, designed and led fun activity breaks, and helped the older adults email the city Department of Transportation. Students also assisted with the collection, entry, and cleaning of survey and accelerometer data.

Theory

The Senior Change Makers Pilot Study used an ecological approach, addressing individual, social, and environmental factors (Sallis & Owen, 2015). Appropriate models and theories were applied to each level. At the individual level, the intervention applied Social

Cognitive Theory by providing participants training and opportunities to develop advocacy skills and confidence (Table 1). Empowerment Theory involves enabling community members to take control of their lives and their environments (Zimmerman & Rappaport, 1988). A core concept was creating a culture of community building, where participants learn to “look beyond themselves” and see themselves as part of a larger mission (Minkler, Thompson, Bell & Rose, 2001). The empowerment process allows disadvantaged people to gain greater access to and control over community resources (Lawrence-Jacobsen, 2005). Given that both younger and older adults tend to be disempowered groups, the application of Empowerment Theory in the Senior Change Makers Pilot Study was apt.

Table 1. *Mapping theory to intervention components and outcomes*

Ecological Framework	Theory	Intervention component	Outcomes
Individual level	Social Cognitive theory Empowerment Theory	Advocacy training, skill development, and practice voicing opinions to others and decision makers	Advocacy beliefs and self-efficacy (psychosocial variables); Physical activity behavior
Social level	Contact theory Empowerment theory	Intergenerational contact and group program activities	Age-related beliefs and stereotypes; group advocacy outcomes
Environment & Policy	Empowerment Theory Social Cognitive Theory (reciprocal determinism)	MAPS survey, advocacy training, and actions related to physical activity environment	Changes to physical activity environment or policies. Interim outcomes include actions by advocates and decision makers.

At the social level, Contact Theory was applied to guide intergenerational interactions. Contact Theory posits that certain types of interactions between generations can reduce ageism and help members of different generations develop informed perceptions of each other (Kuehne & Melville, 2014). Allport (1979) contended that reducing ageism requires four conditions: equal

group status, common goals, intergroup cooperation, and support of authorities. Pettigrew (1998) added a fifth condition: opportunity for friendship development. Contact Theory informed the Senior Change Makers Pilot Study design, development of program materials and activities, and program evaluation (Jarrott & Smith, 2011). The present study integrated and tested Contact Theory by making the advocacy condition a “high-contact” condition, and the physical activity condition a “low contact” condition (Table 2).

At the environment and policy level, the Senior Change Makers Pilot Study applied both Social Cognitive Theory and Empowerment Theory. Social Cognitive Theory holds that individual, social, and environmental factors affect one another in a reciprocal manner (Bandura, 1986). Social Cognitive Theory and the concept of reciprocal determinism predict that changes made to an individual’s physical activity environment would affect their physical activity behavior. Thus, the multilevel intervention components should have an iterative effect on participants’ behavior. Empowerment Theory posits that community members can influence their environments by advocating for change (Zimmerman & Rappaport, 1988). In the present study, participants in the advocacy condition influenced their environment by advocating for improvements to sidewalks, curb cuts, etc.

Conceptual Model

The conceptual model in Figure 1 provides a simplified illustration of how study aims relate to various intervention components (Figure 1). The second model (Figure 2) provides more detail and includes all factors measured in the study, including intervention components, mediators and moderators, and study outcomes.

Table 2. *Application of Contact Theory to high-contact and low-contact intervention arms*

Contact Theory Element	“High Contact” Advocacy Condition	“Low Contact” Physical Activity Condition
Equal group status	- Seniors and students work together as co-participants to complete the advocacy project. - Activities designed to provide each participant with an active role. - Leaders trained to encourage and facilitate equal participation by members of different age groups.	Students serve as helpers to the research team, but are not co-participants with the older adults.
Common goals	- Seniors and students collectively select their advocacy projects, and set goals in an action plan. - At program level, researchers set goal to intervene and assess age-related attitudes and beliefs. - Leaders trained to solicit input from all age groups when selecting advocacy project and creating action plan goals.	- Participants set individual goals related to their physical activity. - Participants report back on individual progress & barriers
Intergroup cooperation	- Seniors and students work together to complete advocacy tasks. Teamwork is encouraged to use participants’ unique skills and resources. Students help seniors use MAPS mobile application and send emails. Seniors provide advocacy experience. - Activity designed to identify the unique skills and contributions of members of different age groups. - Small group activities pair seniors with students. Students spread out and sit with seniors during group sessions. - Leaders trained to encourage participants to appreciate and utilize the unique skills of members of different age groups.	- Older adults share their fitness strategies and experiences with other older adults. - Students primarily provide administrative assistance.
Support of authorities	- Administrators and staff at the senior center/housing were recruited to participate; - Group instructors encourage intergroup interaction during group activities.	Leaders and site staff support the PA program, but do not emphasize intergenerational component.
Opportunity for friendship development	- Activities designed to go beyond ice breakers and allow seniors and students to share personal experiences and stories - Weekly meetings provide repeated contact and provide time to develop familiarity and companionship	- Group building activities will create social interaction among the older adults. - Students will not participate in group building activities.

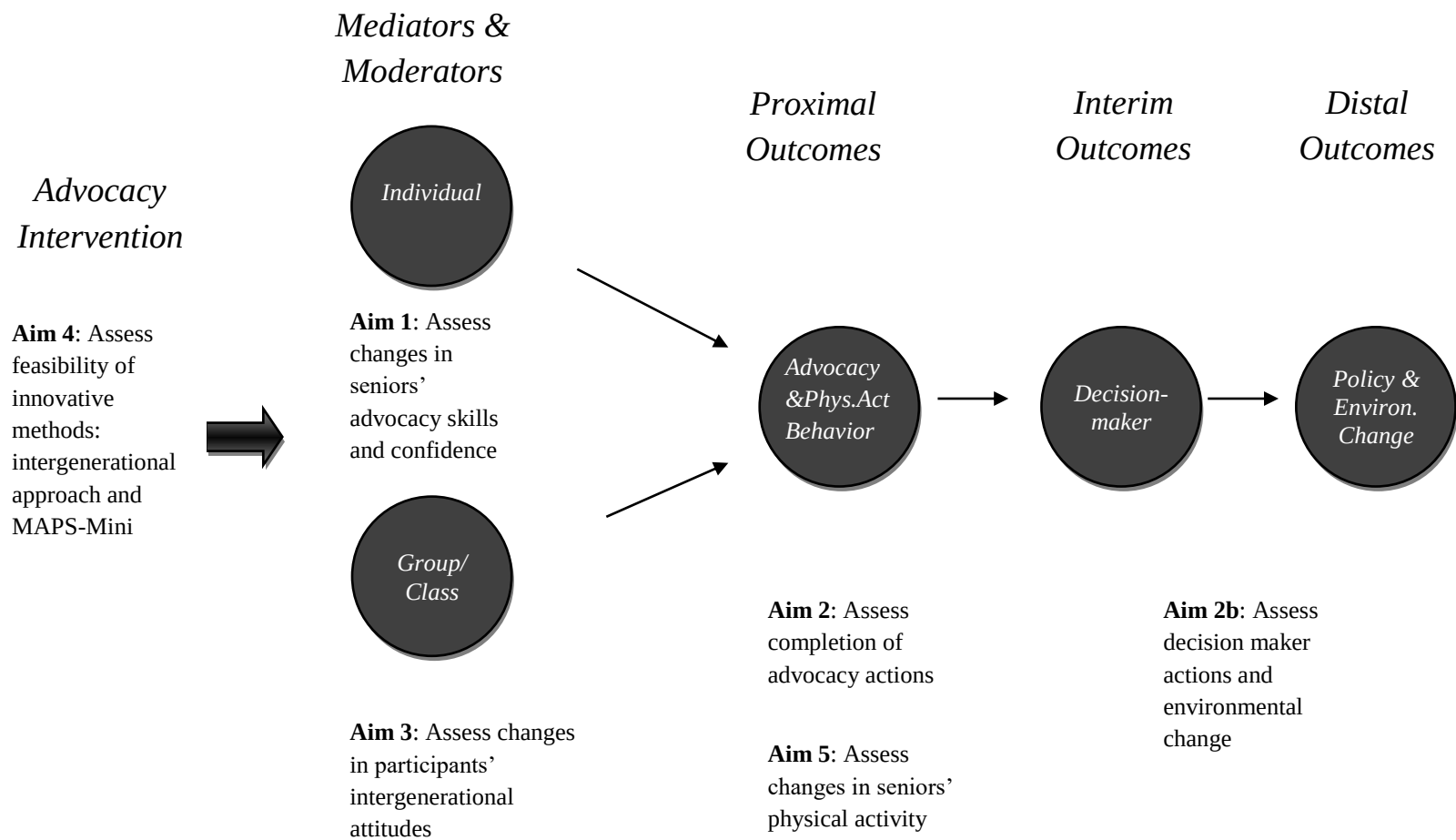


Figure 1. Senior Change Makers Pilot Study Conceptual Model

Intervention Components →	Mediators/Moderators ←→	Proximal Outcomes →	Interim & Distal Outcomes
Education: - Relationship between physical activity (PA) and environment - Introduction to MAPS-Mini - Introduction to advocacy - Introduction to San Diego Dept. of Transportation Activities and skill development: - Conduct environmental assessment using MAPS-Mini - Analysis of MAPS-mini data - Select advocacy issues based on feasibility & importance - Develop action plan - Develop & frame message - Create fact sheets - Leadership & team building - Communication - Network and coalition building - Email and call decision-makers - Develop and make advocacy presentation - Evaluate strategies Intergenerational contact - Equal group status - Common goals - Intergroup cooperation - Support of group leaders and senior residence management	Individual level: - Self-efficacy for advocacy - Perceived sociopolitical control - Advocacy outcome efficacy - Assertiveness - Participatory competence - Knowledge and prior experience - Attitudes - Enjoyment - Perceived barriers - Demographics: age, race/ethnicity, family income Social/Group level: - Peer support for healthy behaviors - Pride in group work - Group outcome efficacy - Follow-up group resiliency - Group roles and participation - Opportunities for control in group work - Group cohesion - Coordinator/leader characteristics Intergenerational attitudes - Ageism; desire for future intergenerational work Process: - Dose and fidelity to intervention; intergenerational contact - Use of MAPS-Mini tool	Individual: - Physical activity – accelerometer - Leisure and active transport - Health advocacy history since starting program - Intent to remain involved in advocacy and/or intergenerational work Group advocacy activities: - Complete environmental assessment - Create action plan - Contact potential partners/allies - Create fact sheet or other educational materials - Contact decision maker (email, calling, letter) - Contact media - Circulate/sign petitions - Hold/attend press conferences - Seek additional funding Group advocacy outcomes: - Meet with decision maker - New advocates or champions (including policymakers) - New partnerships or community allies - Media coverage - More funding for advocacy	Decision-maker/Traffic Engineer: - Listened to group, understood the request, learned something - Satisfaction with advocacy - Change in attitudes, beliefs - Increased knowledge - Intentions to act Policy goals: - Policy development, placement on agenda - Policy adoption and implementation - Policy monitoring and evaluation - Policy strength/quality Impacts: - Built environment improvements for physical activity - Improved neighborhood condition/appearance - Improved quality/availability of recreation facilities - Improved access to public transportation - Increased opportunities for physical activity

Figure 2. Detailed Conceptual Model of Senior Change Makers Pilot Study

Literature Review

Age- and Income-based Disparities

International and national health authorities concur that eliminating health disparities is a priority issue (World Health Organization, 2014; USDHHS, 2014). Health disparities refer to avoidable differences in health outcomes across groups, often based on income, race, education, or area of residence (USDHHS, 2014). As with younger adults, older adults with lower incomes suffer higher rates of disability (Schoeni, Martin, Andreski & Freedman, 2005) and chronic disease (Kaplan, Huguet, Feeny & McFarland, 2010; Mather & Scommegna, 2017) as compared to their counterparts with higher incomes. In addition to low personal income, living in a low-income neighborhood or a neighborhood with unfavorable pedestrian features also increases older adults' risk of physical disability (Beard, et al., 2009). A study of 833 older adults in Alameda County found that older adults who reported neighborhood problems related to traffic, noise, crime, trash, lighting, or public transportation were at an increased risk of functional loss, even after controlling for individual-level demographics (Balfour, & Kaplan, 2002).

Evidence also suggests that unfavorable neighborhood features may disproportionately affect the health of older adults (Mather & Scommegna, 2017). Robert & Li (2001) found that the association between community socioeconomic status and health increased with age, with the strongest association seen among older adults aged 60-69. Perhaps older adults live in the same neighborhoods for longer and have more exposure to neighborhood conditions. Older adults may have less access to resources outside the neighborhood or have functional limitations that make unfavorable neighborhood features (such as uneven sidewalks or poor public transit) more germane (Cunningham & Michael, 2004).

Compared to other age groups, older adults have disproportionately high rates of pedestrian fatalities (National Center for Statistics and Analysis, 2016). In San Diego County, older adults (aged 65+) accounted for the largest percentage of pedestrian fatalities (26.6%) during the years 2008-2012, incurring over 39 collisions per 100,000 persons (City of San Diego, 2014). In comparison, adults aged 35-44 incurred 24 collisions per 100,000 persons, and account for 7.6% pedestrian fatalities. As compared to younger adults, older adults may have less mobility to avoid traffic dangers, placing them at greater risk of harm from pedestrian obstacles such as unsafe crosswalks (Cunningham & Michael, 2004). In San Diego, pedestrian collisions are 10 times greater in low-income census tracts versus high-income census tracts (City of San Diego, 2014). Accordingly, seniors living in low-income neighborhoods possess two characteristics (age and low-income neighborhood) that increase their risk for pedestrian collision and fatalities.

Older Adults' Physical Activity by Income Level

Reviews of demographic correlates of older adults' physical activity indicate that older adults with low incomes engage in less physical activity than their higher income counterparts (King, 2001; King 2011; Wilcox, Tudor-Locke, & Ainsworth, 2002). However, income is only one of many factors that predict older adults' physical activity (Thornton, et al., 2016). Several observational studies assessing determinants of older adults' physical activity from an ecological perspective have found that other factors, such as disability and self-efficacy, may be better predictors of older adults' physical activity than income (Annear, Cushman & Gidlow, 2009; Thornton, et al., 2016).

Evidence suggests that the relationship between older adults' physical activity and income level may vary based on physical activity domain (King, et al., 2011). Several studies have found that older adults living in lower income neighborhoods engage in less leisure time physical activity (Annear, Cushman & Gidlow, 2009; King, et al., 2011). When it comes to

transportation activity, however, King, et al., 2011, found no significant difference between residents of high and low income neighborhoods. The parity in transportation activity across income levels suggests that improving built environment features related to active transport, such as sidewalks and crosswalks, could benefit all older adults, regardless of income level.

The findings of King, et al., 2011, and Annear, et al., 2009, with respect to older adults comport with the findings of studies assessing younger adults. Giles-Corti and Donovan (2002) found that younger adults living in low socioeconomic status (SES) neighborhoods were less likely to meet physical activity guidelines and engage in leisure physical activity, but were more likely to walk for transport, than were their counterparts living in high SES neighborhoods. Collectively, studies of younger and older adults show a complex relationship between physical activity and income, with variations based on physical activity outcome (Giles-Corti & Donovan, 2002).

Older Adults' Physical Activity and the Built Environment

Reviews addressing the relationship between older adults' physical activity and neighborhood environment features provide mixed findings (Kerr, Rosenberg & Frank, 2012; Van Cauwenberg, et al., 2011). Several studies have found that older adults living in pedestrian-friendly communities engage in more physical activity (Frank, Kerr, Rosenberg & King, 2010; Li, Fisher, Brownson, & Bosworth, 2005) but other studies found no relationship (Nagel, Carlson, Bosworth & Michael, 2008; Wilcox, Castro, King, Housemann & Brownson, 2000). Results may depend on whether researchers used objective or reported measures of the built environment and physical activity, and whether they assessed "macroscale" or "microscale" built environment features (Lin & Moudon, 2010; Van Cauwenberg, et al., 2011). Macroscale refers to urban design features such as intersection density, street connectivity, and land use mix. Microscale features

include smaller street-level features that may affect the pedestrian experience, such as sidewalk quality, landscaping, and safety of crosswalks (Cain et al., 2014).

Research results are more consistent when domain-specific models are used to test the relationship between a particular domain of physical activity and the environmental variables expected to influence that domain (Giles-Corti, Timperio, Bull & Pikora, 2005; King, et al., 2011). Several studies of older adults have shown relationships between walking for transportation and macroscale walkability features, such as whether there are shops and other destinations within walking distance and whether street networks and intersections provide a direct and safe route (Cain, et al., 2014; Frank, Kerr, Rosenberg & King, 2010; King, et al., 2011; Shigematsu, et al., 2008). A study of older adults (N= 719; mean age 74 years) from two U.S. regions found that participants living in neighborhoods with good macroscale walkability reported 22-40 more minutes of active transportation per week than those living in less walkable neighborhoods (King, et al., 2011). However, no association was observed between macroscale walkability and leisure activity (King, et al., 2011). Using data from the same study, Thornton et al., (2016) reported that mixed land use (a macroscale variable assessing diversity of residential and retail uses), was associated with more active transport but less walking for leisure. Perhaps walkable neighborhoods with a combination of residential and retail uses are convenient when walking for errands but have attributes, like heavier traffic and more intersections, which deter older adults from walking for leisure (Thornton, et al, 2016).

Associations between older adults' total physical activity and macroscale environmental variables are less consistent than models that assess specific domains of physical activity. At least two studies have shown significant relationships between older adults' total physical activity and land use mix (Cain, et al., 2014; Nagel, et al., 2008). A study of built environment features in three U.S. metropolitan areas found that older adults' total objectively measured physical activity

was positively related to land use mix (Cain, et al., 2014). Similarly, a study of older adults in Portland, Oregon (N= 546, mean age = 75 years) found that among older adults who reported some walking, total walking time was significantly associated with greater land use mix (Nagel, et al., 2008). In contrast, a multi-site study of adults (N = 871) found that older adult women (aged 50+) living in residential neighborhoods reported significantly more total physical activity as compared to older adult women living in mixed-use neighborhoods (Sallis, King, Sirard, & Albright, 2007). With respect to intersection density, Li, et al. (2005) found that self-reported total walking was related to objectively measured intersection density, but Nagel et al., (2008) reported no association.

Research findings are mixed regarding the relationship between older adults' physical activity and access to parks and recreation facilities (Cain, et al., 2014; Michael, Perdue, Orwoll, Stefanick & Marshall, 2010; Thornton, et. al, 2016). Cain et al. (2014) found that access to recreation facilities did not relate to any domain of older adults' physical activity (total, transport, or leisure). In contrast, Li, et al. (2005) found that self-reported total walking was related to number of recreation facilities and parks. Thornton et al. (2016) found that older adults' objectively measured total physical activity related to park access. A study of older adult men found that total walking time was related to access to parks for participants living in high income, but not low-income, neighborhoods (Michael, et al., 2010). Nagel, et al. (2008) found that park access was related to older adults' brisk walking, but not leisure time walking. Several studies reported significant relationships between recreation facilities and transportation walking (Shigematsu, et al., 2009; Thornton, et al., 2016). In sum, several studies suggest that recreation facilities and parks may be important destinations for older adults, but additional research is needed.

Overall, findings from studies of older adults are similar to those of younger adults, which tend to show modest yet significant relationships between physical activity and macroscale built environment features (Duncan, Spence & Mummery, 2005; Mather & Scommegna, 2017; McCormack & Shiell, 2011; Saelens & Handy, 2008). A global study of adults of all ages from 14 cities in 10 countries found that objectively measured physical activity was positively associated with four built environment variables: residential density, intersection density, public transport density, and number of parks (Sallis, et al., 2016). Likewise, a literature review by Saelens and Handy (2008) found that adults walked more if they lived in neighborhoods with favorable macroscale features, such as mixed land use and density, or in neighborhoods with favorable microscale features, such as pleasant aesthetics (Saelens & Handy, 2008).

The present study focuses on advocacy to improve microscale, as opposed to macroscale, built environment features. Evidence shows a link between microscale built environment features and older adults' physical activity (Cain et al., 2014). Several studies using self-reported environmental and physical activity data found that older adults' total physical activity was significantly related to aesthetic features such as pleasant scenery (King, et al., 2000; Sallis, et al., 2007; Wilcox, et al., 2000). Compared to changing macroscale features, such as the density of intersections, improving microscale features may provide a more affordable and feasible approach to making communities more activity-friendly (Cain et al., 2014).

As with macroscale features, the relationship between microscale features and older adults' physical activity is domain specific (Cain, et al., 2014). A study of objectively measured microscale features in three U.S. metropolitan areas found that older adults' self-reported walking for transport was related to microscale streetscape amenities such as benches, aesthetics and social characteristics, setbacks of buildings from the curb, curb quality, intersection crossing signals, and pedestrian protection features (Cain, et al., 2014). Curb and intersection quality was

more important for older adults' transportation activity as compared to younger adults (Cain, et al., 2014), supporting the notion that older adults may be disproportionately affected by certain pedestrian barriers. Providing older adults with skills to advocate for improvements to those barriers may help create communities that are activity-friendly for people of all ages.

Leisure time physical activity related to microscale features including building aesthetics and setbacks, availability of parking, and wide one-way street designs (Cain, et al., 2014). In a study of women living in rural U.S. areas, an association was found between leisure time physical activity and aesthetics such as pleasant scenery, but not other self-reported microscale features such as traffic or sidewalk quality (Wilcox, et al. 2000). Collectively these findings show a conceptual match between the physical activity outcome and microscale variables expected to affect that outcome (Cain, et al., 2014). Study results support the notion that we can enhance our ability to predict older adults' physical activity by using separate models for different physical activity domains and testing environmental variables thought to influence those specific types of activity (Giles-Corti, et al., 2005).

Advocacy by Older and Younger Adults

Grass-roots efforts driven by community members are needed to reduce physical activity barriers and create age-friendly communities (Millstein & Sallis, 2011). Enacting changes to improve the physical activity environment requires relevant, local data (Buman, et al., 2012). Yet local transportation departments often lack funding to conduct microscale audits needed to identify and prioritize pedestrian barriers. Accordingly, community members can provide a valuable service by collecting data and informing local public works projects and policy decisions (Buman, et al., 2012; Winter, et al., 2014).

Several advocacy groups have used audit tools, such as the Stanford Healthy Neighborhood Discovery Tool, to help community members identify projects to make their communities better for physical activity (Rosas, et al., 2016; Winter, et al., 2015). The Discovery Tool is a mobile application that allows residents to identify physical activity barriers and facilitators in their built environment, record audio narratives relating to built environment features, and take photographs (Buman, et al., 2013). The researchers analyze the data by coding the narratives and counting frequencies of barriers and facilitators. Preliminary studies have found that older adults can successfully use the Discovery Tool to conduct neighborhood audits and identify advocacy projects (Buman, et al., 2012; Rosas, et al., 2016).

Seniors may be particularly effective advocates for community change given their life experiences and influence as a powerful voting bloc. Maggie Kuhn, founder of the Gray Panthers social advocacy group, commented:

The old, having the benefit of life experience, the time to get things done, and the least to lose by sticking their necks out, [are] in a perfect position to serve as advocates for the larger public good (Kuhn, 1991, p. 38).

Many older adults feel motivated to advocate for community improvements because they have a deep sense of attachment to their community, fostered by years of residence or strong social connections (Wiles & Jayasinha, 2013). Advocacy issues relating to improving pedestrian features have particular relevance to older adults, who may be disproportionately affected by barriers such as unsafe sidewalks and crosswalks (Cunningham & Michael, 2004) and suffer high rates of pedestrian collisions and fatalities (City of San Diego, 2014).

Older adults have shown to be effective advocates. For example, advocacy groups like the Older Women's League (OWL) were integral in the passage of COBRA, a federal law providing healthcare coverage after employer-sponsored coverage ends. OWL members draft

policy briefs, build alliances, and educate the public on issues affecting older adults. OWL members regularly testify before Congress on issues pertaining to older adult women like social security issues, fair pay issues, and expansion of the Age Discrimination in Employment Act.

In addition to helping the community, advocacy may provide older adults with health benefits. Research shows that volunteering is associated with reduced risk of functional decline, cognitive decline, and mortality (Anderson, et. al., 2014; Fried, et al., 2004). Anderson et al. (2014) proposed a theoretical model that volunteering increases physical, social, and cognitive activity, which in turn may lead to improved functioning through psychological and biological mediators. Potential mediators include generativity, altruism, role enhancement, self-efficacy, physical health, brain derived neurotrophic factor, neurogenesis, and functional reorganization (Anderson, et. al., 2014).

Anderson's model was based on studies of the Experience Corps., a volunteer program for older adults (Anderson, et. al., 2014). Experience Corps connects older adult volunteers with elementary school children and aims to improve the children's academic performance and older adults' physical, social, and cognitive health. The program requires older adults to work with children for 15 hours per week for four to eight months (Fried, et al., 2004). In a randomized, wait-list controlled pilot study (N= 128, 92% female, 95% African American), the older adults in the intervention group reported greater increases in physical activity and social connectedness, and decreased time spent watching television, as compared to the control group. The findings supported Anderson's theory that volunteering may improve health by increasing physical, social, and cognitive activity (Anderson, et. al., 2014; Fried, et al., 2004).

Young adults have also proven to be effective advocates for community change. Youth played a key role in advocating against tobacco use in schools, participating in movements like

the Statewide Youth Movement against Tobacco Use (SYMATU; Holden, Evans, Hinnant, & Messeri, 2005). Another youth group advocated for violence prevention in response to a shooting of a young girl (Christens & Dolan, 2011). The group helped change policies in schools and local police practice, obtained funding from the City, and educated the community about racially driven violence. Members of the youth group reported feeling empowered and confident, and reported developing skills such as public speaking and leadership (Christens & Dolan, 2011).

Common pathways for youth advocacy have included working with public leaders on policy, involvement in community coalitions, infusion in public organizations, youth-led organizing, and school-based service learning (Camino & Zeldin, 2002). Opportunities for youth civic engagement are growing, but additional support for youth advocacy programs is needed (Camino & Zeldin, 2002). With regard to advocacy to make communities more activity-friendly, young adults are natural stakeholders since they bear the burden of long-term physical, psychological, and economic consequences of physical inactivity (Millstein & Sallis, 2011). In San Diego, young people are disproportionately affected by pedestrian collisions (City of San Diego, 2014). Youth aged 15-24 incurred approximately 50 collisions per 100,000 persons in from 2008-2012, and accounted for almost 25 percent of all pedestrian collisions in San Diego County (City of San Diego, 2014). The high risk of youth collisions is similar to older adults, who incurred 39 collisions per 100,000 persons and accounted for 27% of San Diego's pedestrian fatalities. The collision rate of youth aged 15-24 was twice that of adults aged 35-44, who incurred 24 collisions per 100,000 persons from 2008-2012.

Intergenerational Advocacy

Intergenerational community building programs may provide an ideal mechanism to teach older and younger adult community members to advocate for improvements to their physical activity environments. Intergenerational community building projects aim to engage

young people and older adults in projects that benefit the community and concurrently empower participants (Kaplan, 1997). Intergenerational programs have the advantage of drawing on two populations (older and younger adults) that are traditionally excluded from civic engagement and public discourse, yet are major stakeholders in their communities' physical activity environments (Christens & Dolan, 2011). The joint advocacy efforts of younger and older adults can demonstrate the possibilities of civic engagement as a grass roots movement, and show an inclusive approach to community building that crosses boundaries of age and income (Christens & Dolan, 2011).

Intergenerational community building programs have increased in popularity, but systematic research evaluating the process and outcomes of such studies is lacking (Kuehne & Melville, 2014). Only a few studies have evaluated intergenerational community building programs, and most relied solely on qualitative interviews (Kaplan, 1997; Lawrence-Jacobsen, 2005; Winter, et al., 2015).

The Neighborhoods 2000 project (Kaplan, 1997) was an intergenerational community building project wherein elementary students (aged 11-13) worked with older adults on community projects via a 22-lesson curriculum integrated into the students' social studies and civics class. Activities included surveying recreation facilities, land-use mapping, and identifying advocacy projects to improve their community's physical activity environment. Participants advocated for a pedestrian overpass, additional recreation facilities, trash clean up, and building community members' awareness of existing recreation programs. Kaplan, 1997, used qualitative evaluation methods to identify the following program benefits:

- The program challenged age-related stereotypes. Students saw examples of energetic and competent older adults, and older adults learned that students had valid concerns about the community and good ideas for improvement. The participants identified commonalities that bridged generations, and built camaraderie among group members.
- Participants developed a sense of civic responsibility and community activism. Participants learned to take initiative to address problems in their neighborhood instead of remaining passive.
- Participants gained the confidence and skills needed to voice concerns to decision makers. They learned about the structure of the local government and practiced advocacy skills such as letter writing, holding a petition, and making a presentation.

Another intergenerational program, the Intergenerational Community Action Group, involved eight older adults and five undergraduate students (Lawrence-Jacobsen, 2005). The Group met 22 times over the course of a year at a senior housing residence. The Group worked on a community improvement project related to increasing opportunities for intergenerational contact between the residents of the senior housing complex and a local university. Lawrence-Jacobsen (2005) used qualitative methods to evaluate the program, finding similar benefits to those cited by Kaplan (1997).

Lawrence-Jacobsen (2005) suggested that the empowerment process might differ based on the participants' age. For example, students voiced a strong desire for greater empowerment, and valued skills they learned such as talking to decision makers, development of leadership skills, and feeling comfortable voicing opinions in a group setting. Some older adults, in contrast, reported that they already felt empowered and valued the program for providing the opportunity to exercise preexisting skills. Other older adults reported that empowerment was no longer important to them and they felt freed by accepting that some things were outside of their control. Lawrence-Jacobsen (2005) noted generational differences in participants' goals and values, and

suggested that future research explore generational differences in the empowerment process to inform development of intergenerational community building programs.

Another example of an intergenerational community building program, the Neighborhood Eating and Activity Advocacy (NEAAT) Program, engaged older adult residents of two low-income housing complexes in San Mateo (Buman, et al., 2012). Participants used the Stanford Healthy Neighborhood Discovery Tool to perform an audit of their built environment and identify barriers and facilitators to physical activity. For example, the street adjacent to the housing complex lacked a safe crosswalk and pedestrian signal, and most residents felt unsafe crossing the street to get to the store and bus station across the street. The advocates selected their advocacy topic by evaluating potential projects on two dimensions: importance and feasibility (Buman, et al., 2012). Long-term outcomes of the NEAAT Program included the adoption of a “Senior Advisory Committee Resolution,” that addressed a range of issues related to active living (e.g., sidewalk repair, dog leash laws, and open space). Since then, the City’s Planning and Engineering Divisions have implemented a comprehensive sidewalk survey and repair program, which includes plans to add trees (Winter, et al., 2014).

Methods

Overview

The Senior Change Makers Pilot Study was conducted at four low-income senior housing sites in San Diego, CA. Study participants who completed survey measures at baseline and eight weeks included 50 senior participants, and 20 college student participants ($N = 70$). Two sites were randomized to an advocacy program and two sites were randomized to a physical activity program (Figure 3). Group sessions were taught by four members of the research team (not study participants), which included two public health doctoral students, an individual with master's degree in City Planning, and a resident in preventive medicine.

The sample size was determined by several factors. To administer the intervention safely and effectively, we sought to recruit 10-20 older adult participants at each site. Larger group sizes would have made it difficult to ensure the safety of the participants during group exercises and walks. Budgetary limits on incentives, supplies, and staff salaries also restricted the sample size..

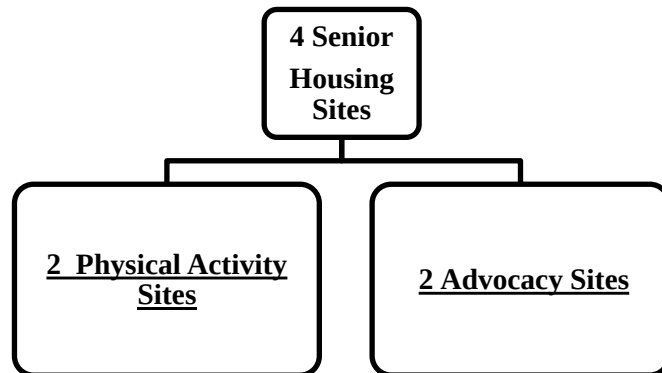


Figure 3. *Senior Change Makers Pilot Study Design*

The study design included a control group because the advocacy measures (Millstein, et al., 2016a) had not previously been applied in a controlled design. Without a control group, we could not determine whether outcomes of the advocacy program are attributable to the intervention or some other factor (e.g., social desirability, history, or maturation). Use of a control group increases internal validity and chances for causal inferences. The primary objective of the present study, assessing changes in older adults' advocacy confidence and beliefs, was strengthened by the use of a control group that did not engage in advocacy. Given the research team's expertise in physical activity and interest in environmental influences on physical activity, we selected a physical activity control group.

Preliminary Studies

The Senior Change Makers Pilot Study used a previously developed audit tool, the Microscale Audit of Pedestrian Streetscapes-Mini (MAPS-Mini), to help participants evaluate features of their built environment (Sallis, Cain, et al., 2015). MAPS-Mini is a 15-item audit used to score neighborhood features that relate to physical activity, such as sidewalks, intersections, and parks. The scores from MAPS-Mini strongly correlated with the original 120-item MAPS research instrument (Sallis, Cain, et al., 2015). Completing the audit involves walking down the street and answering questions about neighborhood features. The 15-item tool is short enough for use by community members, and was previously developed in both paper and mobile application formats. The tool was developed using physical activity data from participants of all ages (Sallis, Cain, et al., 2015), but the present study was the first time an older adult sample used the tool to perform neighborhood audits. To accommodate the older adult participants, the font size was increased.

The MAPS-Mini tool provides a list of issues for participants to evaluate when assessing a neighborhood's physical activity environment, and directs participants' attention to certain

features. By providing a standardized list, MAPS-Mini allows comparison across communities with different pedestrian assets and obstacles. The MAPS-Mini audit helps teach participants the factors that affect pedestrian experience, and introduces them to built environment terminology. For example, if a participant audits a street that does not have a pedestrian buffer to separate cars from the sidewalk, the participant learns the terminology and learns that a pedestrian buffer is important for walkability. The MAPS-Mini approach differs from the Stanford Discovery Tool, which relies on participants to generate issues (Buman, et al., 2013). Sheats, et al. (2013) indicated that a drawback of the Discovery Tool is that it depends on participants to identify salient built environment features, and participants may not record certain negative features due to habituation.

The Senior Change Makers Pilot Study also benefited from previously developed and validated survey items to assess changes in participants' advocacy skills, confidence, and attitudes (Millstein, et al., 2016a). The advocacy items were tested in youth participants of the Youth Engagement and Action for Health (YEAH!) program. YEAH! was designed by the San Diego County Childhood Obesity Initiative to help youth advocate for improvements to their school or neighborhood physical activity or nutrition environment (Millstein, Woodruff, Linton, Edwards & Sallis, 2016). The YEAH! program was evaluated using a series of newly developed measures to test various psychosocial factors, such as participants' confidence to advocate (Millstein, et al., 2016). The authors of the advocacy measures provided feedback to help adapt the measures for use in the present study's sample of college students and older adults.

Timeline

The Senior Change Makers Pilot Study took place over the course of one year, from April 2016 to April 2017. Key milestones and tasks are presented in Table 3.

Table 3. *Study Timeline*

Apr. 2016	• Grant awarded
May 2016	• Measures: research, select, revise, and format • IRB application
June 2016	• Recruit group leaders • Action plan with tasks, assignments & timeline • Develop physical activity program materials
July 2016	• Interview experts in intergenerational programs & advocacy • Recruit senior sites (7/15-8/24)
Aug. 2016	• IRB approval (8/7) • Develop advocacy program materials • Select and randomize sites (8/24) • Recruit study participants (8/25-9/27)
Sept. 2016	• Prepare participant materials: consent, accelerometers, meter log & instructions, meeting schedules, baseline survey • Prepare internal systems: student intern schedule & tracking, accelerometer tracking, filing system • Recruit student interns (9/1 -9/21) • Prepare student training materials, internship syllabus, course credit paperwork • Student training (9/21 and 9/23) • Introductory meetings to recruit & consent participants (9/6 - 9/15) • ClinicalTrials.gov registration • Group meetings begin; collect baseline data (9/27)
Oct. 2016	• Prepare for weekly group meetings: agenda, handouts, supplies, music, snacks, direct observation forms, attendance • Prepare survey entry database and accelerometer database • MAPS-mini focus groups
Nov. 2016	• Prepare accelerometers and survey for post-test data collection • Final meeting: post-test data collection, celebration, graduation, incentives, presentation of students' final projects (11/15-11/17)
Dec. 2016- Jan. 2017	• San Diego Foundation progress report • Data entry • Data cleaning • Collection of outstanding accelerometers and surveys
Feb. 2017	• Data analysis
Mar. 2017	• Data analysis • Four month follow up with advocacy participants
Apr. 2017	• Draft results and discussion • Prepare report for San Diego Foundation

Site Recruitment

The Senior Change Makers Pilot Study involved seniors recruited from four low-income senior housing residences in San Diego, California. Recruitment of senior sites started in mid-July 2016 and completed in approximately six weeks. Potentially eligible senior housing sites were identified using San Diego Housing Commission's 2016 "Countywide Affordable Housing Inventory," which lists residences that provide affordable rents for low-income older adults. We sought to find sites that met the following criteria:

- Adequate recruitment pool. Assuming a recruitment rate of 10% of residents, we sought sites with 150 or more low-income units.
- Residents with diverse racial-ethnic backgrounds
- Majority of residents speak English
- Facilities for group meetings
- Administrative approval
- Enthusiastic staff
- Safe surroundings for outdoor audits and walks
- No other conflicting research studies.

Twenty-two potential sites were contacted via telephone to introduce the study and obtain information regarding the above-listed criteria. It was necessary to work with sites that had mostly English speaking residents because the study was administered in English only, and study materials and consent forms were not translated into other languages. To ensure a sufficient recruitment pool, the research team ranked the sites based on the number of low-income housing units, and met with managers or activity coordinators at the 10 largest sites. During in-person meetings, the research team gathered information relating to eligibility criteria. We assessed willingness to participate, addressed questions and concerns, discussed recruitment potential, and evaluated site facilities. Six of the 10 sites were eliminated for the following reasons: construction preventing use of the meeting room, site administration did not approve the study, majority of residents did not speak English, concerns regarding safety from crime expressed by site staff, other research study already in progress, and not enough residents to meet recruitment goals. The

remaining four sites met study criteria and agreed to participate in either study condition (Table 4; Figure 4).

Once the four sites were selected, sites were randomized into the physical activity or advocacy condition using an online randomizer. Randomization of sites was necessary because cross contamination would have occurred if participants living in the same building were assigned to different conditions. Senior participants were therefore randomized before their baseline measurements and consent process. The researchers then worked with the site to determine the day and time of the weekly group meetings. At each site, meetings were held at the same day, time, and place each week.

Table 4. *Pilot Study site by condition, location, and affordable rent units*

Site	Location	# Affordable Rent Units
A: Physical Activity	Hancock St. San Diego, CA 92110	560
B: Advocacy	Ibis St, San Diego, CA 92103	199
C: Physical Activity	9th Avenue San Diego, CA 92101	154
D: Advocacy	3rd Avenue, San Diego, CA 92101	152



Figure 4. Map of sites by study condition. Advocacy sites = ★ ; Physical activity sites = ☆

Participant Recruitment

The Senior Change Makers Pilot Study involved seniors recruited from four senior housing residences in San Diego, California, and undergraduate students from local universities. Recruitment of seniors began in late August 2016 and continued for approximately one month. Student recruitment began in September 2016 and took approximately three weeks. Enrollment was contingent upon satisfaction of the inclusion and exclusion criteria and completion of the informed consent. We applied the following inclusion-exclusion criteria:

Senior eligibility criteria:

- 50 years or older
- Have not had a fall that resulted in a hospitalization in the past 12 months
- Have not had chest pain in the past month when you were not doing physical activity
- Doctor has not said that you have a heart condition and should only do physical activity recommended by a doctor
- Able to walk three meters within 30 seconds (Shumway-Cook, Brauer & Wollacott, 2000)
- Able to walk without human assistance (cane or walker use okay)
- Able to read and write in English
- Able to complete written surveys without assistance
- Able to attend regular study activities at the site
- Able to provide written informed consent

Student eligibility criteria:

- 18 years or older
- Able to complete written surveys without assistance
- Able to provide written informed consent
- Current undergraduate student (or graduated within past year)
- Able to commit approximately 6-12 hours per week to study activities for at least one school quarter (10-12 weeks)

Senior participant recruitment occurred through word of mouth, short presentations (using IRB-approved script), and flyers. Researchers worked with staff to create a recruitment plan that was acceptable for the site. Recruitment materials indicated whether the program was physical activity or community improvement. Participants were informed that they would receive a \$20 gift card for participating. Upon reaching a potential participant, recruitment staff introduced the project and assessed interest in participating in the study. People who expressed interest in participating were asked to attend an introductory meeting, where researchers

explained the study and inclusion criteria, completed the in-person informed consent and eligibility screening process, and distributed accelerometers and baseline surveys. If a potential participant could not attend the introductory meeting, we scheduled another time to complete the consent and screening process. For potential participants who contacted the research team over the phone (e.g., after seeing a flyer), the researchers invited the participant to attend a scheduled introductory meeting, or set up another time to provide study information and complete the consent and screening process.

Recruitment of students occurred through word of mouth, email lists sent to local university students in health-related fields of study, and established protocols to recruit UCSD undergraduate students in the fields of public health, biology, and human development. All students who applied met eligibility requirements. Students were given the meeting information (time and day of week) for the four sites and were asked to select which of the four meeting times they could attend each week. Students were blinded to study condition and specific site information (name and location) when selecting their meeting time. Thus, students were assigned to sites based on the availability of their schedules and did not choose study condition or site. Informed consent was obtained after students were assigned to a site. Some students enrolled to receive internship credit through UCSD, and other students volunteered without receiving course credit. To meet requirements, students receiving internship credit assisted researchers with data input and cleaning. They also completed a dissemination project to share their internship experience through video, writing, or art. The student dissemination projects were shared with the senior participants during the final week of the intervention.

All student participants underwent a training prior to the commencement of the eight week program. Separate half-day trainings were held for students assigned to the advocacy sites and students assigned to the physical activity sites. The separate trainings were necessary to avoid

contamination across conditions. To create a “high contact” intergenerational experience, students in the advocacy condition were trained to participate in all activities with the seniors and interact with the seniors as much as possible. Students in the physical activity condition were trained to serve as assistants to the researchers. Both trainings included sensitivity training to address issues specific to working with older adults. For example, the students put cotton in their ears, wore glasses smeared with Vaseline, and taped their fingers together to replicate functional and sensory limitations experienced by some seniors. The students were also trained in research methods, such as how to conduct a process evaluation, collect data, and maintain participant confidentiality. The same researchers led both trainings and followed a prepared outline to ensure uniformity across trainings.

The original research plan anticipated that the advocacy program would culminate with the seniors making an advocacy presentation to a relevant decision maker. However, the Department of Transportation’s online reporting system made it unnecessary for the seniors to make in-person presentations. At both sites, the advocacy projects selected by the seniors were within the jurisdiction of San Diego’s Department of Transportation. Projects related to sidewalk and crosswalk repairs, lack of curb cuts, and lighting. During the advocacy program, the seniors met with traffic engineers from the City of San Diego to obtain feedback on the feasibility of their projects and advocacy strategies. Due to the nature of the issues presented, the traffic engineer recommended submitting online requests, or indicated they would submit the request themselves. After an issue was submitted, it was reviewed by an engineer to determine if the fix was warranted and allowed under the city planning guidelines. If approved, projects were fixed immediately, or put on a list to await funding. Accordingly, presentations to a decision maker were not needed.

Intervention Development

The Senior Change Makers Pilot Study was informed by a literature review of advocacy and intergenerational programs, existing community programs, and a series of meetings and informal interviews and with experts in fields of physical activity, intervention design, built environment, advocacy, older adult programming, theory, empowerment, and measurement.

Literature review and author interviews. A review of the literature identified several intergenerational community building programs (Kaplan, 1997; Lawrence-Jacobsen, 2005; Winter, et al., 2015). Two researchers involved in those programs were interviewed about the lessons they learned during their research experiences. Both researchers acknowledged that the older adult participants attended the meetings because they enjoyed themselves and the interaction – not because they were passionate advocates. The researchers recommended that the advocacy curriculum be flexible and provide information relevant to the participants’ interests. One researcher identified the challenge of letting the participants do the work, and the temptation to step in to help participants succeed. The authors provided ideas for group activities and resources for additional information on intergenerational programs.

YEAH! San Diego. The eight-week advocacy program was informed by materials from the Youth Engagement and Action for Health (YEAH!) program. The Senior Change Makers Pilot Study adopted the measures developed to evaluate the YEAH! program (Millstein, et al., 2016) and worked with the YEAH! researchers to adapt the measures for the older and younger adult sample.

SNAP-ed for Seniors Program. Program materials were adapted from San Diego County’s Aging and Independence Services “SNAP-ed for Seniors” community improvement program. The SNAP-ed for seniors program focused on advocacy for policy, systems, and environment changes to improve participants’ health. The SNAP-ed for Seniors Coordinator

provided information regarding methods to keep participants engaged during group meetings, including ideas for active icebreakers, nominal incentives, and group-building exercises. The Coordinator identified challenges including working with non-English speaking participants and failing to set clear expectations regarding program duration and incentives. The Coordinator also identified factors that facilitated successful advocacy, such as engaging on-site staff, developing group identity, and providing food at each meeting.

Circulate San Diego. Materials were drawn from Circulate San Diego, a regional organization focused on making neighborhoods more walkable and bikeable. Materials used included handouts to help participants create an action plan, contact local representatives, and write an advocacy letter.

Interviews with social workers. The research team conducted informal interviews with two social workers who worked at low-income senior housing sites. The social workers provided valuable information on everyday issues that low-income older adult participants might face: physical and mental health issues, financial strain, difficulty reading and writing, loss of friends and family members, etc. They provided insights that influenced recruitment and program materials. For some residents, seeing a written notice posted on their door can cause anxiety because such notices often bear bad news. Using colored paper and pleasant graphics can help distinguish a friendly flier. However, certain colors of paper (e.g., any bright or dark colors) can make text difficult to read for older adults. Light colors, such as light pink, work well.

Interviews with site managers. During the site recruitment process, the research team interviewed 10 managers of low income senior housing sites about existing programming, and methods that have (and have not) worked to recruit and maintain older adult participants. Recruitment strategies varied from site to site. Common methods included posting flyers on doors, making short pitches at pre-scheduled events (like a monthly birthday party), and setting

up a table in the lobby. The managers provided recommendations regarding recruitment flyers, such as keeping the flyers short and simple, and using light colored paper. Some managers suggested highlighting free refreshments, and others suggested making the study seem exclusive and time sensitive with words like “first come, first serve.” Most locations indicated that monetary incentives were the biggest draw, but that the Study’s \$20 incentive was not adequate and should not be emphasized.

Research collaboration. The Senior Change Makers Pilot Study is the result of collaboration and meetings among researchers with experience in a variety of fields: physical activity, aging, intervention design, theory, conceptual model development, qualitative methods, built environment, advocacy, older adult programming, empowerment, and measurement. Members of the dissertation committee for the author of this study provided extensive input and guidance on all aspects of the study. Researchers from the UCSD Stein Institute for Research on Aging provided input on study design, participant recruitment, and IRB approval. A UCSD research team with an ongoing study to promote physical activity in older adults, the “PEP4PA” study, provided guidance on study design, recruitment, ethics approval from the institutional review board (IRB), and program materials for the physical activity condition. Researchers from San Diego State with experience working with older adults in San Diego County’s “Feeling Fit” program provided guidance regarding program materials for the physical activity condition, program evaluation, and statistical analysis.

Intervention Content

Group meetings in both conditions were held once a week for eight weeks and lasted one hour each. The group meetings followed the same format for both conditions:

- Attendance and name tags
- Review last week’s content

- Active icebreaker to get participants moving
- Lesson and activities on weekly topic
- Closing and homework

Advocacy condition. The participants in the advocacy intervention underwent an 8-week advocacy program (Table 5). The researchers prepared advocacy curriculum materials in advance, but the focus of the curriculum was tailored to the interests and types of projects selected by the participants.

Both advocacy groups completed an environmental assessment using the MAPS-Mini tool during week three of the advocacy program. Participants at each advocacy site were divided into four small groups (2-3 seniors and 2 students) and each group was assigned an audit route in the neighborhood. The following week the advocacy groups discussed the audit results and each group brainstormed 11-12 potential advocacy issues related to improving the pedestrian environment. From that list of issues, the groups each selected four to five priority issues that they wanted to present to the traffic engineer during week five of the program. The traffic engineers, who worked for San Diego's Department of Transportation, were asked to provide feedback regarding the feasibility of the projects and recommendations on how to advocate for change. The participants selected one or two group members to present each issue to the traffic engineer. The participants' presentations described the issue and its importance for the senior residents and other community members. The traffic engineers recommended that the seniors submit online requests through the City's "Get it Done" website. They provided the senior participants with departments and phone numbers to call for future advocacy issues. The engineers provided information regarding the process used by the City to evaluate, prioritize, and fix problems reported by citizens.

After presenting issues to the traffic engineers, the older adult participants worked with students to make online requests regarding pedestrian advocacy issues of their choosing. The

City’s “Get it Done” website requests information regarding the location of the problem, the type of problem (curb, lighting, etc.), a brief description, and an option to upload photographs. The students helped the seniors type the description and upload photographs.

Table 5. *Advocacy condition weekly program topics*

Week	Advocacy Topics
1. Kick off	Introduction to study Benefits of physical activity and current guidelines Environment and physical activity Intergenerational stereotypes activity
2. Introduction to Advocacy and MAPS	Introduction to advocacy –Advocacy 101 handout Introduction to MAPS-Mini Intergenerational discussion: Where were you active as a child?
3. MAPS-Mini in the field	Conduct MAPS-Mini audit outdoors Homework: do MAPS-Mini audit around your home.
4. Selecting an Advocacy Project	Report back on findings during their own audits “Community Improvement Project Ideas” worksheet Prepare for meeting with traffic engineer; identify issues to present; assign spokesperson for each issue Homework: prepare presentations for traffic engineer
5. Meeting with a Traffic Engineer	Introduction to City of San Diego transportation department, request submission process, and “Get it Done” website Present issues to traffic engineer
6. Submitting online requests	Creating a Fact Sheet Submit online request to City of SD Dept. of Transportation Homework: call your representative
7. Advocacy work continued	Examples of successful advocacy projects by older adults Calling your representative – report back Creating action plans and anticipating future advocacy challenges Key advocacy skills: communicating with representative, identifying community partners, meeting with your representative
8. Celebration/Graduation	Report on advocacy accomplishments Students present projects (articles, videos, artwork) Certificates of completion of Senior Change Makers Program

The final two weeks of the program were spent learning additional advocacy skills, creating action plans, and thinking about how to handle common advocacy challenges. Participants reported on the advocacy actions they had taken and received feedback from the group.

To create a “high contact” condition pursuant to Contact Theory (Table 2), the students in the advocacy condition were encouraged to work with the older adults on advocacy projects. Activities were designed to create equal group status, common goals, and intergroup cooperation (Table 2). During the field audit, students assisted the older adults by helping them complete the MAPS-Mini audit, and taking pictures of physical activity barriers. The pictures were sent to the City Department of Transportation as part of the online requests to fix selected pedestrian-related issues. The students and older adults worked together to draft and submit online requests.

Physical activity condition. In the physical activity condition, participants underwent an 8-week program that provided information about safe physical activity, strategies to increase physical activity, and guided walks (Table 6). Topics focused on walking, but also included information and activities relating to strength training, flexibility, and balance. Behavior change strategies, such as goal setting, social support, and positive thinking, were introduced and reinforced through group activities. The students assigned to the physical activity condition helped create and lead activities, assisted seniors who had hearing or vision impairments, and ensured that the older adults were performing exercises safely. In contrast to the students in the advocacy condition, who acted as co-participants in advocacy efforts, the students in the physical activity condition primarily provided administrative assistance.

Table 6. *Physical activity condition weekly program topics*

Week	Physical Activity Topics
1. Kick off	Introduction to study Walking safety Fall prevention Group walk
2. Walking Benefits and Self-Monitoring	Posture and hip hinge Physical activity guidelines for older adults Benefits of physical activity Self-Monitoring worksheet
3. Benefits, Barriers and Goal Setting	Benefits and Barriers to physical activity SMART goals Group walk
4. Beyond Walking (Strength, Flexibility, Balance)	Benefits of different modes of exercise Incorporating different modes of exercise into daily life Stations with different types of exercise Review guidelines and goals
5. Social Support and Positive Thinking	Advantages of social support and positive thinking Identifying a support system Incorporating positive thinking into everyday life Brainstorm new places to walk; group walk
6. Sedentary behavior and health	Identify adverse conditions associated with sedentary behavior Decreasing sedentary behavior throughout the day Group walk
7. Keeping up the habit	Barriers to walking Setbacks and relapse Group walk
8. Celebration/Graduation	Active games: charades, bingo Review of key concepts Certificates of completion

Measures

The Senior Change Makers Pilot Study evaluation plan applied a mixed methods approach to collect data from older adult and student participants. Measures included pre-post survey items, pre-post accelerometer data, direct observation of group sessions, and focus groups held at four weeks and post-intervention (Table 7). The design was quantitative dominant (QUAN+qual) because the primary aim was to assess quantitative advocacy measures. Qualitative and quantitative data were collected at different times throughout the intervention, but analysis and interpretation occurred concurrently (after the intervention). The design was complementarity because both methods were used to answer related questions and evaluate study outcomes. Survey items were pre-tested in a convenience sample of five older adults and two students. Feedback was requested on item clarity, length of time to complete the survey, and whether any items made the respondent feel uncomfortable.

Table 7. *Measures for primary outcomes, secondary outcomes, and process evaluation*

Construct	Respondent, Measure, and Timing	Scales or Item	Psychometrics and Source
PRIMARY OUTCOME (AIM 1)			
Advocacy confidence and skills	Senior and student survey; baseline and 8 wks Senior focus group, 8 wks	- Self-efficacy for advocacy (mean of 2) - Perceived sociopolitical control- active participation (mean of 2) - Perceived sociopolitical control-optimism for change (mean of 2) - Advocacy outcome efficacy (1 item) - Assertiveness (mean of 3) - Participatory competence (mean of 2) - Knowledge of resources (1 item) - Group resiliency (one item) Focus groups with both advocacy groups assessed changes in advocacy confidence and skills	Inter-item correlations ranged from .268 - .818; Millstein, et al., 2016a
SECONDARY OUTCOMES (AIMS 2, 3, & 5)			
Advocacy actions and outcomes	Senior and student survey; Timing varies Advocacy checklist; Senior Interviews 8 wks, 4 mo	- Personal advocacy activities since starting program (checklist; post-test only) - Health advocacy history in last 6 weeks (mean of 2; pre and post-test) - Intent to remain involved (mean of 2) At 8 weeks, Advocacy checklist used to count advocacy actions. At 4 months, called seniors in advocacy groups to get updates	Inter-item correlations ranged from .335 to .620; Millstein, et al., 2016a Advocacy checklist informed by Coffman, et al., 2007
Intergenerational attitudes	Senior & student survey Base, 8 wks Senior focus group, 8 wks	- Fraboni Scale of Ageism ("FSA"; mean of 15 items for seniors, 26 for students) - Young Adults Perceived as Prosocial Community Members ("PCM"; mean of 4) - New items: Desire for more intergenerational work (pre and post test) and change in respect for people from different generations (post test only) Focus groups with both advocacy groups assessed changes in intergenerational attitudes.	FSA: alpha = 0.86; Rupp, 2005; Prosocial Community Members: alpha = 0.80; Zeldin, 2002
Physical activity	Senior and student survey and accelerometer Base, 8 wks	- Accelerometer: mean min. MVPA/valid day. - IPAQ Transportation PA: mean min/wk - IPAQ Leisure PA: mean min/wk - BRFSS strength: mean min/wk - BRFSS flexibility: mean min/wk - Self-efficacy for exercise (mean of 9)	IPAQ: ICCs 0.50 to 0.65, Tomioka, et al., 2011; Self-efficacy: alpha = .0.92, Resnick & Jenkins, 2000

Table 7. *Measures for primary outcomes, secondary outcomes, and process evaluation, continued*

Construct	Respondent, Measure, and Timing	Scales or Item	Psychometrics and Source
PROCESS EVALUATION (AIM 4)			
Recruitment	Researcher records 8 wks	Number of participants who completed baseline data, dropped out after completion of baseline data, and completed program (attended ≥ 4 meetings and completed post-test data).	Linnan & Steckler, 2002
Intervention Dose	Researcher attendance sheet	Rate of senior and student participant attendance. Percentage of participants who attended ≥ 4 meetings.	Linnan & Steckler, 2002
Fidelity	Researcher direct observation of meetings	Average content-related questions and praise statements per class, by site. Percentage of key curriculum points covered by site.	Marcoux, et al., 1999
Intergenerational Contact	Senior and student survey 8 wks	• Equal group status: Student and older adult group members had an equal say during group meetings • Common goals: Members of this group worked well together to accomplish our goals • Intergroup cooperation: When working together, students and older adult group members each contributed by applying unique skills and experience. • Support of authorities: The group leaders encouraged students and older adults to interact with each other	New items except “common goals” (adapted from Millstein, et al., 2016a item for “Collective efficacy toward group goals”)
	Researcher direct observation of meetings	Observer tracked amount of time spent in large group discussions (defined by interaction primarily between the group leader and participants) versus small, intergenerational activities and discussion.	Adapted from Inter-generational Observation Scale; Jarrott & Smith, 2011
Perception of experience	Senior and student survey 8 wks	• Roles and participation checklist • Roles and participation: Likert (mean of 2) • Opportunities for control in group work (mean of 2) • Group cohesion (mean of 2) • Coordinator/leader characteristics (mean of 3) • Collective efficacy toward group goals (one item) • Pride in group work (mean of 2) • Follow up group resiliency (mean of 2) • New item: feedback on group meetings (4 items)	Inter-item correlations ranged from .202 - .481; Millstein, et al., 2016a
MAPS-Mini evaluation	Senior focus group wk 4	Seniors in advocacy group provided feedback regarding MAPS-Mini usability, satisfaction, and recommendations for improvement	Questions informed by Kirwan, 2013
Advocacy program feedback	Senior focus group 8 wks	Feedback on recruitment, curriculum, roles and participation, and contact theory (equal group status, common goals, cooperation, and leadership support)	Allport, 1979; Kuehne & Melville, 2014

Primary outcomes.

Advocacy confidence and skills. Validated survey items were used to measure senior and student psychosocial measures related to advocacy confidence and skills (Millstein, et al., 2016a). Five scales of two to three items assessed self-efficacy for advocacy, perceived sociopolitical control (active participation and optimism for change), assertiveness and participatory competence (Millstein, et al., 2016a). Three single items assessed advocacy outcome efficacy, knowledge of resources, and group resiliency (Millstein, et al., 2016a). Mean scores for the eight advocacy measures were averaged to create a cumulative advocacy index. Some items were revised from the original items (Millstein, et al., 2016a) to apply to younger and older adult respondents, and to focus on advocacy for issues related to the physical activity environment. For example, the item: “I am confident that I can work to make my school or community a better place for being physically active and eating healthy” was revised to read: “I am confident that I can work to make my community a better place for being physically active.” Participants indicated on a 5-point scale how strongly they agreed or disagreed with each statement. Validity of items developed by Millstein, et al. (2016a) was strengthened by the use of Empowerment and Social Cognitive Theories, a youth-specific advocacy model, and measures adapted from tobacco control literature (Holden, et al., 2005). Results of confirmatory factor analysis and inter-item correlations for subscales are reported in full elsewhere (Millstein et al., 2016a).

Secondary outcomes.

Advocacy actions and outcomes. At eight weeks senior participants self-reported their advocacy activities in a checklist of people they talked to about making their community a better place for being physically active. The checklist was adapted from two items created by Millstein, et al., (2016a) to assess personal advocacy activities since starting the program. Survey items also assessed health advocacy history and intent to remain involved in advocacy work (Millstein, et

al., 2016a). Completion of advocacy actions and outcomes were recorded by the researchers throughout the intervention using an advocacy checklist. Items for the checklist were informed by the Composite Logic Model designed to guide measurement of advocacy and identify interim outcomes that precede changes to public policy or the environment (Coffman, Hendricks, Kaye, Kelly & Masters, 2007). Examples of actions included creating an action plan, writing letters, and completing an advocacy presentation. Examples of outcomes included completion of a needs assessment by a city engineer and built environment improvements. At four months post-intervention, the research team contacted the advocacy group participants for a brief interview to determine if any actions were taken, or results achieved, since the eight-week program ended. Follow-up interviews were not audio recorded. A checklist of advocacy actions and outcomes was used to guide the interviewer (Coffman, et al., 2007).

Intergenerational attitudes. Senior and student participants completed survey items at baseline and eight weeks to assess changes in intergenerational attitudes and beliefs using the Fraboni Scale of Ageism (FSA; Rupp, 2005). The FSA is a 26 item scale developed to assess ageism of younger adults towards older adults. For the present study, 15 FSA items were adapted for use in the older adult population to assess ageism towards younger adults. For example, the original FSA item: “Old people complain more than other people do” was adapted for older adult respondents as follows: “Young people complain more than other people do.” Items that did not apply to young adults (e.g., “Many old people just live in the past”) were not included in the scale administered to seniors. Participants indicated on a 5-point scale how strongly they agreed or disagreed with each statement. Higher scores indicate greater agism. The FSA has high internal consistency in young adult samples ($\alpha = 0.86$). To assess seniors’ perceptions of young adults as prosocial community members, senior participants completed a four-item scale shown to be reliable for older adult respondents ($\alpha = 0.80$; Zeldin, 2002). The items ask senior respondents whether they agree or disagree with statements such as “young people are interested

in helping to improve this neighborhood” and “young people are friendly to their neighbors” (Zeldin, 2002).

Physical activity. Seniors’ and students’ physical activity was measured at baseline and 8-weeks via accelerometer and survey. At both time points, senior and student participants wore Actigraph accelerometers (model GT3X, Pensacola, FL) for seven days during all waking hours except when bathing or swimming. Researchers provided participants with written and in-person directions regarding accelerometer use and protocols, including demonstrations of how to fasten the elastic belt and proper positioning of the accelerometer over the right hip. Participants were asked to re-wear the accelerometer if they did not accrue at least five valid days, and the day that the rewear was requested was excluded from analyses to avoid data captured when the meter was in the researchers’ possession. Accelerometer scoring procedures and cut points followed procedures used by King, et al., 2011, to allow comparison of our participants’ physical activity to that of a larger US sample. A valid day was defined as ten valid hours per day, and a valid hour had no more than 30 consecutive zero intensity counts (King, et al., 2011). Accelerometers were set to collect data in 60-second epochs. MeterPlus version 4.0 was used to score and clean accelerometer data. Overnight wear was flagged, verified by at least two researchers, and cleaned to eliminate data collected when the participant was asleep. Estimates of physical activity intensity were determined using validated algorithms and cut points for older adults (sedentary = 0-100 counts per minute (cpm), light = 101-1951 cpm, moderate = 1952-5754 cpm, and vigorous = 5755-100,000 cpm; Copeland & Esliger, 2009; Freedson, Melanson & Sirard, 1998) and calculated as average minutes of moderate and vigorous physical activity (MVPA) per valid wearing day (King, et al., 2011).

Two items from the International Physical Activity Questionnaire (IPAQ) were used to assess self-reported walking for transportation and walking for leisure at baseline and 8 weeks

(Tomioka, Iwamoto, Saeki & Okamoto, 2011). The item assessing frequency of walking for transportation asked, “During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place? (E.g., walking from home to the corner store?).” The item assessing frequency of walking for leisure asked, “Not counting any walking for transportation you already mentioned above, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?” Both items included a follow up question to assess duration: “How much time did you usually spend on ONE of those days . . .” walking for transportation or leisure. IPAQ directions were modified based on recommendations from a previous study evaluating use of IPAQ in an older adult sample (Heesch, Van Uffelen, Hill & Brown, 2010). For example, directions were repeated in the beginning of each section to instruct respondents to include only activities lasting at least 10 minutes, and to avoid double counting activities reported in previous sections. Examples were provided to help respondents with the response format (Heesch, Van Uffelen, Hill & Brown, 2010). The IPAQ has been shown to be reliable and valid for use with older adults. Intraclass correlation coefficients (ICC) varied by age and gender, ranging from .50 to .65 (Tomioka, et al., 2011). Spearman correlation coefficients between IPAQ scores and accelerometer measured physical activity ranged from .42 to .53 (Tomioka, et al., 2011).

Two items were adapted from the Behavioral Risk Factor Surveillance System (BRFSS) to assess frequency and duration of strength and flexibility training. The results of the BRFSS are comparable to other nationally administered self-report measures of physical activity including the National Health and Nutrition Examination Survey (NHANES) and the National Health Interview Survey (NHIS; Keadle, McKinnon, Graubard & Troiano, 2016). The item assessing strength training asked, “During the last 7 days, on how many days did you do activities designed to increase muscular strength or tone, such as lifting weights, pull-ups, push-ups, or sit ups?” The item assessing flexibility asked, “During the last 7 days, on how many days did you do any

activities designed to increase flexibility, such as stretching or yoga?” Both items had a follow up question to assess duration: “How much time did you usually spend on ONE of those days doing activities designed to . . .” increase strength or flexibility.

The 9-item Self-Efficacy for Exercise Scale (Resnick & Jenkins, 2000) was used to evaluate participants’ confidence to exercise despite certain obstacles (weather, boredom, etc.) at baseline and eight weeks. Participants reported how confident they were to exercise three times per week for 20 minutes when faced with certain barriers (e.g., “the weather was bothering you” or “you felt tired”), using a 10-point scale ranging from “not confident” to “very confident.” The scale was originally developed for adults, and was revised for older adults (Resnick & Jenkins, 2000). The scale has been shown to be valid and reliable in an older adult sample ($\alpha = .92$; Resnick & Jenkins, 2000).

Process evaluation.

Recruitment and retention. Participant recruitment and retention was tracked by the research team to assess the feasibility of implementing the intervention with low-income older adult and college student participants (Linnan & Steckler, 2002). To complete the program a participant must have attended at least half (four of eight) group meetings. After the program we contacted dropouts who attended less than four meetings and asked: “What made you decide not to participate?”

Intervention dose and fidelity. To evaluate intervention dose received by participants, researchers took attendance at group meetings (Linnan & Steckler, 2002). The planned dose was eight meetings lasting one-hour each. Intervention dose was assessed by measuring the percentage of seniors who attended at least four of eight sessions (50%). To measure fidelity to intervention, a research team member observed and assessed coverage of curriculum and use of

engaging questions (a measure of group participation) in 34% of group meetings (Marcoux, Sallis, McKenzie, Marshall, Armstrong & Goggin, 1999). Four to six key curriculum points were identified by the group leaders prior to the start of the group meeting.

Intergenerational contact. To assess intergenerational contact, student observers trained in process evaluation used an observation scale based on the Intergenerational Observation Scale (Jarrott & Smith, 2011) to measure intergenerational interaction during 34% (n=11 of 32) of group meetings. The observers used the scale to keep track of the amount of time spent in large group discussions (defined by interaction primarily between the group leader and participants) versus small, intergenerational activities and discussion.

Participant roles and feedback. Survey items from measures developed for advocacy research (Millstein, et al., 2016a) provided process evaluation to assess participants' perceptions of their roles and participation. Participants reported their roles and participation, opportunities for control in group work, group cohesion, leader characteristics, collective efficacy toward group goals, and group resiliency. The items ask senior respondents to use a five-point scale to agree or disagree with statements such as "this group allowed me to have a say in planning events or activities" and "when I attended meetings, I took part in discussions" (Millstein, et al., 2016a). A new, four-item scale was created to obtain additional feedback on group meetings. The scale asked about satisfaction with group meeting content, handouts, and leader preparation.

Evaluation of MAPS-Mini. Prior to performing the outdoor neighborhood audit using the Microscale Audit of Pedestrian Streetscapes (MAPS) tool, the advocacy groups learned about the connection between physical activity and the environment and were introduced to MAPS-Mini items. The MAPS-Mini tool and manual were modified for older adults by increasing the font size and adding more photographs to the manual.

At the third group meeting, the participants at the advocacy sites used MAPS-Mini to evaluate their neighborhoods' pedestrian features. At each site, the researchers selected four walking routes of varying length, and brought the participants maps of the routes. The routes were labeled "fast, medium, and slow" based on the route length. The seniors were asked what pace they would like to walk, and were assigned to a group to match their desired pace. The seniors were instructed on safe walking tips, and the students were told to watch for anyone having balance issues or other difficulties.

At the first advocacy site, the participants at the audit included eight older adults, six university students, and two researchers. Attendees were split up into four groups of four, with two older adults and two younger adults/researchers in each group. At the second advocacy site, the participants attending the audit included eight older adults, five university students, and two researchers. Again, attendees split up into four intergenerational groups. Everyone was given five paper MAPS-Mini sheets and each group had an electronic tablet with the MAPS-Mini mobile application. The participants were instructed to take turns using the mobile application on the tablet. The paper version and the mobile application had the same items. The groups were instructed to return from the audit in 40 minutes. Most groups completed three to five MAPS-Mini segments (blocks) and several street crossings during that time.

After the seniors completed the field audit, researchers trained in qualitative methods held a focus group at each advocacy site (Kirwan, et al., 2013). At the first advocacy site, six older adults participated in the focus group. At the second site, eight older adults participated. One researcher moderated the focus group and another researcher took notes. The focus groups were not audio recorded. The purpose of the focus group was to obtain feedback on the MAPS-Mini tool and determine whether it was feasible to use the tool among older adults. A moderator guide was developed and covered topics such as likes/dislikes, clarity of items, suggested

improvements, and feedback on training received prior to the audit. The focus groups also addressed the mobile application of MAPS-Mini, which the seniors had the opportunity to use during the field audit. Feasibility was achieved if a majority of the focus group participants reported that they could easily understand and use the tool, and that the tool aided their advocacy process. All senior participants were invited to participate and received a reusable shopping bag in return for time spent at the focus group.

Post-intervention focus groups. After completion of the 8-week advocacy intervention, researchers conducted two focus groups (one at each advocacy site) to obtain feedback on the advocacy program (Ayala & Elder, 2011) and seek recommendations for future advocacy programs (Marcoux, et al., 1999). A moderator guide was developed with the assistance of a qualitative data expert. The focus groups each lasted approximately one hour, and were audio recorded. Focus groups recordings were analyzed by two researchers familiar with the project with a background in qualitative data analysis. A content analysis approach was used to allow themes to emerge from the data. Each researcher reviewed the recordings separately to identify themes. After independent review, the researchers developed raw, first, second, and higher order themes. Disagreements were discussed and resolved. Final inter-rater reliability was >90% percent, suggesting reliability between raters. After identifying higher order themes, quotations were identified to illustrate those themes. Trustworthiness of the data was supported by having multiple people examine the data, and by member checking with two focus group participants to test whether categorizations accurately reflected their comments.

Statistical Analysis

Preliminary Analyses. Descriptive statistics were used to report senior and student participants' age, gender, race/ethnicity, income, education, BMI, and percent obese. Normality of data distribution was assessed using tests for skewness and visual inspection of histograms

(Doane & Seward, 2011). Though ANOVAs are robust to violations of the assumption of normality of data distribution, extreme skewness may affect the ability to interpret p-values (Doane & Seward, 2011). One process evaluation variable, “pride in group work,” had a skewness statistic of -2.3 ($SE = .34$), which is just outside the acceptable range of $< |2|$ and indicated a negatively skewed distribution (Doane & Seward, 2011). The scale was transformed by calculating the natural log of the data, and we used the transformed variable in an ANOVA comparing mean “pride in group work” for the two study conditions. Similar results were found for the transformed measure ($F(1,47) = .956; p = .333$) and the non-transformed measure ($F(1,47) = .852; p = .361$). The same procedures were used for two measures that had borderline skewness values of -1.93 (leader characteristics) and -1.99 (contact theory). The log transformed results of an ANOVA comparing group differences in leader characteristics ($F(1,47) = 1.074; p = .305$) were comparable to the non-transformed results ($F(1,47) = .829; p = .367$). The transformed results of contact theory ($F(1,47) = 1.366; p = .248$) also were comparable to the non-transformed results ($F(1,47) = 1.06; p = .308$). Based on these preliminary analyses, the original (non-transformed) measures were used in the final analyses.

Intention to treat analysis was considered as an approach to avoid overestimation of the effectiveness of the advocacy intervention. Intention to treat analysis decreases the chances of a Type 1 error by including all randomized participants in analyses, even if they did not receive the full intervention or complete post-test measures. Intention to treat analyses rely on assumptions to impute participants’ missing data, a process that can bias and underestimate intervention effects (Armijo-Olivo, Warren & Magee, 2009). For this study we tested the “last observation carried forward” approach and assigned baseline values to missing post-test results (Armijo-Olivo, et al., 2009). By assuming no change over time, intention to treat analysis can attenuate group differences and make it more difficult to find significant intervention effects. However, a comparison of study results with and without intention to treat analysis revealed no substantial

differences in the significance of any outcome. Because intention to treat analyses did not have any impact on study results and can bias estimates of treatment effects, we performed analyses without imputing missing values (Armijo-Olivo, et al., 2009). Participants were excluded from analyses for measures which they lacked data.

Given the small sample sizes we considered bootstrapping techniques. Bootstrapping is a non-parametric approach that does not assume normal data distribution and can reduce the impact of outliers (Efron & Tibshirani, 1994). Preliminary ANOVAs comparing groups' baseline characteristics were run with and without bootstrapping using the SPSS bootstrapping module. Analyses using bootstrapping produced slightly smaller confidence intervals but did not impact the significance of any tests. Given that ANOVAs are robust to non-severe violations of assumptions, and since bootstrapping did not create any meaningful advantage, we did not use bootstrapping in final analyses.

Senior participants were clustered by study design within four senior housing sites. To assess degree of co-variation within sites, which is a violation of the independence assumption for traditional analysis of variance procedures, we calculated intra-cluster correlation coefficients (ICCs) for key baseline measures. ICCs were calculated using mixed regression procedures with an empty model and site entered as a random effect. Assessing ICCs helped determine whether to use traditional analysis of variance procedures or if mixed ANOVA procedures were needed to account for within-site clustering. ICCs for primary advocacy measures ranged from 0.0 to 0.10. The majority of advocacy measures had ICCs equal exactly to zero (active participation, optimism, participatory competence, group resiliency, and the cumulative advocacy index). A few ICCs were slightly higher (self-efficacy for advocacy = .044, advocacy outcome efficacy = .015, assertiveness = .043, and knowledge of resources = 0.10). ICCs for the two intergenerational measures were 0.0 (youth as pro-social community members) and .181

(ageism). The ICC for accelerometer-measured MVPA was .065. Even though small ICCs can affect power, adding sites was not an option in this pilot study due to budgetary limitations. Because 10 of the 12 key outcomes tested had ICCs that were zero or near zero, we concluded that using traditional analysis of variance for repeated measures was acceptable, and used it for all outcome measures for consistency in analysis procedures.

Preliminary analyses also were conducted to determine whether to use the four study sites as the independent variable, or the two study conditions (i.e., combining two sites in each condition) as per the a priori study design. SPSS General Linear Model univariate ANOVAs (for continuous variables) and Chi-Square tests (for dichotomous variables) were conducted to identify baseline differences between the four sites for key characteristics including demographics, advocacy self-efficacy, prior advocacy experience, intergenerational attitudes, and physical activity outcomes. We wanted to determine if the two advocacy sites were comparable at baseline, and if the two physical activity sites were comparable at baseline, such that it would be appropriate to combine participants assigned to the same study condition. Only one variable, the Fraboni Scale of Ageism for Seniors, was significantly different between sites at baseline ($F(3, 60) = 4.05, p = .011$). Post hoc comparisons using the Least Significant Difference (LSD) test indicated that the mean score for one of the advocacy sites ($M = 1.81, SD = .43$) was significantly lower at baseline than physical activity site #1 ($M = 2.37, SD = .49$) and physical activity site #2 ($M = 2.41, SD = .62$). However, the two advocacy sites did not differ from each other, and the two physical activity sites did not differ from each other. This general pattern of virtually no baseline differences (i.e., only one comparison) across sites provided support for aggregating sites by condition (advocacy vs. physical activity) for analysis, as study aims and hypotheses were oriented toward condition effects.

As a further check, post-intervention process evaluation measures were examined to evaluate whether the intervention was applied consistently within each study condition. For each process evaluation measure (e.g., opportunities for control, group cohesion, and participation), an ANOVA with post hoc comparisons was conducted to determine if the two physical activity sites differed from each other and if the two advocacy sites differed from each other. Only one process evaluation measure, opportunities for control in group work, differed between the two physical activity sites. No significant difference in intervention processes was found between the two advocacy sites. These preliminary analyses provided evidence that the interventions were applied consistently within each condition.

Based on these preliminary comparisons and given the similarities between the two advocacy sites and between the two physical activity sites, subsequent analyses to test study aims were conducted by comparing the two study conditions. This approach also was supported by the standardization of program materials and delivery in each study condition. Direct observation of group meetings indicated consistency in curriculum coverage and quality of intervention delivery. On average, the instructors at each site covered 80-100% of the key curriculum points, asked four to six content related questions, and gave eight praise statements. Instructors in each study condition used the same agendas, curriculum, and handouts. Instructors who taught the same study condition attended each other's group meetings to increase consistency. Students received a standardized training based on their assigned study condition.

Primary Analyses. As a check on the randomization of sites to conditions and the comparability of participants across conditions, baseline characteristics of participants in each study condition were assessed using Univariate ANOVAs (for continuous variables) and Chi-Square tests (for dichotomous variables). No differences were found between the two study conditions for primary outcomes.

Main analyses testing intervention effects were conducted using 2 (time) by 2 (condition) repeated measures ANOVAs. We examined time (baseline, eight weeks) by condition (advocacy, physical activity) interactions for study outcomes. The analyses did not include covariates (age, gender, income, race/ethnicity) in the models because participants served as their own control in the repeated measures study design. Further, correlational analyses examined relationships between covariates (age, gender, income, race/ethnicity) and key study outcomes (advocacy, intergenerational, and physical activity). Results did not reveal any patterns of significant correlations to justify including covariates in the analyses as main effects. While there is the potential for demographic covariates to moderate intervention effects, sample size limitations precluded designing the study with sufficient power to test moderator effects, so they were not included.

Statistical analyses were performed using SPSS, version 24 (SPSS Inc., Chicago, IL). Partial eta squared (η_p^2) was reported as a measure of effect size for repeated measures ANOVAS. For each outcome, the partial eta squared statistic can be interpreted as the percentage of unexplained variation in the outcome that can be uniquely explained by the time by condition interaction.

For all analyses, significance was tested at $\alpha = .05$. A limitation of the study was that the small sample size limits the ability to detect between group differences. Accordingly, all between condition comparisons were considered exploratory, which is consistent with the nature of the study as a pilot. Given the reduced likelihood of significant findings in a small pilot study, we also reported trends in the data. (i.e., $.10 \geq p > .05$). Furthermore, Bonferroni corrections were considered because conducting multiple comparisons can increase the likelihood of a Type 1 error. However, given the limited power and exploratory nature of this pilot study, we did not adjust the significance level based on the number of comparisons performed.

The key analyses conducted for each study aim included the following:

Aim 1. To assess the efficacy of the advocacy versus physical activity programs to increase seniors' advocacy skills and confidence outcomes, we used ANOVAs for repeated measures to identify condition by time interactions (i.e., to determine if greater increases over time were observed in the advocacy group than in the physical activity group). As per the complementarity mixed methods design, Aim 1 was also informed by findings from focus groups. Focus group discussions regarding changes in advocacy skills and confidence were reviewed, analyzed, and summarized. Themes were identified using constructs from advocacy survey items as a starting point. Focus group findings were compared to quantitative findings and described in a narrative summary.

Aim 2. Researchers tracked completion of advocacy actions and resulting environmental changes using an advocacy checklist and based on participants' reports at group meetings. Results were reported using counts of actions and a narrative summary of advocacy actions taken and outcomes achieved. Results from the four month follow up were also reported in a narrative summary.

Aim 3. To assess changes in seniors' and students' intergenerational attitudes from pre- to post-program, we used ANOVAs for repeated measures to test for condition by time interactions (i.e., to determine whether attitudes changed more in one condition versus the other). Conceptually, the analyses assessed whether the supposedly "high contact" advocacy condition showed greater improvements in intergenerational measures over time. In addition to testing condition by time interactions, we also tested each condition separately to assess whether seniors within each condition had any significant pre-post change in intergenerational beliefs over time. Aim 3 also was informed by focus group data related to intergenerational issues. As per the

complementarity mixed methods design, qualitative and quantitative findings regarding intergenerational issues were compared and described in a narrative summary.

Aim 4. A variety of measures and analysis strategies were used to assess the feasibility of the pilot study methods. Descriptive statistics were used to report on recruitment and retention, including the number of participants who completed baseline data, dropped out after completion of baseline data, and completed the program (i.e., attended at least four meetings and post-test data). We used descriptive statistics to report overall and weekly attendance at group meetings (intervention dose) for the physical activity and advocacy conditions (i.e., the average number of sessions participants in each condition attended). To assess program quality we used descriptive statistics to report the average number of content-related questions and praise statements per class, by study condition. We reported the average percentage of key curriculum points covered by the group leaders.

To assess the feasibility of creating a high-contact intergenerational condition, we used descriptive statistics and reported the average time spent in small (intergenerational) versus large group discussions, by study condition. We used univariate ANOVAs to evaluate post-test survey items relating to whether the four conditions for a high contact intervention (equal status, common goals, cooperation, and support from leadership) were met.

We used univariate ANOVAs to evaluate post-test process evaluation measures created by Millstein, et al., (2016a) to assess the participants' perceptions of their experience (e.g., roles, participation, group cohesion, and leader characteristics).

Findings from focus groups on the MAPS-Mini tool were reported using narrative summary. Data from post-intervention focus groups, which addressed program feedback, were reported in a narrative summary.

Aim 5. To assess the efficacy of the two programs to increase seniors' physical activity, we used ANOVAs for repeated measures to test for condition by time interactions (i.e., to assess whether physical activity indicators changed more pre- to post-program for participants in the physical activity condition or in the advocacy condition). In addition to interaction statistics, we reported descriptive statistics to summarize average minutes of physical activity (accelerometer-measured MVPA and self-reported physical activity in transportation, leisure, strength, and flexibility domains) at baseline and eight weeks by study condition. Outliers in self-reported physical activity data were identified and participants were contacted to check responses and ensure that physical activity was not double counted across multiple domains.

Results

Participants

Participants were recruited over the course of four weeks in fall 2016. Figure 5 shows the number of senior and student participants who were randomized, received the intervention, were lost to follow up, and were analyzed for the primary outcome. The eight-week intervention concluded in November 2016. A four-month follow-up was conducted in March 2017 to determine whether the advocacy condition members had performed any additional advocacy actions.

Sample demographics and key baseline characteristics are presented in Table 8. The 60 senior participants who completed baseline data averaged 75 years of age ($SD = 9$) and were mostly female (84%). Senior participants were mostly White, non-Hispanic (70%). Other racial/ethnic backgrounds included African American (11%), Hispanic/Latino (10%), American Indian (7%), and Asian (5%). Most senior participants reported annual household income of less than \$20,000 (72%) and the majority reported attending at least some college or vocational training (79%). Senior participants averaged 13 ($SD = 18$) minutes per day of accelerometer-measured moderate to vigorous physical activity (MVPA). When asked about prior advocacy, most seniors reported signing a petition (63%). Fewer reported that they had contacted a government official (30%) or news media (32%), or met with a school or government official (38%). Only 15% had previously conducted a community assessment and 22% reported no prior advocacy.

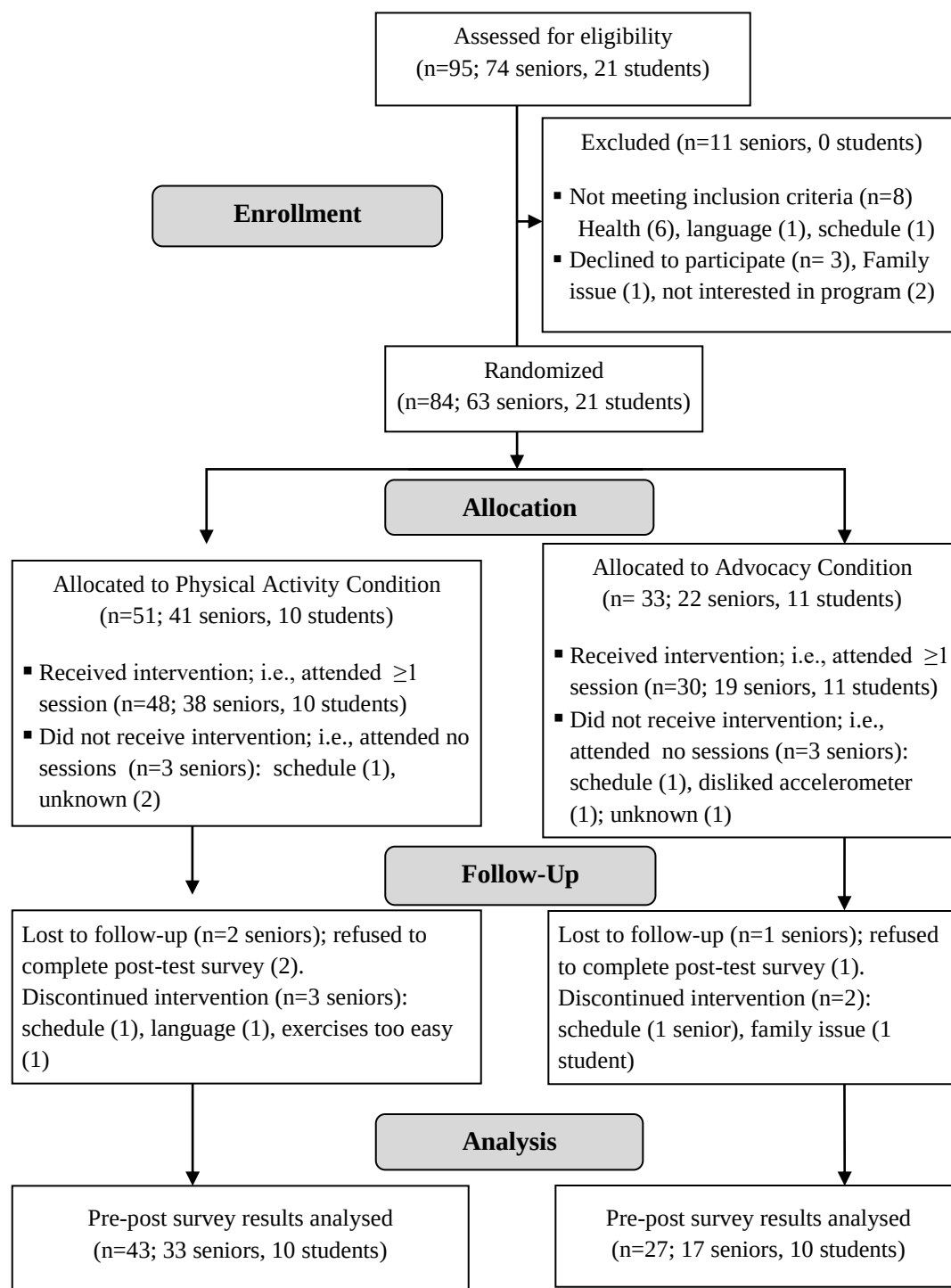


Figure 5. CONSORT Flow Diagram of senior and student participants

Table 8. *Sample demographics and baseline characteristics for physical activity (PA) and advocacy (Adv.) conditions*

	Senior Participants				Student Participants			
	PA	Adv.	Total	<i>p</i>	PA	Adv.	Total	<i>p</i>
Number of participants	n=39	n=21	n=60		n=10	n=11	n=21	
Age, mean (SD)	76 (9.65)	74 (9.18)	75 (9.45)	.490	23 (3.20)	25 (10.14)	24 (7.53)	.618
Gender, % female	83	86	84	.747	90	73	81	.339
White, non-Hispanic, %	65	81	70	.194	30	36	33	.772
Annual household income, %				.141				.919
<\$20,000	67	81	72		10	27	19	
\$20,000-\$39,999	24	19	22		30	9	19	
≥ \$40,000	9	0	6		60	63	61	
Highest education completed, %				.209				.753
Junior high or less	8	0	5		0	0	0	
Some high school	18	14	17		0	9	5	
Some college or vocational	46	57	50		90	73	81	
Completed college	21	10	17		10	9	10	
Completed graduate degree	8	19	12		0	9	5	
BMI, mean (SD)	27 (6)	30 (8)	28 (7)	.226	22 (3)	23 (2)	22 (3)	.556
Obese ¹ , %	25	43	32	.162	0	0	0	--
MVPA, accelerometer, mean min/day (SD)	16.8 (19.6)	5.6 (8.7)	13.1 (17.5)	.030	38.0 (14.9)	58.2 (26.2)	48.1 (23.2)	.048
Transport PA, mean min/wk (SD)	225 (239)	251 (269)	234 (248)	.702	242 (282)	345 (265)	296 (271)	.399
Leisure PA, mean min/wk (SD)	226 (219)	127 (215)	190 (221)	.101	161 (150)	213 (230)	188 (193)	.553
Strength PA, mean min/wk (SD)	83 (110)	56 (85)	74 (102)	.336	217 (189)	297 (225)	259 (208)	.388
Flexibility PA, mean min/wk (SD)	89 (92)	54 (53)	77 (81)	.115	105 (123)	86 (125)	95 (121)	.731
Self-efficacy for exercise, mean, range 1-10 (SD)	6.1 (2.4)	5.6 (2.6)	5.4 (2.5)	.486	6.3 (2.2)	6.3 (1.0)	6.3 (1.6)	.938
Self-efficacy for advocacy, mean range 1-5(SD)	4.0 (1.0)	3.8 (.9)	4.0 (.9)	.321	4.2 (.6)	4.5 (.5)	4.3 (.6)	.239
Prior advocacy, range 0-6 (SD)	1.7 (1.6)	2.4 (1.7)	2.0 (1.6)	.134	1.4 (9.7)	1.7 (1.2)	1.6 (1.1)	.500
Signed a petition, % yes	59	71	63	.348	60	82	71	.292
Contacted govt. official, % yes	18	52	30	.005	20	18	19	.921
Contacted news media, % yes	28	38	32	.441	0	0	0	--
Letter to editor, % yes	15	19	17	.722	0	0	0	--
Community assessment, % yes	15	14	15	.911	10	27	19	.339
Met school/govt. official, % yes	36	43	38	.604	50	45	48	.845
Nothing prior to study, % yes	23	19	22	.723	20	9	14	.500
Fraboni Scale of Ageism, mean, range 1-5 (SD)	2.4 (.5)	2.0 (.4)	2.2 (.5)	.003	1.9 (.4)	1.9 (.5)	1.9 (.4)	.840
Youth as pro-social community members, mean, range 1-5 (SD)	3.7 (.98)	3.7 (.64)	3.7 (.87)	.991	--	--	--	--

Note. SD = standard deviation; BMI = body mass index (weight in kg/height in m²); MVPA = moderate to vigorous physical activity; PA = physical activity; Adv. = advocacy; obesity = BMI > 30. Chi-Square tests used for dichotomous variables (gender, %White, and % obese).

The 21 student participants averaged 24 years of age ($SD = 8$) and were mostly female (81%). Eight students received course credit for their participation and the remainder participated without receiving course credit. Student participants were majority Asian (62%). Other racial/ethnic backgrounds included White, non-Hispanic (33%), Hispanic/Latino (14%), African American (5%), and Native American (5%). Student participants averaged 48 ($SD = 23$) minutes per day of moderate to vigorous physical activity. When asked about prior advocacy, most students reported signing a petition (71%) and almost half had met with a school or government official (48%). Fewer reported contacting government officials (19%) and none had contacted the news media. Only 19% had previously conducted a community assessment and 14% reported no prior advocacy.

Advocacy Confidence and Skills (Aim 1)

Changes in senior participants' advocacy beliefs and skills from baseline to eight-weeks are reported in Table 9. Two of the eight advocacy measures produced significant condition by time interactions: advocacy outcome efficacy (Figure 6) and knowledge of resources (Figure 7). The cumulative advocacy index showed a trend for the advocacy group to increase scores more than the physical activity group over time, $F(1, 47) = 3.81, p = .057, \eta_p^2 = .075$. Advocacy outcome efficacy was measured by a single item assessing the belief in the ability of community groups to advocate for changes to make communities better places to be physically active. Participants in the advocacy condition increased their advocacy outcome efficacy scores more than the participants in the physical activity condition, $F(1, 47) = 4.75, p = .034, \eta_p^2 = .092$. The item testing knowledge of resources assessed participants' ability to get information about how to make the community better for physical activity. Participants in the advocacy condition increased their knowledge of resources over time whereas participants in the physical activity condition saw a slight decrease, $F(1, 47) = 3.09, p = .039, \eta_p^2 = .088$.

Table 9. *Changes in seniors' advocacy skills and confidence from baseline to 8 weeks (AIM 1)*

Construct	Items (range 1-5)*	Physical Act. Mean (SD) n=32		Advocacy Mean (SD) n=17		<i>F</i> (1,47)	<i>p</i>	η^2_p
		Base- line	8- wks	Base- line	8- wks			
Self-efficacy for health and advocacy behaviors	(1) I am sure that I can tell my friends to be physically active. (2) I am confident that I can work to make my community a better place for being physically active.	4.05 (1.01)	3.91 (.87)	3.65 (.86)	4.03 (1.10)	2.36	.131	.048
Perceived sociopolitical control: active participation	(1) I like to wait and see if someone else is going to solve a problem. (reverse coded). (2) I find it very hard to talk in front of a group. (reverse coded)	3.36 (1.19)	3.24 (1.00)	3.59 (.92)	3.59 (.81)	.183	.671	.004
Perceived sociopolitical control: optimism for change	(1) If I tell someone "in charge," like a leader, about my opinions, they will listen to me. (2) I enjoy participation in community groups because I want to have as much say as possible in my community.	3.56 (.86)	3.77 (.71)	3.62 (.99)	4.12 (.65)	1.20	.280	.025
Advocacy outcome efficacy	(1) Community groups can advocate for changes to make communities better places for physical activity.	4.28 (.73)	4.31 (.74)	4.18 (.81)	4.65 (.70)	4.75	.034	.092
Assertiveness	(1) I can talk with others about issues I believe in. (2) I can ask others to help work on making our community healthier. (3) I can start discussions with others about how to change our community to make it healthier.	3.84 (.71)	3.82 (4.16)	4.18 (.67)	4.16 (.60)	.000	.997	.000
Participatory competence and decision-making	(1) If I have a problem when working towards a goal, I usually do not give up. (2) I can influence the decisions my group makes.	3.92 (.98)	4.06 (.78)	3.74 (1.00)	3.88 (.99)	.001	.980	.000
Knowledge of resources	(1) I know how to get information about ways to make my community a better place for being physically active.	3.72 (.99)	3.66 (1.81)	3.24 (1.25)	4.00 (.79)	4.52	.039	.088
Group resiliency	(1) I am confident that our Senior Change Makers group can work through problems if they arise.	4.00 (.88)	4.16 (.81)	3.94 (.97)	4.41 (1.00)	1.41	.240	.029
Cumulative Advocacy Index	Mean of scores from 8 advocacy measures listed above ($\alpha=.791$)	3.84 (.56)	3.86 (.52)	3.76 (.72)	4.10 (.64)	3.81	.057	.075

Note: Items revised from Millstein, et al., 2016. Range 1-5: 1= disagree strongly, 2= disagree somewhat, 3= neutral, 4= somewhat agree, 5 = strongly agree. η^2_p =partial eta squared.

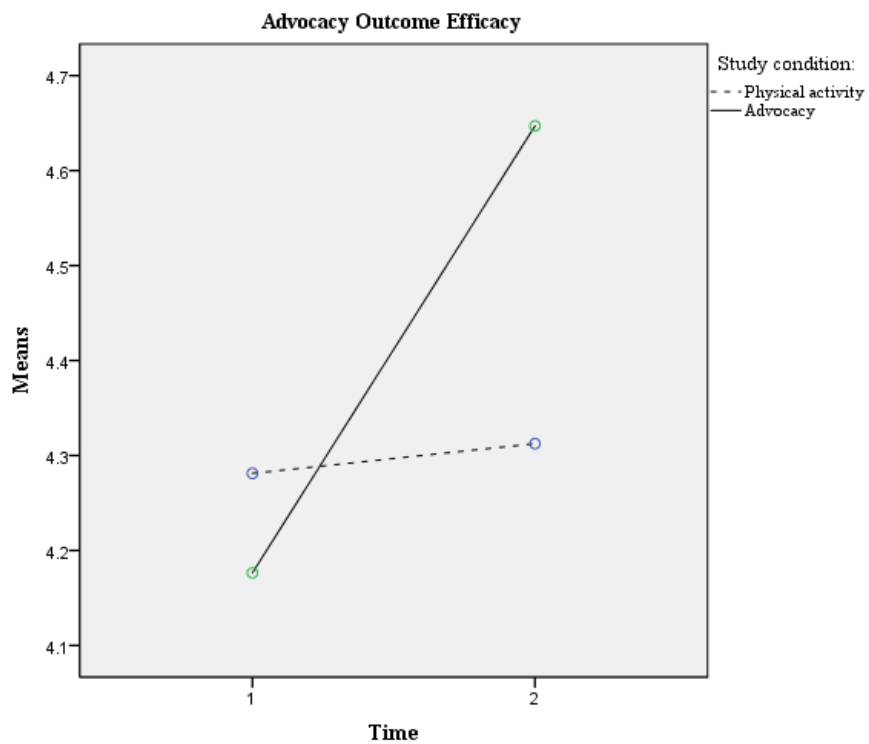


Figure 6. *Seniors' advocacy outcome efficacy at baseline and 8 weeks, by study condition*

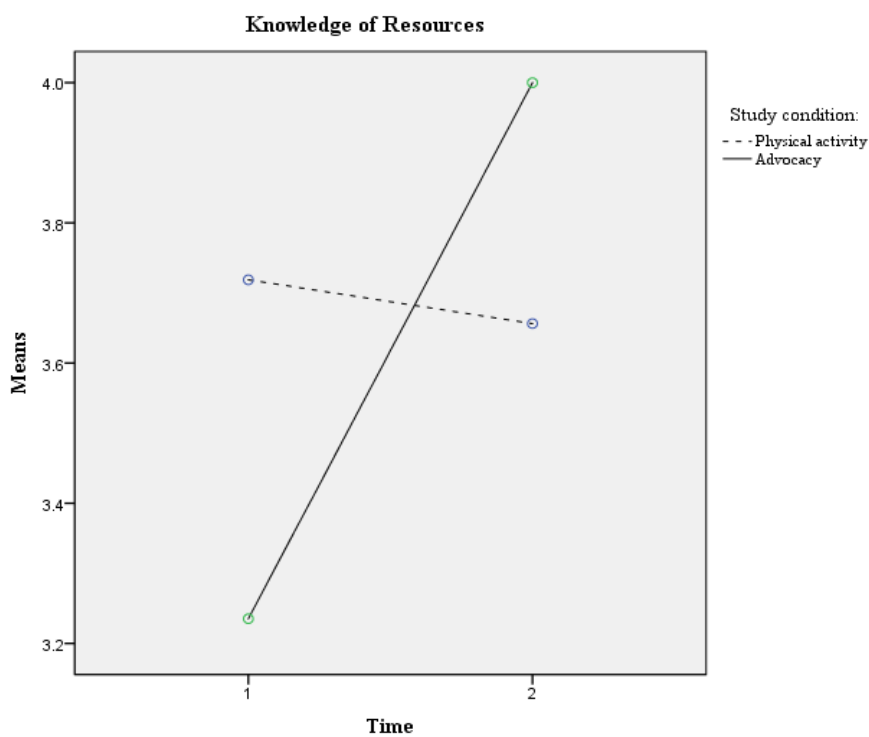


Figure 7. *Seniors' knowledge of resources at baseline and 8 weeks, by study condition*

Self-efficacy for advocacy increased in the advocacy condition and decreased in the physical activity condition, but condition by time interaction did not reach significance, $F(1, 47) = 2.36, p = .131, \eta_p^2 = .048$, Figure 8.

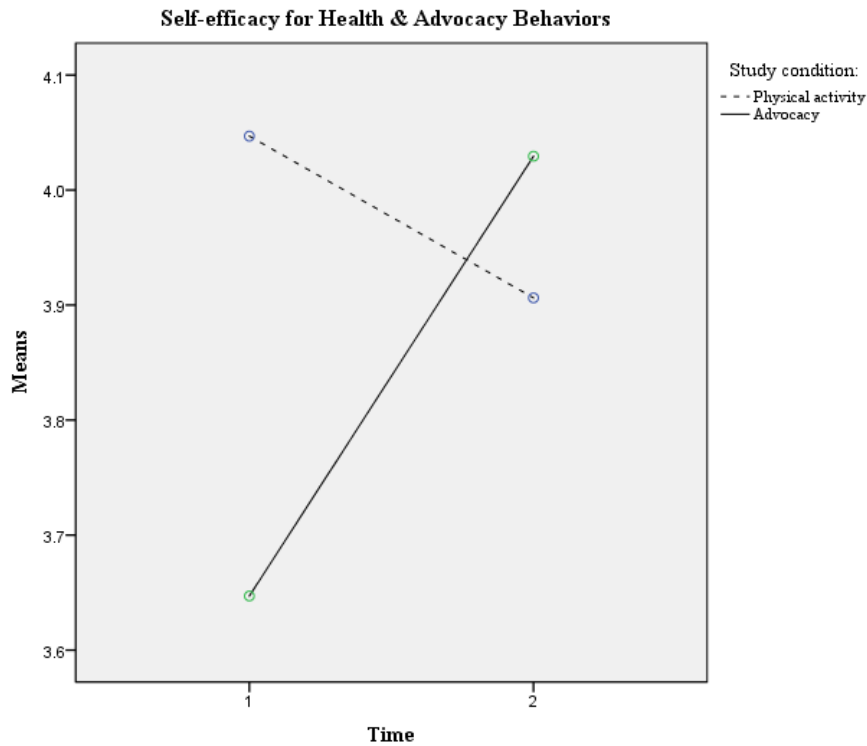


Figure 8. *Seniors' self-efficacy for health and advocacy behaviors at baseline and 8 weeks, by study condition*

Advocacy Actions and Outcomes (Aim 2)

Table 10 summarizes the advocacy actions that the seniors took during the eight-week advocacy program. Most seniors completed an audit of nearby streets (84%), submitted an online advocacy request (79%), or made an advocacy presentation (58%). Sample online request:

“At the SE corner of Ibis and Fort Stockton, the asphalt in the crosswalk near the curb is raised about 2.5 inches causing a tripping hazard. I live at a senior residence located near that corner. I use a walker with wheels, and it is very difficult for me or any of the other residents using assistive devices to use that crosswalk because we can’t get the wheels over the raises in the asphalt. The people in the neighborhood are very nice and many times a motorist will stop and get out of their car to help me lift my walker over the obstacle in the crosswalk. This is a crucial intersection because there is a school across the street and schoolchildren use this crosswalk. It has a high volume of traffic for cars and pedestrians. Please contact me to let me know the status of this project.”

Fewer seniors performed advocacy “homework,” such as making follow up telephone calls and emails to the City.

Table 10. *Summary of advocacy actions taken during 8-week advocacy program (AIM 2)*

Advocacy Actions	Advocacy Group #1 (n=10)	Advocacy Group #2 (n=9)
# Participants that completed MAPS-Mini environmental assessment	8 seniors 6 students	8 seniors 5 students
Analyze and discuss results of assessment (group activity)	Yes	Yes
Select advocacy issue(s) (group activity)	Yes	Yes
Create action plans (group activity)	Yes	Yes
Develop and frame a message regarding importance of advocacy projects (group activity)	Yes	Yes
Take photographs of advocacy issues	2 seniors 2 students	2 seniors 1 student
# Seniors who made an advocacy presentation	6 seniors	5 seniors
Recruit new group members, advocates, or champions.	2 seniors	2 seniors
Develop new partnerships or community allies.	1 senior	1 senior
# Online submissions to City’s “Get it Done” website	8	7
# Follow up telephone calls to the City	7	1
# Follow up e-mails to the City	2	0
Circulate/sign petitions regarding advocacy issue	0	1

Both advocacy groups succeeded in making neighborhood improvements (Table 11).

Most of the participants’ advocacy issues related to repairs to sidewalks, crosswalks, crossing

signals, and installation of curb cuts. Six of the 11 issues were fixed within two weeks of making a request to the City. Three of the fixes were temporary, pending a scheduled road resurfacing.

Table 11. *Advocacy projects and results achieved during 8-week advocacy program (AIM 2)*

Project	Results
Advocacy Group #1	
1. Curb cut and crosswalk repairs needed on SW corner of Fort Stockton and Hawk	City patched broken asphalt in crosswalk; new curb cut will be installed and Hawk street resurfaced this year as part of pipeline project
2. Broken and raised asphalt in the crosswalk on SE corner of Ibis and Fort Stockton	City ground down the raised asphalt and patched holes in the crosswalk
3. Raised and cracked sidewalk on south side of Fort Stockton, between Hawk and Goldfinch	City patched the raised sidewalk and cracks with asphalt
4. Lighting needed along Fort Stockton	City approved two additional street lights along Ft. Stockton between Goldfinch and Jackdaw; put on “unfunded projects” list
5. Curb cuts needed at the ally on the north side of Fort Stockton, between Ibis and Jackdaw	City ADA department submitted a request for curb cuts.
Advocacy Group #2	
1. Crosswalks at intersections of Elm and 4th, and Elm and 5th have broken asphalt and cement.	City patched broken asphalt in crosswalk at 5 th and Elm, but not 4 th and Elm
2. Pedestrian crosswalk signals at 14 th and Market not functioning, and when they are functioning they are too short	Pedestrian signals fixed. Petition started to have the crosswalk signals lengthened; 60 signatures obtained. Partnership developed with civic engagement group at nearby senior residence
3. Stop sign at intersection of Third and Date should be enlarged; crosswalk needs “continental” stripping.	City performed evaluation of intersection. Request for enlarged stop sign not approved because stop sign already considered oversized based on the classification of 3rd Avenue. Work order to change the standard crosswalk to a continental crosswalk.
4. Cement lid on water meter utility box at 5th and Elm is broken and a trip hazard	City fixed lid on water meter box
5. Flooding of sidewalk and crosswalk on west side of 3 rd and Date	Flooding reported to Storm Water Department and ADA. No actions taken to date.
6. Dangerous pedestrian crossing at 2nd and Cedar. Need crosswalk on east side of intersection.	City performed evaluation of intersection. No actions taken.

Prior to the final group meeting, a member of the research team called participants in the advocacy groups and asked who they felt would be a good leader to continue the group after the 8-week study ended. The researcher then contacted the person in each group that received the most votes to ask whether they would be willing to lead the group after the study ended. At one site the selected leader agreed to assume the leadership role. At the other advocacy site, the selected leader and all other group participants declined because they were too busy or didn't want the responsibility of leading the group.

Researchers called participants in the advocacy condition four months after the intervention ended and asked if they had done any advocacy since the final group meeting. The researchers talked with 15 of the 19 seniors who participated in the advocacy program (Table 12).

Table 12. *Four-month follow up: seniors' advocacy actions taken after 8-week intervention*

Advocacy Group #1	
1. Created "Change Makers" group to continue advocacy efforts	• Six active members; meet once a month • Recruit new group members through monthly newsletter and word of mouth • Post flyers to announce upcoming meetings • Group leader makes reminder calls • Researched Uptown Community Plan and brainstormed alternative ways to fund projects (i.e., through a business council) • Plans for group field trip to attend town council meeting
2. Change Makers group advocated for better lighting around building	• Researched potential community partners • Developed partnership with two community stakeholders: local restaurant owner and pastor of local church • Shared advocacy program materials with new community partners • Contacted building management to request better lighting • Made presentation to building's board of directors regarding need for lighting
3. Other outcomes	• Article submitted in monthly newsletter about the Senior Change Makers Pilot Study, the successes achieved, and recruiting additional participants • Request made (via telephone) for City to paint crosswalks at Washington & Ibis and Washington & Hawk • Request submitted on City's "Get it Done" website regarding dangerous driving condition • A student intern volunteers and teaches restorative yoga at one of the study sites • Participant organized event for senior residents to participate in the Women's March on Washington. She reported that the study reminded her of her potential as an advocate
Advocacy Group #2	
	• Participant made six online requests using the "Get it Done" website regarding trip hazards and broken asphalt around 4th and 5th street. Her next steps are to call her representative and the mayor's office • Several participants continued taking photographs of pedestrian barriers • Several participants talked to family members and neighbors about the program and pedestrian issues around their residence • One participant shared the advocacy program materials with the civic engagement group at a nearby senior residence. She shared several newspaper articles related to walkability with friends and other group members. • One participant drives other residents to the hospital and doctor appointments. She advocated for short-term parking spots close to the building so that the sick or impaired residents do not have to walk far.

Results from survey items assessing self-reported advocacy actions are reported in Table 13. One of the three survey measures showed a trend: personal advocacy activities since starting the program. There was a trend for advocacy participants talking to more people about making their community a better place for being physically active, $F(1, 47) = 2.74, p = .104$.

Table 13. *Seniors self-reported advocacy actions, by study condition (AIM 2)*

Construct	Items	Phys. Act. Condition n=32		Advocacy Condition n=17		F (1,47)	p	η_p^2
		Base- line	8-wks	Base- line	8-wks			
Health advocacy history	(1) In the last six weeks, how many times have you tried to tell your peers, family, or friends to think more about being physically active?							
	(2) In the last six weeks, how many times have you tried to tell people in your community, or government officials, to be more interested in making your community a better place for being physically active? (response scale: never, once, 2 or 3 times, 4 or 5 times, 6 or more times)	2.42 (1.06)	2.64 (.99)	2.24 (.97)	2.47 (1.15)	.003	.957	.000
Intent to remain involved	(1) I plan to work to improve the health and safety of my community							
	(2) If I had a chance to join a similar group in the future, I would do it. (1= disagree strongly, 2= disagree somewhat, 3= neutral, 4= somewhat agree, 5 = strongly agree).	3.78 (.81)	3.80 (.77)	4.03 (.67)	3.85 (.93)	.735	.396	.015
Personal advocacy activities since starting program (post-test only)	(1) Since you started this program, who, if anyone, have you talked to about making your community a better place for being physically active? (Check all that apply) (a) Family member (b) Friend (c) Healthcare provider (doctor, nurse, caregiver, physical therapist, etc) (d) A city representative, government official, or community leader (e) I have not talked to anyone about making our community a better place for being physically active							
		---	1.27 (1.04)	---	1.76 (.90)	2.74	.104	.054

Intergenerational Attitudes (Aim 3)

There were no significant time by condition interactions for senior participants' intergenerational attitudes (Table 14). Since process evaluation data showed that the study did not create high and low contact intergenerational conditions as intended, we examined changes over time for each condition separately. In both study conditions, seniors' attitudes about young people as pro-social community members improved. The improvement in attitudes about young people was significant for the advocacy condition, $F(1,16) = 6.23$, $p = .024$, $\eta_p^2 = .280$, but not the physical activity condition, $F(1, 31) = 2.09$, $p = .158$, $\eta_p^2 = .158$; however, this difference in group change was not sufficient to produce a condition by time interaction, as noted above. Based on the Fraboni Scale of Agism (adapted for senior respondents), both study conditions decreased their ageism somewhat, but these changes over time were not significant. Reliability analysis of the adapted 15-item scale showed Cronbach's alpha of .795, indicating good reliability. The majority of seniors in the advocacy (82%) and physical activity (84%) conditions reported that working with young people in the program improved their respect for young people.

For students, one measure showed a significant time by condition interaction: the Fraboni Scale of Ageism (Table 15, Figure 9). Ageism decreased in the physical activity condition but not the advocacy condition, $F(1, 18) = 6.37$, $p = .021$. Reliability analysis of the 26-item scale showed Cronbach's alpha of .846, indicating good reliability. All students reported that working with people from different generations increased their respect for people from different generations, and the majority indicated that they wanted more opportunities to work with older adults in the future.

Table 14. *Changes in seniors' intergenerational attitudes and beliefs from baseline to 8 weeks, by study condition (AIM 3)*

Construct	Items	Physical Activity Condition n=32		Advocacy Condition n=17		F (1,47)	p	η_p^2
		Base- line	8-wks	Base- line	8-wks			
Young Adults as Prosocial Community Members $\alpha = .871$	(1) Young people are friendly to their neighbors. (2) Young people are interested in helping to improve this neighborhood. (3) Young people have a strong work ethic. (4) Young people demonstrate respect for others.	3.73 (1.00)	4.01 (1.06)	3.66 (.56)	4.18 (.81)	.647	.425	.014
Fraboni Scale of Ageism, adapted for older adults $\alpha = .795$; higher scores indicate greater ageism	(1) Many young people are happiest when they are with people their own age. (2) Young people complain more than other people do. (3) Young people should be encouraged to speak out politically (reverse coded). (4) Young people are a menace on the road. (5) Young people are always so forgetful. (6) Young people are so opinionated. They think they know it all. (7) The company of most young people is quite enjoyable (reverse coded). (8) I sometimes avoid eye contact with young people when I see them. (9) I don't like it when young people try to make conversation with me. (10) Complex and interesting conversation cannot be expected from most young people. (11) Young people should feel welcome at the social gatherings of older people (reverse coded). (12) Young people don't really need to use our community sports facilities. (13) It is best that young people live where they won't bother anyone. (14) I personally would not want to spend much time with a young person. (15) Most young people are interesting, individualistic people (reverse coded).	2.43 (.57)	2.35 (.61)	1.94 (.46)	1.78 (.51)	.326	.571	.007
Desire for future inter-generational work	(1) I would like more opportunities to work with people from other generations	3.84 (1.22)	3.88 (1.01)	3.94 (.75)	4.29 (.85)	1.02	.317	.021
Respect * (y/n; post-test only)	(1) Working with people from different generations in this program has increased my respect for people from different generations.	---	84% yes	---	82% yes	.033	.855	.001

Note: Items revised from Millstein, et al., 2016. Range 1-5: 1= disagree strongly, 2= disagree somewhat, 3= neutral, 4= somewhat agree, 5 = strongly agree. *A Chi-Square test was used to assess between group differences in the categorical item "respect." η_p^2 =partial eta squared.

Table 15. *Changes in students' intergenerational attitudes and beliefs from baseline to 8 weeks, by study condition (AIM 3)*

Construct	Items	Physical Activity Condition n=10		Advocacy Condition n=10		<i>F</i> (1,18)	<i>p</i>	η_p^2
		Baseline	8-wks	Baseline	8-wks			
Fraboni Scale of Ageism $\alpha = .846$; range 1-5; higher scores indicate greater ageism	(1) It is sad to hear about the plight of the old in our society these days (reverse coded).							
	(2) Many old people are happiest when they are with people their own age.							
	(3) Many old people are stingy and hoard their money and possessions.							
	(4) Many old people are not interested in making new friends, preferring instead the circle of friends they have had for years.							
	(5) Many old people just live in the past.							
	(6) I would prefer not to go to an open house at a senior's club, if invited.							
	(7) Most old people should not be trusted to take care of infants.							
	(8) Teenage suicide is more tragic than suicide among the old.							
	(9) Old people should be encouraged to speak out politically (reverse coded).							
	(10) Most old people would be considered to have poor personal hygiene.							
	(11) Most old people can be irritating because they tell the same stories over and over again.							
	(12) Old people complain more than other people do.							
	(13) The company of most old people is quite enjoyable (reverse coded).	1.87 (.36)	1.53 (.36)	1.98 (.39)	1.99 (.39)	6.37	.021	.261
	(14) Old people are a menace on the road.							
	(15) Old people are always so forgetful.							
	(16) Old people are so opinionated. They think they know it all.							
	(17) I sometimes avoid eye contact with old people when I see them.							
	(18) I don't like it when old people try to make conversation with me.							
	(19) Complex and interesting conversation cannot be expected from most old people.							
	(20) Feeling depressed when around old people is probably a common feeling.							
	(21) Old people should find friends their own age.							
	(22) Old people should feel welcome at the social gatherings of young people (reverse coded).							
	(23) Old people don't really need to use our community sports facilities.							
	(24) It is best that old people live where they won't bother anyone.							
	(25) I personally would not want to spend much time with an old person.							
	(26) Most old people are interesting, individualistic people (reverse coded).							
Desire for future intergen. work	(1) I would like more opportunities to work with people from other generations (scale 1=disagree strongly, 5=strongly agree).	5.00 (.00)	5.00 (.00)	4.40 (.52)	4.60 (.70)	.643	.433	.034
Respect (post-test only)	(1) Working with people from different generations in this program has increased my respect for people from different generations. (Y/N)	---	100% yes	---	100% yes	--	--	---

Note: Items revised from Millstein, et al., 2016. Range 1-5: 1= disagree strongly, 2= disagree somewhat, 3= neutral, 4= somewhat agree, 5 = strongly agree. η_p^2 =partial eta squared.

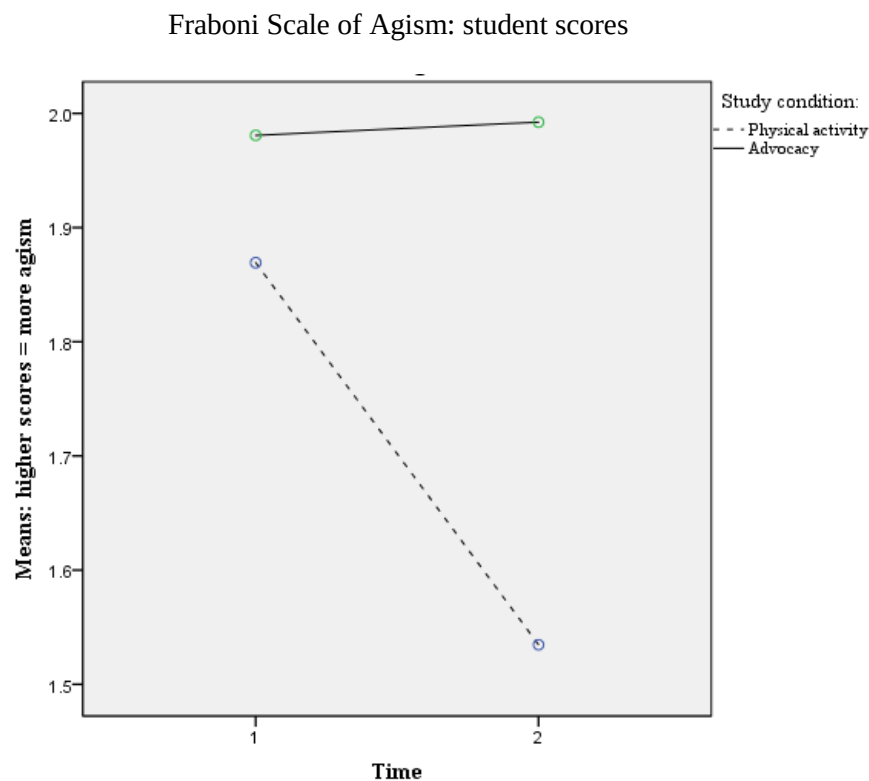


Figure 9. *Students' ageism scores at baseline and 8 weeks, by study condition*

Process Evaluation (Aim 4)

Recruitment and retention. Recruitment of senior sites began in mid-July 2016 and was completed in approximately six weeks, including researching potential sites, meetings with site managers, and selection and randomization of sites. Recruitment of seniors began in late August 2016 and continued for approximately four weeks. Senior recruitment rates varied between 4-10% at each site, calculated as a percentage of the number of housing units. For every hundred affordable rent units, six senior participants were recruited and five were retained (Table 16). Dropouts and their reasons for discontinuation are reported in Figure 5, and include schedule conflicts, language barriers, family issues, disliking the accelerometer, and feeling like the

exercises were too easy. Overall study retention of seniors was $50/63 = 79\%$. Recruitment of students began in September 2016 and was completed in approximately three weeks. Student retention rate was $20/21 = 95\%$.

Table 16. *Senior participant recruitment and retention rate as a percentage of affordable units at the senior residence (AIM 4)*

Site	# Affordable Rent Units	Participants randomized	Recruitment rate	Participants completed intervention	Retention rate
Physical Activity #1	560	23	4%	17	3%
Physical Activity #2	154	17	10%	16	10%
Advocacy #1	199	13	7%	10	5%
Advocacy #2	152	10	6%	7	5%
Totals	1065	63	6%	50	5%

Intervention dose. Attendance rates at group meetings averaged 88% for seniors and 93% for students (Table 17). Of the 63 seniors who were randomized to a study condition, 84% attended the minimum dose of at least four sessions, 6% attended 1-3 sessions, and 9% did not attend any sessions.

Table 17. *Participants' attendance at group sessions by site and overall (AIM 4)*

Site	Seniors' attendance	Students' attendance	Combined
Physical Activity #1	91.8%	93.8%	92.1%
Physical Activity #2	88.3%	93.8%	89.8%
Advocacy #1	83.8%	93.8%	87.5%
Advocacy #2	83.3%	91.4%	86.1%
Totals	88.0%	93.3%	89.4%

Note. Attendance rates for each meeting were calculated by dividing number of participants who attended the meeting by the total number of participants.

Seniors' participation rates remained steady over the course of the eight-week program (Table 18). Attendance rates ranged from 81% (week 6) to 93% (week seven). Attendance rates at the physical activity programs (92% and 88%) were higher than rates at the advocacy programs (84% and 83%).

Table 18. *Attendance of senior participants by week (AIM 4)*

Site	Week 1: 9/28/16	Week 2: 10/05/16	Week 3: 10/12/16	Week 4: 10/19/16	Week 5: 10/26/16	Week 6: 11/02/16	Week 7: 11/09/16	Week 8: 11/16/16	Totals
Phys. Act. #1	21/22	17/20	16/20	20/20	19/20	18/19	17/19	18/19	146/159 = 92%
Phys. Act. #2	12/16	15/16	15/16	14/16	15/16	11/16	15/16	16/16	113/128 = 88%
Adv. #1	8/10	8/10	8/10	7/10	8/10	8/10	10/10	10/10	67/80 = 84%
Adv. #2	9/9	8/9	8/8	7/8	6/8	6/8	7/8	4/8	55/66 = 83%
Totals	50/57 = 88%	48/55 = 87%	47/54 = 87%	48/54 = 89%	48/54 = 89%	43/53 = 81%	49/53 = 93%	48/53 = 90%	381/433 = 88%

Note. Attendance rates calculated by dividing number of senior participants who attended the meeting by the total number of participants in that group. The decrease in total number of participants over time reflects discontinuation of participation.

Fidelity and quality. Direct observation was conducted in 34% (11/32) of group meetings by two students or research team members trained in direct observation measurement. The results of the two observers were averaged to create scores for each group meeting. Average scores per group meeting were calculated for each site and each condition (Table 19).

The direct observation process evaluation showed consistency in quality of intervention delivery across sites and study conditions. At group meetings, the group leaders asked an average of three to seven content-related questions, a measure of engagement and quality of program delivery. Praise statements were used an average of eight times per class in both study conditions. Coverage of key curriculum points, a measure of intervention fidelity, ranged from 80-100%.

Intergenerational contact. The advocacy groups spent similar amounts of time in small, intergenerational discussions as the physical activity groups (Table 19). Results show that both conditions averaged about 17 minutes of small, intergenerational discussion during each sixty-minute session. The advocacy condition spent more time in large group discussions (21 min/class) as compared to the physical activity condition (10 min/class).

Table 19. *Direct observation process evaluation (AIM 4)*

	Content related questions per class, mean	Praise statements per class, mean	Key curriculum points covered per class	Large group discussion, min/class, mean	Small, intergenerational discussion, min/class, mean
Physical Activity #1	5	5	80%	12	22
Physical Activity #2	7	10	95%	8	11
Physical Activity Groups, mean	6	8	87.5%	10	17
Advocacy #1	3	6	100%	25	22
Advocacy #2	5	9	100%	17	14
Advocacy Groups, mean	4	8	100%	21	18

Participant roles and feedback. Seniors' scores on post-test process evaluation measures are in Table 20. Seniors in the advocacy condition reported significantly higher levels of group participation, $F(1, 47) = 5.04, p = .029$, and felt they had more opportunities for control in group work, $F(1, 47) = 8.48, p = .005$. Participants of both study conditions gave similar ratings to group cohesion, leader characteristics, collective efficacy toward group goals, pride in group work, follow-up group resiliency, and feedback on group meeting content and materials. For the elements of contact theory, the advocacy condition mean scores were slightly higher across all items yet none reached statistical significance. Reliability analysis of the 4-item Contact Theory Index showed Cronbach's alpha of .848, indicating good reliability.

Table 20. *Seniors' intervention processes, post-test, by study condition (AIM 4)*

Construct	Items	Phys. Act. n=33	Adv. n=17	<i>F</i> (1,47)	<i>p</i>	η_p^2
Roles and participation: checklist (scale: 1-6)	(a) Active member through meeting attendance (b) Served in a leadership role (c) Helped plan activities, events, or strategies (d) Supervised other group members (e) Assisted other group members (f) Recruited people to join the group (g) Have not taken an active role	2.06 (1.52)	1.76 (.66)	.583	.449	.012
Roles and participation: Likert scale	(1) When I attended meetings, I took part in the discussions. (2) I took responsibility for things that the group needs to have done.	3.71 (1.05)	4.32 (.53)	5.04	.029	.095
Opportunities for control in group work	(1) This group allowed me to have a say in planning events or activities. (2) This group had specific leadership roles for people my age.	3.58 (.91)	4.32 (.75)	8.48	.005	.150
Group cohesion	(1) I am NOT happy with my group's level of commitment to its goals for creating healthier communities. (reverse coded) (2) Most members of our group do NOT spend time together outside of meetings or events. (reverse coded)	2.64 (1.08)	2.94 (.83)	1.040	.313	.021
Coordinator/ leader characteristics	(1) Our leader(s) provided help whenever we needed it. (2) Our leader(s) did not force ideas or opinions on the group. (3) Our leader(s) let us work through our disagreements to decide what was best for the group.	4.57 (.61)	4.73 (.54)	.829	.367	.017
Collective efficacy toward group goals	(1) Members of this group worked well together to accomplish our goals.	4.39 (.86)	4.53 (.80)	.290	.593	.006
Pride in group work	(1) I am proud of the work our group accomplished. (2) Our work was worth the time and effort we put into it.	4.40 (.88)	4.62 (.65)	.852	.361	.017
Follow-up group resiliency	(1) This group does not give up during tough times. (2) If this group failed to accomplish one of our goals, we kept trying to find a way to reach it.	4.29 (.71)	4.00 (1.20)	1.144	.290	.023
Contact Theory Index ($\alpha=.848$)	Mean of four items below	4.45 (.72)	4.66 (.57)	1.06	.308	.022
Equal group status	(1) Student and older adult group members had an equal say during group meetings.	4.33 (.92)	4.59 (.87)	.887	.351	.018
Common goals	(2) Members of this group worked well together to accomplish our goals.	4.39 (.86)	4.53 (.80)	.290	.593	.006
Intergroup cooperation	(3) The group leaders encouraged students and older adults to interact with each other.	4.52 (.71)	4.65 (.70)	.388	.536	.008
Support of authorities	(4) When working together, students and older adult group members each contributed by applying unique skills and experience.	4.58 (.94)	4.88 (.33)	1.70	.199	.034
Feedback on group meetings	(1) The meetings kept me engaged and interested. (2) I would have preferred to spend more class time doing physical activity. (reverse coded) (3) The handouts helped me understand the concepts covered in the meetings. (4) The group leader was well prepared.	4.20 (.47)	4.40 (.37)	2.37	.133	.046

Note: All items except the Roles and Participation Checklist had a 1-5 response scale: 1= disagree strongly, 2= disagree somewhat, 3= neutral, 4= somewhat agree, 5 = strongly agree (Millstein, 2016).

Evaluation of MAPS-Mini. The focus groups data addressed six main questions relating to the MAPS-Mini audit.

1. What was your experience using MAPS-Mini (paper version)?

The participants all agreed that the tool aided the advocacy process by helping identify pedestrian barriers in the built environment. Many participants commented that it was difficult to write and walk at the same time. They needed to stop to complete the items. They also found it difficult to complete the tool because they did not have anything hard to write on, like a clipboard. Several participants had difficulty carrying the tool and a pencil while they walked. One woman said she was losing balance trying to carry her things, use her cane, and look around at the same time. She found it easier when a student carried her MAPS-Mini sheet and helped her complete the items. Many participants agreed that having the students assist with the MAPS-Mini sheet was helpful.

The older adults liked having the students take pictures of the issues that they saw. One student reported that her group would ask her to take pictures from multiple angles and the older adults would check the pictures to make sure she captured the issue. She commented that by documenting the seniors concerns in a photograph, she confirmed the validity and importance of the seniors' concerns.

2. What was your experience using the mobile application?

The majority of participants did not like using the mobile application and did not see any advantage over the paper version. The screen was difficult to see in daylight because of the glare. The font was too small to read. Some participants were able to select items using the radio dial buttons on the touch screen, but others had difficulty. Participants recommended making the font and buttons bigger. Visual issues aside, the participants who tested the application indicated that

they understood the items and the layout was intuitive. One participant commented that the tablet was too heavy due to the thick protective case, and another indicated that it was difficult to keep balance and hold the tablet at the same time. Several participants refused to try the mobile application because they did not like computers. Several participants thought that the mobile application was better suited for a younger population, and suggested that they could work with a younger person to fill out the items on the mobile application.

3. Was there anything confusing about the MAPS-Mini tool?

Overall, the participants found the tool easy to understand but had several suggestions to improve the tool. The participants felt that identifying cardinal directions was the most difficult part. Others forgot the meaning of the term “buffer,” and suggested we include a descriptive term like “separation between the pedestrians and cars.” Another participant asked about the meaning of the term sidewalk “heave.” Several participants had difficulty answering the item about lighting because they do not walk outside at night. Two participants mentioned that it was difficult to determine if a segment was residential or commercial when both land uses were present. One participant suggested we include pictures next to each item as a reminder of how to score each item.

4. Was it useful having a group of people assess the same neighborhood with the same tool?

Most the participants concurred that working in groups was useful because each group member saw different things and had a slightly different perspective. Several participants commented that it was helpful to have a group member who used a walker because it educated them about the challenges that those with walkers might face. For example, a participant with a walker was forced to veer out of the crosswalk into oncoming traffic to avoid a large patch of broken asphalt. Without observing the woman in the walker negotiate the street crossing, the

other members of the group would not have understood the safety concerns (beyond a trip hazard) caused by the broken asphalt. Another participant commented that he had not noticed that a sidewalk was narrow and obstructed by parking meters until he saw a group member with a walker have difficulty negotiating the sidewalk. Several students commented that it was interesting to learn what type of sidewalk cracks seniors considered trip hazards compared to what they would consider a trip hazard. Participants agreed that having group members with different impairments (including vision, mobility, balance, and use of assistive devices) enhanced the quality of their audit and increased their understanding of the issues.

Another participant indicated that going in a group was motivating. If he had been instructed to complete the audit on his own, he would not have done it. Several participants indicated that it was safer for them to go out in groups given the increased risk of falls at their age. Again, having a younger adult present to help carry things and write on the form was useful. For some participants it would have been dangerous to complete the audit alone and negotiate the survey while walking.

5. *Did the audit help you notice things in your neighborhood that you had not noticed before? Would you have preferred to just walk around and look for issues without using the tool?*

Some participants commented that they walked their neighborhood all the time, and did not see anything new during the audit. Most participants indicated that the tool brought things to their attention that they had not noticed before. For example, one participant commented that she had not noticed that a crosswalk was not marked. Several participants indicated that they had never noticed sidewalk buffers before using the tool. Others indicated that they had not noticed that their streets lacked lighting, because they usually do not go out at night. Some participants said that they had not considered the lack of shade or the upkeep of buildings.

Several participants indicated that they liked the tool because it provided a written record of issues they saw and exact locations. The record helped them remember the issues so that they could share with others and make a report. Two participants indicated that the tool helped keep them focused on issues that relate to physical activity.

6. *What were the most important items on the tool? Are there any items we should add?*

Many participants indicated that the most important item related to sidewalk trip hazards. They suggested that the binary response for trip hazards (major or not) might not be appropriate for their population, since they are affected by smaller hazards. In other words, an older adult might trip on a hazard that most people would consider “minor,” not “major.” Participants suggested increasing the number of response options, or making the item more subjective (“would you trip or find it dangerous?”) Other items cited as the most important included crosswalks, benches and shade at bus stops, and bike paths. Suggestions for additional items included items relating to trash, stoplights, security, and homeless people. A common suggestion was to add an item asking about trip hazards within the crosswalk.

Lessons learned.

- The MAPS-Mini tool can educate the participants about neighborhood features that impact walking, and may help them notice physical activity barriers they had not previously considered.
- Completing the audit in a group that includes participants with different impairments (e.g., vision, balance, and use of assistive devices) helps other group members understand potential pedestrian barriers.
- Provide participants something to write on, like a clipboard
- Encourage older participants to stop to fill out the items. Walking and writing may increase risk of falls.
- Pair older adults with a younger adult who can help carry things, take photographs, and fill out the audit tool.

- Consider revising the tool to provide better descriptions of challenging terms and improve confusing response options.

Post intervention focus groups.

Two researchers trained in qualitative research methods independently reviewed transcripts from the focus groups held at each advocacy program site. A total of 327 raw data themes were identified. Using advocacy and intergenerational survey constructs as a starting point, the researchers compared their results and classified data into 47 first order themes, 28 second order themes, and 3 higher order themes: advocacy, intergenerational benefits, and program feedback. Table 21 sets forth the second and higher order themes, and provides examples using quotations from the focus groups.

Table 21. *Thematic analysis of two focus groups of senior advocacy participants, n = 13*

Theme	# Focus Group Comments	Example
ADVOCACY		
Empowerment	8	Q. What does the word empowerment mean to you? A: "It means feeling that I'm not helpless, not a victim. That I can do something about my neighborhood, my environment, my family, myself."
Self-efficacy for health and advocacy behaviors	4	"I like that I can say 'I don't like it to a group of people and then call the real people and tell them 'I don't like this and ya'll going to have to fix it.' 'It gave me a voice, man. . . . Instead of being a little old lady.'"
Perceived sociopolitical control: active participation	3	"The program made me aware of the problems in the walking spaces around me, and I learned to speak up and do something. And that's the truth."
Perceived sociopolitical control: optimism for change	8	"What you guys did was open my eyes to the fact that there are people, or agencies, that look at this stuff and would change it maybe if one of us would say we didn't like it or it was causing us a problem."
Advocacy outcome efficacy	7	"I was surprised by the promptness of the people who got back to me, and I was surprised by the actual stuff that happened."
Assertiveness	3	"I now know that I can contact the city and get things looked into or get some answers."
Participatory competence and decision-making	3	"It makes me feel stronger about it [plans to advocate in the future]. I'm going to continue. I never thought I'd be getting as much done."
Knowledge of resources	8	"You brought the information to us; took us out in the neighborhood; very interactive with us; information that we could utilize now and in the future."
Group resiliency	4	"Even though the information about the lighting is not real positive, we're plugged into the system now and it caused me to come up with some other ideas."
Advocacy challenges	8	"My brain did not have a corner marked 'unfunding is a problem.' My understanding was if they only knew what our problem is, they'd come out and fix it. And realizing that our problem was indeed valid, and that it was going to go on a list of 'unfunded problems' was a whole new concept to me. I mean, I just don't tend to think of funding. If I show you the hole in the road, you're going to go "Oh wow! That's a hole in the road!" and you're going to fix it. Instead of saying we're going to put it on our list of holes in the road and as soon as we get some money were going to come out and fill the holes in the road."
		Lack of social support: "Someone said, 'Well what would you do that for? What makes you think you would get anything done?'"

Table 21. *Thematic analysis of focus groups, continued*

Theme	#	Comments	Example
Awareness of built environment issues	10	“Before I used to just walk. Now I see the street, I look at the corners. Is there a curb there? Is there something that they will trip? But before I just walked now I just notice all those. Because I have no problem. But now, there is something here. . .”	
Helping others	5	“...When I used to walk down the road and see all these ruts and bumps and things and I just walk past. And now I think about... not me, but what about people in wheelchairs? . . . If I complain it helps other people. . . . I start to think ‘well maybe I could do something.’ And I wouldn’t have given it one iota of thought if it wasn’t for this program”	
Intent to continue future advocacy	6	“I’m happy that we are going to continue on with the group and involve more people.”	
Co-benefits	3	“Program encouraged walking” “Made me a safer driver” “Made me a safer pedestrian”	
INTERGENERATIONAL BENEFITS			
Young Adults as Prosocial Community Members	4	“They treated us nice. They didn’t treat me like the old fogey that I am and I appreciated it.” “The important thing was that they cared.”	
Students not on Cell phones	2	“I liked that the student were involved. It showed me that the younger generation is involved in the environment and our safety. And they do care about the senior citizens. . . .Like my kids are always in their cell phones texting. I’m always going ‘There’s a world out here! There’s a world out here! You know. Get out of your phone.’ They weren’t in their phones constantly. They showed interest in us which I appreciated.”	
Reducing ageism	8	“I like having those kids up here with me. Makes me feel young. . . . They have all this energy. . . . I liked the fact that they bring a different level to me. I’m always on my level. I only deal with people 50 and above. I used to say that, ‘If you ain’t 50, I ain’t talking to you.’ But now I realize that they have a life too and that there are a lot of similarities between what people think of us and what people think of them. . . . That they think that they know it all or that they are lazy or that they don’t care about other people. All those myths.”	
Helping the students	4	“I liked to think that I helped them to see that the future is brighter. That we really are alive and well and living and functioning. We’re not all just frail and like that. You can be our age and still be concerned and up and about and all that. And I think the kids were able to see that.” “I think you guys learned something from us. You may be old but you’re still feisty.”	
Effect of working with kids	3	Q. How do you think our program would have been different if you were only working with people your own age? A. “I think it would have turned into a grumpy session – ‘I don’t like this or I don’t like that.’ But with the kids there we were on better behavior.”	

Table 21. *Thematic analysis of focus groups, continued*

Theme	#	Comments	Example
Effect of working with kids, cont.		“It was more effective having the students here. Partly it gave us people to bounce ideas off of. . . . Encouraged more discussion because there was a little bit of ‘Well let me explain to you about – since they were strangers to us as opposed to everybody who lives here knows about the corner of Hawk street. . . . It made me a little more focused in what I talked about.”	
Technology	4	“But now I don’t mind mixing with the kids because they know a lot of new stuff – technology and stuff that I don’t even think about.” “And they were very helpful at doing things like taking pictures and helping us when we got out there on the street.”	
PROGRAM FEEDBACK			
Roles and participation	5	“You let us actually do the stuff which was good.”	
Group interaction	6	“It was nice to spend time with my neighbors, some of whom I don’t know very well.”	
Coordinator/leader characteristics	2	“This was well thought out. You had real specific things you were trying to teach us, and deliver to us, and help us in our movement in our area. You guys were very encouraging and very specific in your thought and it was very easy to participate.”	
Collective efficacy toward group goals	6	“One person can make a difference, but if they have more behind them it makes them stronger.”	
Pride in group work	3	“Living here 15 years, hearing the people who have singularly called to no avail. And then suddenly we get changes with this group. So this is fantastic.”	
Things they liked about the program		• Working with students : 8 • Handout : advocacy resource list with contact information for City Dept. of Trans, Mayor’s office, and local representative: 8 • Handout: pictures comparing good and bad built environment features: 5 • Student-led activity breaks : 4 • Learning and gaining awareness about the built environment: 4 • Seeing results and neighborhood improvements :3 • Organization and pace of program: 3 • Feeling empowered: 3 • Taking action on advocacy issues : 2 • Students helping with technology (emails to the city) and photographs: 2 • Snacks : 2 • Group discussion: 1 • Socializing with neighbors: 1 • Field audit: 1 • Encouraged walking: 1 • Convenient location of group meetings: 1 • Reminder calls: 1 • Incentives: 1	

Table 21. *Thematic analysis of focus groups, continued*

Theme	# Comments	Example
Dislikes and recommendations for future programs	• Not clear on program goals during recruitment: 13 • Thought program was about exercise: 8 • Not disappointed that program was about advocacy: 12 • Wanted recruitment and involvement of more participants: 4 • More food : 4 • More/longer field audits, maybe to place with good built environment: 3 • Program wasn't long enough: 1 • More time to get to know each other (e.g., student introductions with area of study and where they are from): 1 • Collaboration with other groups: 1 • More in-depth content regarding built environment and safety issues: 1 • Field trip to city or town council meeting: 1	

Physical Activity (Aim 5)

Accelerometer protocols were completed by 76 participants at baseline (56 seniors, 20 students), and 69 participants at eight weeks (50 seniors, 19 students). Of the 69 participants who wore the accelerometers at baseline and eight weeks, five participants (all seniors) were excluded from analyses because they did not accrue five valid wear days of at least 10 hours per day at both time points. Re-wears were requested in 18 cases (12% of participants who wore the accelerometer): four at baseline (all senior participants) and 14 at post-test (12 seniors and two students). Four senior participants refused to re-wear the accelerometer and four participants (two seniors and two students) lost their accelerometer.

Senior participants' physical activity is reported in Table 22. At baseline senior participants averaged 13 minutes of MVPA per day ($SD = 18$), or 92 minutes per week. Twenty-three percent (23%) of senior participants met the recommended 150 minutes of weekly MVPA at baseline (29% in the physical activity condition and 12% in the advocacy condition). Seniors in the physical activity condition accrued more daily MVPA than seniors in the advocacy condition at baseline, $F(1, 51) = 4.99, p = .030$.

No significant time by condition interactions were found for any accelerometer-measured outcome. The physical activity condition showed no significant change in MVPA from baseline to 8-weeks, $F(1, 14) = .891, p = .361$. The advocacy condition showed no significant change in MVPA from baseline to eight weeks, $F(1, 14) = .891, p = .361$.

Only one of the self-reported physical activity measures produced a significant time by condition interaction: transportation physical activity. Participants in the physical activity condition reported increases in their transportation physical activity over time, whereas participants in the advocacy condition decreased over time, $F(1, 47) = 4.35, p = .042$, Figure 10.

Students' physical activity is reported in Table 23. Student participants averaged 48 minutes of MVPA per day ($SD = 23$), or 337 minutes per week at baseline. Students in the advocacy condition accrued more daily MVPA than students in the physical activity condition at baseline, $F(1, 19) = 4.51, p = .048$. Students' average MVPA showed no significant change at post-test ($\bar{x} = 44$ min/day, $SD = 17, F(1, 18) = 1.35, p = .261$).

There was only one significant time by condition interaction in the accelerometer-measured physical activity outcomes. Students' sedentary behavior decreased in the physical activity condition over time, and increased in the advocacy condition over time $F(1, 17) = 4.33, p = .05$, Figure 11. For students' light physical activity, a trend showed the physical activity condition increased over time while the advocacy condition decreased over time $F(1, 17) = 3.93, p = .06$. There were no significant interactions for students' self-reported physical activity.

Table 22. *Seniors' physical activity, by study condition (AIM 5)*

Measure	Items	Phys. Act. n=32		Advocacy n=17		F (1,47)	p	η_p^2
		Base- line	8-wks	Base- line	8-wks			
Accelerometer physical activity; mean min/valid wear day (SD); n=44 (29 physical activity, 15 advocacy)	Moderate and vigorous physical activity (MVPA)	17.4 (19.2)	17.6 (22.4)	5.2 (9.0)	3.6 (6.5)	.506	.481	.012
	Vigorous physical activity	.04 (.18)	.11 (.29)	.00 (.00)	.00 (.00)	.892	.350	.021
	Moderate physical activity	17.3 (19.2)	17.5 (22.2)	5.2 (9.0)	3.6 (6.5)	.462	.501	.011
	Light physical activity	255.9 (92.4)	269.0 (97.4)	201.4 (57.0)	194.4 (53.5)	2.24	.142	.051
	Sedentary	551.8 (120.0)	574.6 (160.6)	602.7 (87.4)	593.2 (98.3)	.867	.357	.020
	Nonwear	615.0 (66.5)	578.9 (131.0)	630.7 (71.2)	648.7 (90.7)	2.66	.110	.060
Transportation physical activity: adapted from IPAQ; mean min/week (SD)	(1) During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place? (2) How much time did you usually spend on ONE of those days walking from place to place?	234.5 (252.6)	377.5 (317.6)	214.1 (252.2)	164.4 (207.8)	4.35	.042	.085
Leisure physical activity: adapted from IPAQ; mean min/week (SD)	(1) Not counting any walking for transportation you already mentioned above, <u>during the last 7 days</u> , on how many days did you <u>walk</u> for at least 10 minutes at a time <u>in your leisure time</u> ? (2) How much time did you usually spend on ONE of those days walking in your leisure time?	214.9 (205.6)	252.5 (283.2)	116.5 (220.5)	79.1 (89.6)	1.07	.306	.022
Strength training: Adapted from BRFSS; mean min/week (SD)	(1) During the last 7 days, on how many days did you do activities designed to increase muscular strength or tone, such as lifting weights, pull-ups, push-ups, or sit ups? (2) How much time did you usually spend on ONE of those days doing activities designed to increase strength?	93.9 (116.2)	108.9 (111.0)	52.0 (86.3)	75.9 (130.6)	.078	.781	.002
Flexibility training: Adapted from BRFSS; mean min/week (SD)	(1) During the last 7 days, on how many days did you do any activities designed to increase flexibility, such as stretching or yoga? (2) How much time did you usually spend on ONE of those days doing activities designed to increase flexibility?	95.9 (93.2)	138.3 (134.4)	47.1 (53.6)	92.6 (140.3)	.007	.936	.000
Enjoyment of physical activity	(1) I enjoy doing physical activity. (Scale 1=disagree strongly, 5=strongly agree).	4.3 (1.0)	4.4 (1.0)	4.0 (1.3)	4.1 (1.4)	.018	.894	.000
Self-efficacy for exercise	See Resnick & Jenkins, 2000; mean of 9; scale 1 = not confident, 10= very confident	6.2 (2.5)	6.3 (2.8)	5.5 (2.6)	6.3 (2.5)	.871	.356	.018

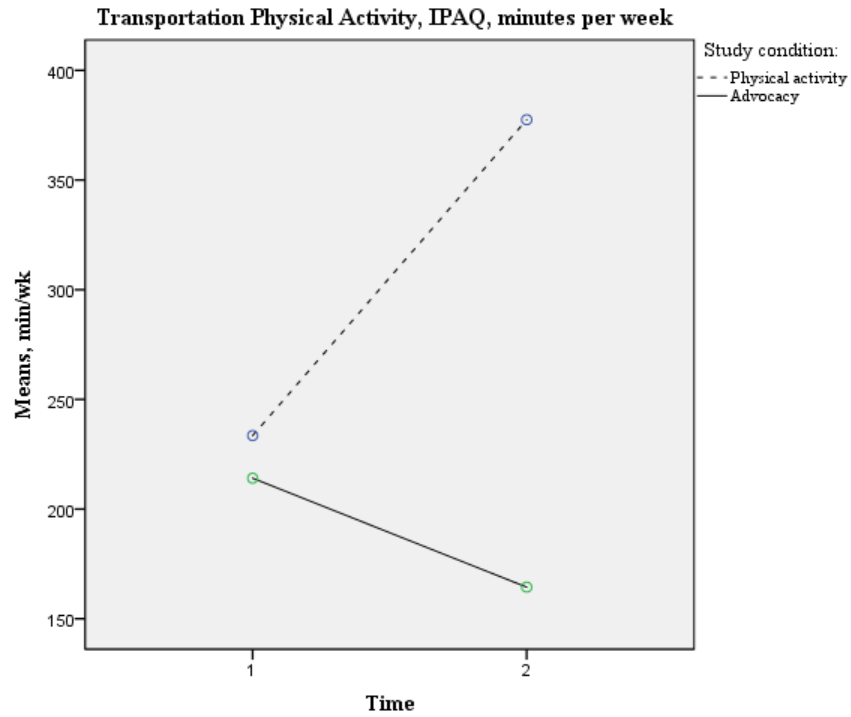


Figure 10. *Seniors' self-reported transportation physical activity at baseline and 8 weeks, by study condition*

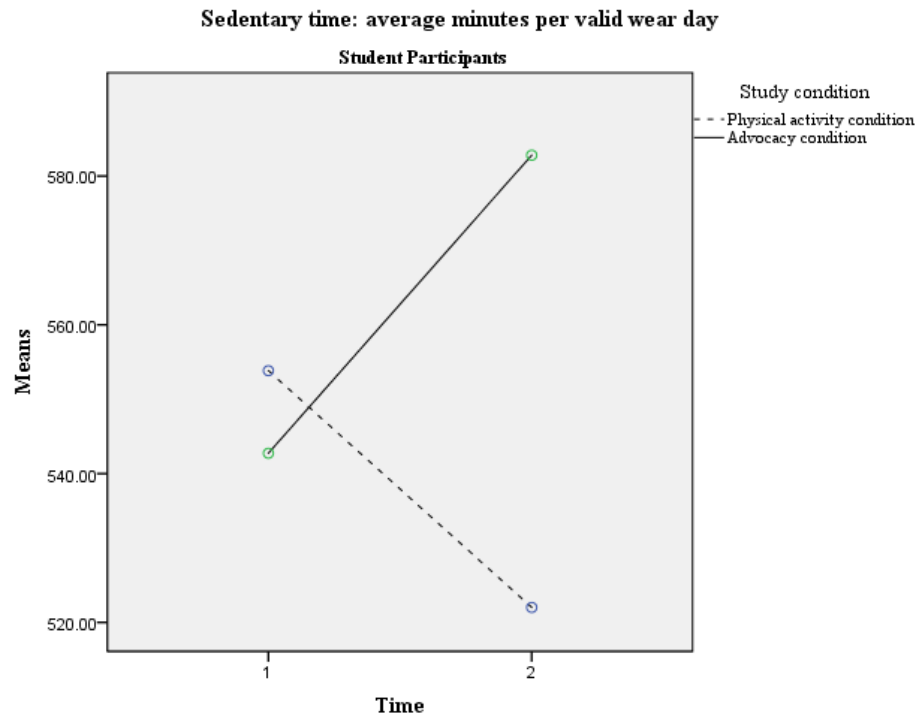


Figure 11. *Students' average minutes of daily sedentary time at baseline and 8 weeks, by study condition*

Table 23. *Students' physical activity, by study condition (AIM 5)*

Measure	Items	Phys. Act. n=10		Advocacy n=10		F (1,18)	p	η_p^2
		Base- line	8-wks	Base- line	8-wks			
Accelerometer physical activity; mean min/valid wear day (SD); n=19	Moderate and vigorous physical activity (MVPA)	40.1 (14.1)	36.8 (18.1)	58.2 (26.2)	50.1 (13.5)	.219	.646	.013
	Vigorous physical activity	2.9 (3.4)	1.8 (2.2)	1.2 (1.3)	2.4 (3.0)	2.10	.166	.110
	Moderate physical activity	37.2 (12.8)	35.1 (18.0)	57.0 (25.6)	47.8 (12.6)	.580	.457	.033
	Light physical activity	229.5 (34.7)	244.9 (71.9)	236.7 (56.8)	207.4 (73.1)	3.93	.064	.188
	Sedentary	553.8 (77.8)	522.0 (103.4)	542.7 (64.6)	582.8 (94.4)	4.33	.053	.203
	Nonwear	616.6 (83.2)	602.3 (49.9)	636.3 (78.2)	599.7 (77.1)	.439	.516	.025
Transportation physical activity: adapted from IPAQ; mean min/week (SD)	(1) During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place? (2) How much time did you usually spend on ONE of those days walking from place to place?	242.0 (281.7)	211.5 (125.7)	295.5 (219.8)	347.5 (251.5)	.331	.572	.018
Leisure physical activity: adapted from IPAQ; mean min/week (SD)	(1) Not counting any walking for transportation you already mentioned above, <u>during the last 7 days</u> , on how many days did you <u>walk</u> for at least 10 minutes at a time <u>in your leisure time</u> ? (2) How much time did you usually spend on ONE of those days walking in your leisure time?	161.0 (150.1)	210.5 (441.8)	171.0 (193.4)	154.0 (252.2)	.205	.656	.011
Strength training: Adapted from BRFSS; mean min/week (SD)	(1) During the last 7 days, on how many days did you do activities designed to increase muscular strength or tone, such as lifting weights, pull-ups, push-ups, or sit ups? (2) How much time did you usually spend on ONE of those days doing activities designed to increase strength?	216.5 (189.4)	167.0 (205.1)	297.0 (237.7)	207.0 (247.6)	.121	.732	.007
Flexibility training: Adapted from BRFSS; mean min/week (SD)	(1) During the last 7 days, on how many days did you do any activities designed to increase flexibility, such as stretching or yoga? (2) How much time did you usually spend on ONE of those days doing activities designed to increase flexibility?	104.8 (122.6)	78.0 (108.2)	85.5 (131.5)	66.0 (187.9)	.017	.897	.001
Enjoyment of physical activity	(1) I enjoy doing physical activity. (Scale 1=disagree strongly, 5=strongly agree).	4.8 (4.2)	4.9 (0.3)	4.8 (4.2)	4.7 (0.6)	.621	.441	.033
Self-efficacy for exercise	See Resnick & Jenkins, 2000; mean of 9; 1 = not confident, 10= very confident	6.2 (2.2)	5.5 (2.4)	6.2 (1.1)	6.7 (1.5)	2.44	.136	.119

Discussion

The Senior Change Makers Pilot Study models an inclusive approach to community building that crosses boundaries of age and income, and demonstrates the possibilities of grass root civic engagement. In a brief, eight-week intervention, the advocacy condition participants showed significant increases in their advocacy outcome efficacy and knowledge of resources (Millstein, et al., 2016a) and made demonstrable improvements to their pedestrian environment. The intergenerational advocacy groups worked with the City Department of Transportation to fix trip hazards on crosswalks and sidewalks, a broken crosswalk signal, and a broken water meter utility box. The City approved requests for additional street lighting, curb cuts, and crosswalk stripping. Participants reported that their advocacy work gave them “a feeling of success and empowerment.” The participants’ advocacy achievements are important because built environment features, such as safe sidewalks and crosswalks may affect older adults’ physical activity and are foundational to age-friendly communities (AARP, 2012; WHO, 2007). After the intervention, one advocacy group established their own group and continued advocating for neighborhood improvements.

Advocacy Confidence and Skills (Aim 1)

Compared to participants in the physical activity condition, seniors in the advocacy condition increased their advocacy skills and beliefs on two measures: advocacy outcome efficacy and knowledge of resources. The other six advocacy measures did not show significant differences between study conditions over time. The cumulative advocacy index showed a trend for the advocacy group to increase scores more than the physical activity group over time, $F(1, 47) = 3.81, p = .057, \eta_p^2 = .075$.

Insignificant findings on survey measures did not comport with focus group findings, which suggested that participants perceived increases across most advocacy constructs assessed in the survey (see Table 9). For example, several participants commented about how the program increased their optimism for change. “I was surprised by the promptness of the people who got back to me, and I was surprised by the actual stuff that happened,” commented one participant. It may be that the survey results, though often in the expected direction, were not significant due to the small sample size. The advocacy condition had high baseline scores for two measures (assertiveness and group resiliency), and insignificant findings may have resulted from a ceiling effect. For several advocacy measures (optimism for change, participatory competence, and group resiliency), differences between conditions were attenuated by unexpected increases in the physical activity groups’ scores, suggesting that advocacy and physical activity programs may confer some common psychosocial benefits.

Advocacy outcome efficacy showed significant increases in the advocacy condition over time, was a primary goal of the curriculum, and was a prevalent focus group theme. According to Social Cognitive Theory, self-efficacy plays a central role in behavior change (Bandura, 1986). The advocacy curriculum sought to foster self-efficacy for advocacy by teaching skills and providing opportunities to advocate. Advocacy outcome efficacy was tested by an item asking if community groups can advocate for changes to make communities better places for physical activity. Several participants noted they were surprised by the City’s response to their advocacy requests. One participant said, “Well I thought everybody would ignore it - especially the city. So I learned that people care.” Seeing results, even a temporary or small fix, appears to be important for developing advocacy confidence.

Gaining knowledge of resources was an outcome that significantly increased in the advocacy condition, but not the physical activity condition, and was commonly mentioned in

focus groups. The advocacy program content was tailored to provide participants with information germane to their communities and advocacy interests. When asked what they liked about the program, the most frequent response was a handout listing advocacy resources, including contact information for the Department of Transportation, local representatives, and the Mayor's office. Several participants used the resource list to advocate after the intervention ended.

Findings of increased advocacy confidence and skills comport with a previous study of youth advocates (Millstein, et al., 2016) that tested the same advocacy measures used in the present study. In the study of youth advocates, results from pre-post surveys showed six of ten advocacy measures increased over time: self-efficacy for health and advocacy behaviors, active participation, assertiveness, health advocacy history, knowledge of resources, and social support for health behaviors (Millstein, et al., 2016). The greater number of significant findings in the youth study might be due to the larger sample ($N = 92$). The present study used a controlled design and partially corroborated the findings of Millstein, et al., 2016, supporting the need to conduct further controlled studies with larger sample sizes.

The Senior Change Makers Pilot Study was designed using Empowerment Theory to guide program content and evaluation (Minkler, et al., 2001). Focus group data suggested the advocacy program increased participants' empowerment, an important outcome because older adults often feel unheard (Christens & Dolan, 2011). One older adult noted, "A lot of us, particularly right now, feel very helpless that we have anything to say about anything." In early 2017, several months after the intervention ended, this participant organized a demonstration at her senior residence, in coordination with the Women's March on Washington. She and five other residents made posters, marched to a local coffee shop, and read passages relating to peace,

freedom, and human rights. When asked during the four-month follow up whether the advocacy program had anything to do with her decision to organize the march, she indicated that it did.

It reminded me of my potential. I've done a lot of things in the past as an activist, and I forgot. It reminded me of the things I've learned and the experiences I had.

The participant commented that the program made her feel empowered. To her, empowerment meant “feeling that I’m not helpless, not a victim. That I can do something about my neighborhood, my environment, my family, myself.” Her experience comported with the tenets of Empowerment Theory, which involve enabling community members to take control of their lives and their environments (Zimmerman & Rappaport, 1988). The advocacy program sought to inspire a culture of community building, where participants learn to “look beyond themselves” and see themselves as part of a larger mission (Minkler, et al., 2001). The advocacy measures used in this study (Millstein, et al., 2016a), did not include a specific measure of empowerment, though many of the constructs included in the survey fall under its umbrella (e.g., perceived sociopolitical control and self-efficacy for advocacy; Zimmerman & Rappaport, 1988). Future research might use specific scales to assess changes in participants’ empowerment, and examine how the empowerment process differs for older and younger adults (Lawrence-Jacobsen, 2005).

The participants confronted advocacy challenges that may have affected their confidence and explain why some advocacy measures did not show greater increases. Focus group participants noted feeling discouraged by the quality of the City’s repairs. “I was thrilled that it was repaired and then discouraged when it was crumbling,” said one participant. Others noted barriers including lack of time for advocacy, cynicism from other residents, and frustration with the City’s lack of funding to fix approved projects.

My brain did not have a corner marked ‘unfunding is a problem.’ My understanding was if they only knew what our problem is, they’d come out and fix it. And realizing that our problem was indeed valid, and that it was going to go on a list of ‘unfunded problems’ was a whole new concept to me. I mean, I just don’t tend to think of funding. If I show you the hole in the road you’re going to go ‘Oh wow! That’s a hole in the road!’ and you’re going to fix it.

Of all the advocacy items, the lowest scores were reported for the scale that used reverse coded items (active participation), suggesting that participants may not have read the item carefully or may have made a mistake when responding. Reliability analysis for the cumulative advocacy index (mean of 8 advocacy measures) indicated that the scale’s Cronbachs alpha would increase from .791 (with reverse coded item) to .823 (without reverse coded item). The same issue occurred with a process evaluation scale that used reverse coded items to assess group cohesion. Even though the reverse coded items used uppercase letters to draw attention to the negative phrasing and highlight that the item differed from other items in the scale, (e.g., “I am NOT happy with my group’s level of commitment. . .”), the scores on the reverse coded items were much lower than all the other process evaluation measures. Future studies might assess the use of reverse coded items in an older population.

Advocacy Actions and Outcomes (Aim 2)

As hypothesized, the advocacy groups selected advocacy issues and completed a variety of advocacy actions including neighborhood audits, emailing and calling City offices, and making presentations to traffic engineers. Compared to physical activity participants, the advocacy participants reported talking to more people about making their community a better place for physical activity ($p = .10$). Advocacy activities were recorded by researchers using an advocacy checklist that included both interim actions and results achieved. For advocacy research, assessing interim actions is important since many advocacy projects do not yield immediate results (Coffman, et al., 2007). The advocacy groups surpassed expected outcomes by achieving

environmental improvements, including repaired crosswalks, sidewalks, and crosswalk signals (Table 11).

Many of the advocacy projects selected by the older adults related to improving intersection crossings and curbs. Research shows that intersection crossings and curbs explain transportation activity among older adults, but not younger adults (Cain, et al., 2014). A younger adult may not notice broken asphalt in the crosswalk or the lack of curb cuts, but these barriers might deter an older adult from walking. When asked what impact the program had, one participant noted:

It showed me that others might have problems that I don't. . . . like those holes you are talking about. I just walk past them, go around them. But people with wheelchairs and walkers can't do that.

Several focus group participants affirmed that conducting the field audit with group members with different physical abilities helped them understand the disparate impact of built environment barriers. Older adults may be disproportionately affected by certain pedestrian barriers (Cunningham & Michael, 2004), and advocacy provides an opportunity to raise awareness and address needs.

Arguably, the advocacy outcomes achieved in the study did not depend on student participation, but the present study design does not permit such conclusions. A study design comparing an intergenerational advocacy group with a non-intergenerational advocacy group could assess differences in study outcomes and processes, and evaluate the impact of the intergenerational component. Qualitative findings suggested that the students played a important role in the submission of online advocacy requests. The students brought their laptops to the group meetings, typed the seniors' concerns, and used their own email address if the older adult did not have one.

The four-month follow up revealed that several participants in the advocacy programs continued their advocacy efforts after the researchers left. At one site, the participants took ownership of the group and continued to meet and work on lighting issues. They wrote updates in the monthly newsletter to recruit new members, and developed partnerships with the local church pastor and the owner of a nearby restaurant. The research team helped facilitate the transition by asking each of the participants in the group who they thought would be a good group leader, and then asking the person who received the most nominations if they would accept the group's nomination to lead. A nomination process can help identify a person with sufficient social influence to serve as an effective leader (Valente, 2012). The nomination process did not work in the second advocacy group because the participants who received the most votes were unwilling to take the leadership role.

Intergenerational Attitudes (Aim 3)

The results from the intergenerational measures provided mixed findings. We hypothesized that the seniors and students in the advocacy condition would engage in more intergenerational contact and see greater improvements in their intergenerational attitudes. The study design aimed to create a comparison between a “high contact” advocacy condition and “low contact” physical activity condition. However, results from direct observation evaluations indicated that both study conditions averaged about 17 minutes of intergenerational discussion during each sixty-minute session. The survey items designed to test the elements of Contact Theory showed no statistically significant difference between the quality of intergenerational contact in each condition. Based on process evaluation measures, the advocacy condition was not a “high-contact” condition as intended.

Creating different levels of intergenerational contact was more difficult than anticipated. The students in the physical activity condition were trained to serve as research assistants,

whereas the students in the advocacy condition were trained to participate in all activities and interact with the older adults as much as possible. However, the students in the physical activity condition ended up interacting with the older adults. Researchers could have enforced rules to restrict students' communication and roles, but this would have created an unnatural artifice and biased the intergenerational measures. Future studies applying Contact Theory might consider using a control group that does not involve intergenerational contact (Meshel & McGlynn, 2004) or creates separate activities for each generation (Pinquart & Rensen, 2000).

In accord with the equal intergenerational exposure across study conditions, seniors in both study conditions decreased their ageism, though decreases were not statistically significant. Seniors in both study conditions reported improved attitudes about young people as contributing community members. The improved attitudes about young people was statistically significant for the advocacy condition, but not the physical activity condition, a finding that provides some support for our original hypothesis. One participant commented:

I liked that the student were involved. It showed me that the younger generation is involved in the environment and our safety. And they do care about the senior citizens. . . .

The majority of senior participants in both study conditions reported that working with young people in the study improved their respect for young people. Survey results are consistent with focus group findings. When asked what they liked about the program, working with the students was the most frequent response.

A cited benefit of intergenerational community building projects is the opportunity to improve students' attitudes towards older adults, dispel myths, and educate students about careers with older adults (Karasik & Wallingford, 2007). Here, all students reported that working with people from different generations increased their respect for people from different generations, and the majority indicated they wanted more opportunities to work with older adults in the future.

Of the eight students who received course credit for their participation, four asked to continue working on the study the following school quarter. Despite indications that the students enjoyed the intergenerational experience, only the students in the physical activity condition decreased ageist beliefs and stereotypes, as measured by the Fraboni Scale of Ageism. The students in the advocacy condition saw no change in ageism. These findings contradicted our hypothesis that the students in the advocacy condition would engage in more intergenerational contact and decrease ageism to a greater extent than the physical activity condition.

Research on intergenerational programs provide mixed findings regarding changes in young peoples' attitudes. For example, a study involving one-day (five hours) of intergenerational activities showed improved attitudes of adolescents towards older adults (Couper, Sheehan, & Thomas, 1991.) In contrast, attitudes of sixth-grade students towards older adults became more negative after a seven-day program of intergenerational activities including singing, dancing, and conversation (Corbin, Kagan, & Metal-Corbin, 1987). Discrepancies may be attributable to differences in the age and health of participants, and program activities (Meshel & McGlynn, 2004). Compared to the advocacy condition, participants in the physical activity condition were more physically active at baseline. The activities in the physical activity sessions were designed to be fun and high energy. The students in the physical activity groups saw the seniors dancing, walking, and lifting weights. In contrast, activities in the advocacy condition were mostly sedentary and involved challenging advocacy work. The differences in participants and program content may explain why students in the physical activity condition decreased ageist beliefs while students in the advocacy condition did not change their beliefs. Offering young adults intergenerational experiences is important given the need for a workforce to meet older adults' needs, but more research is needed to determine what types of exposure reduce ageism (Karasik & Wallingford, 2007).

Future studies might create higher quality intergenerational contact by increasing the length of the intervention to allow more time for participants to form relationships. Longer interventions (six to nine months) may be more effective at improving intergenerational attitudes (Christian, Turner, Holt, Larkin & Cotler, 2014). Several participants in the focus groups indicated they wanted more time to visit with the students. Research suggests older adults often participate in programs for social reasons, and less for program content (Lawrence-Jacobsen, 2005). To improve the quality of intergenerational contact, Contact Theory suggests participants have equal group status, which can be evaluated based on income, education, or power (Kuehne & Melville, 2014). In the Senior Change Makers Pilot Study, the students reported higher levels of income than the seniors, and the students were not residents of the community. Unequal group status may have reduced the participants' ability to collaborate on advocacy projects. The seniors took the lead on selecting the advocacy projects because it was their neighborhood. Future studies might consider recruiting young people who live in the same community as the older adults.

The Fraboni Scale of Ageism used in this study has not been validated in an older adult sample. The FSA was designed to test ageism of younger adults, and the items used in this pilot study were adapted for older adults by replacing the term "old people" with "young people" and eliminating items assessing stereotypes that did not apply to younger adults (e.g., "Many old people just live in the past"). Reliability analysis of the adapted scale showed Cronbach's alpha of .795, indicating good reliability. The adapted scale did not test stereotypes unique to younger adults (e.g., excessive use of mobile phones). There is little research assessing ageism and stereotypes held by older adults against young people (Zeldin, 2002), and future studies to validate such a measure are needed.

Process Evaluation (Aim 4)

We hypothesized that process evaluation measures would show study methods were feasible with respect to recruitment, intervention dose and fidelity, program content, use of an environmental audit tool, and intergenerational contact. The hypothesis was supported except for the maintenance of high and low contact intergenerational conditions. Process evaluation helped assess whether the intervention was delivered as intended, and was essential to interpreting the intergenerational outcomes.

Recruitment and retention. Recruitment of seniors lasted four weeks and used techniques such as in-person recruitment, flyers, introductory meetings, and notices in newsletters. The recruitment rate for seniors was approximately six seniors for every 100 units at the senior residences. Identifying seniors with social influence and asking them to recruit friends in their social network was a useful strategy. A longer recruitment period might result in more participants, though site staff indicated that a fixed group tends to participate in multiple programs. Recruiting seniors who do not generally participate in programs presents a worthy challenge for future research.

Many participants in the advocacy condition indicated they were not clear on the topic of the program when they enrolled in the study. Most advocacy participants believed the program was an exercise program. Only one focus group participant indicated he was disappointed when he learned the program was about community change, not exercise.

Low-income senior housing has not been extensively researched as a setting for advocacy and physical activity interventions. The pilot study showed benefits of working in low-income senior residences such as established recruitment channels, convenient meeting locations, potential for sustainability, and the ability to work with a population that often feels disempowered (Christens & Dolan, 2011; Zimmerman & Rappaport, 1988).

Intervention dose. Attendance rates in both programs were high and did not drop off over the course of the intervention. These results differ from the experiences shared by the staff of the senior residences, who indicated that most programs start with 10-15 participants, but retain only a handful of participants within a few months. High attendance rates may indicate that the seniors found value in the interventions, or perhaps felt more obligated since the program was part of a university study.

Steady attendance might also relate to the intergenerational interaction. One of the most commonly mentioned “likes” about the program was working with students. Focus group participants appreciated the students’ intelligence, creativity, and “young and fresh” energy. A common theme was the way students treated the seniors (e.g., they “treated us like a friend,” and “the important thing was that they cared”). Having four to five students in each group increased the attention each senior participant received. One senior participant was surprised to learn she could communicate with the students, and they were not always absorbed with their cell phones. Another participant reported that she did not miss meetings because she wanted to be a good example and did not want to let the students down.

Fidelity and quality. The direct observation process evaluation showed consistency in quality of intervention delivery across sites and conditions. Group leaders asked an average of three to seven content-related questions (a measure of engagement), gave an average of eight praise statements, and covered 80-100% of key curriculum points. These results suggest the intervention was delivered as intended.

Participant feedback. Seniors gave high ratings to program content, handouts, and leader preparation. As compared to participants in the physical activity condition, participants in the advocacy condition reported having more opportunities for control and more involvement in group work and discussions. This finding is expected given the collaborative content of the

advocacy versus physical activity program. Both conditions reported similarly high levels of collective efficacy, pride in group work, and group resiliency, indicating these advocacy measures may test constructs germane to physical activity interventions.

Evaluation of MAPS-Mini. The criteria for determining the feasibility of using the MAPS-Mini tool with an older adult population was whether the majority of participants reported (1) the tool aided their advocacy process and (2) they could easily understand and use the tool. For the first criterion, focus group participants all agreed the tool aided the advocacy process by helping identify pedestrian barriers. Having group members with different impairments (vision, mobility, balance, etc.) and assistive devices made participants aware of built environment barriers they may not have experienced personally. The tool provided a checklist of potential issues, taught key terminology, and provided a written record of issues for use in advocacy projects. A prevalent focus group theme was the development of awareness of built environment issues:

Before I used to just walk. Now I see the street, I look at the corners. Is there a curb there? Is there something that they will trip? But before I just walked. Now I just notice all those.

For the second criterion of the MAPS-Mini feasibility test, improvements are needed to make the tool easier to use and understand. The older adults had a difficult time negotiating their “stuff” during the audit: paper, pencil, assistive devices, etc. The older adults appreciated having the students help them fill out the items, take pictures, and walk with them if they felt off balance. Participants wanted more sensitive response options for items relating to trip hazards. Older adults may trip on a crack other age groups would consider minor. The mobile application was not user friendly for the older adults due to the small font size, glare, and difficulty selecting items using the radio buttons on the touch screen.

Physical Activity (Aim 5)

We hypothesized the physical activity program would increase participants' physical activity more than the advocacy program. For seniors, the accelerometer data did not support this hypothesis. We found no condition by time interactions for any of the seniors' accelerometer-measured outcomes. Students in the physical activity group significantly decreased sedentary behavior ($p = .05$) and showed a trend for increases in light physical activity ($p = .06$), a finding that partially supports our hypothesis.

The lack of change in seniors' MVPA may be explained by the physical activity conditions' high baseline MVPA. Seniors in the physical activity condition averaged 17 minutes of physical activity per day (121 min/week) at baseline. The advocacy condition averaged five minutes of MVPA per day (36 min/week). In comparison, a study of older adults using the same accelerometer cut-points (1952 cpm) found older adults living in low-income block groups accrued approximately 50 minutes of MVPA/week, or seven min/day (King, et al., 2011). Another study of 700 US seniors found women aged 70+ accrued five minutes of MVPA per day, and men aged 70+ accrued nine minutes per day (Troiano, et al., 2008), based on MVPA cut-points of 2020 cpm. Perhaps the physical activity condition did not achieve significant increases in MVPA because they were already an active group.

During recruitment, participants were told which program (physical activity or advocacy) would be delivered at their residence. Baseline differences in physical activity suggest a self-selection bias for active individuals to participate in the physical activity program. Significant results may have been more likely if we only enrolled sedentary seniors. However, since our primary outcome was advocacy we did not want to exclude physically active seniors.

Alternatively, the physical activity program may not have sufficiently emphasized the importance of increasing physical activity outside of group meetings. Future researchers might

consider providing pedometers to allow participants to self-monitor and set goals, an approach that has been successfully implemented with older adults (Kerr, Rosenberg, et al., 2012). The Senior Change Makers Pilot Study did not use a systematic process to help participants with goal setting and accountability, which might have improved outcomes.

The lack of change in MVPA may also be explained by biased baseline data. Participants were asked to keep their physical activity behavior the same during the baseline measurement, but the act of wearing the accelerometer may have resulted in a Hawthorne effect (van Sluijs, van Poppel, Twisk, & van Mechelen, 2006). The anticipation of starting the intervention may have also led to an increase in physical activity. If participants increased activity during baseline measurement, it might explain why self-report data suggested the physical activity condition believed they increased their physical activity over time.

For the physical activity condition, average scores on all four self-reported physical activity measures increased over time, but only the increase in transportation activity reached statistical significance. Compared to the advocacy condition, seniors in the physical activity condition reported greater increases in transportation physical activity from baseline to eight weeks ($p = .04$). Researchers modified survey directions to increase the validity of the self-reported physical activity data (Heesch, et al., 2010), but over reporting remained an issue. Based on reports of a 94-year-old participant, her cumulative physical activity for transportation, leisure, strength, and flexibility averaged 22 hours per day.

For the advocacy groups, the process of advocating for pedestrian improvements did not lead to significant increases in physical activity. This differs from findings of an advocacy study that found that youth participants' self-reported physical activity significantly increased over time (Millstein, et al., 2016). Here, the advocacy program did not include any behavior change strategies, such as self-monitoring, to increase participants' physical activity. The lack of change

in participants' behavior suggests that to increase physical activity, strategies targeting physical activity behavior are needed.

The physical activity guidelines recommend 150 minutes of MVPA per week (USDHHS, 2008). At baseline, 29% of seniors in the physical activity condition and 12% in the advocacy condition met the recommendation. The majority of senior participants did not meet guidelines, indicating a continued need for physical activity interventions for seniors. The need for effective interventions is particularly urgent for low-income seniors, who tend to accrue less overall physical activity (King, et al., 2011) and are disproportionately affected by disability and chronic disease (Mather & Scommegna, 2017; Schoeni, et al., 2005).

Limitations

Study results are limited by the small sample size, which reduced the likelihood of finding significant differences between study conditions. Sample bias may have occurred due to use of a non-probability sampling method and participants' self-selection into the intervention conditions. During recruitment, participants were told which intervention they would receive. Recruiting participants without disclosing the program content may reduce bias, but creates practical challenges since participants want program details before they commit to participate. Randomizing after recruitment would also reduce selection bias. Participants in the physical activity condition were more physically active at baseline, though baseline scores did not differ on primary advocacy outcomes. Larger samples sizes are needed to perform mediation analysis and explore pathways between the advocacy intervention, psychosocial factors, and advocacy outcomes. Including more sites and matching sites by number of low-income units, existing programming, and neighborhood walkability could also reduce bias. Analyses testing for co-variation within sites showed intra-cluster correlation coefficients at or close to zero for most

variables, but even small ICCs can affect power. The inability to add more sites, due to budgetary constraints, was a study limitation.

The students and researchers who implemented the intervention also collected, entered, and cleaned data. The lack of a separate measurement staff may have introduced bias. To reduce bias, students were trained in data collection (e.g., how to address questions regarding survey items without influencing responses) and the importance of accurately reporting direct observation measures. Data were entered twice by two different people and discrepancies were reviewed and corrected by two study leaders.

Study findings cannot be generalized to residents of low-income housing because only a small percentage of the seniors living at each site participated. Most study participants were Caucasian, female, and healthy enough to walk at least short distances. It is unknown how the study sample compares with residents who chose not to participate. Future research might try to learn more about seniors who do not participate in programs offered at their residence and test strategies to increase engagement.

Study results were limited by the short duration of the intervention. A longer advocacy program might have resulted in greater increases to participants' advocacy confidence and more substantial built environment changes. The advocacy follow up was conducted at four months because of the one-year study term. A longer follow up might have provided a better indication of program sustainability and impact. The physical activity programs may have also produced greater increases in physical activity with a longer intervention.

Strengths

The Senior Change Makers Pilot Study showed the feasibility of teaching advocacy to an intergenerational group of university students and low-income seniors. The intervention

addressed and achieved results at all levels of the Ecological Framework (individual advocacy beliefs, intergenerational attitudes, and environmental improvements). Theories including Empowerment Theory, Social Cognitive Theory, and Contact Theory, informed the study design, delivery, and evaluation. Program content and delivery benefited from an interdisciplinary research team with expertise in urban planning, medicine, kinesiology, and law. Development of program materials involved a literature review, interviews with researchers and social workers, and collaborations with community groups. During the advocacy program, traffic engineers provided guidance to the participants regarding the feasibility of their projects and potential advocacy strategies.

Study results were enriched by the use of a mixed methods approach that measured both generations (Jarrott, 2011). Most intergenerational community building programs only collected qualitative data (Lawrence-Jacobsen, 2005; Winter, et al., 2015), and using quantitative measures advances the literature. Instruments validated in younger adults, including MAPS-Mini (Sallis, Cain, et al. 2015), advocacy measures (Millstein, et al., 2016a), and the Fraboni Scale of Ageism (Rupp, 2005), were pilot tested in an older adult population. The use of a control group that did not engage in advocacy was a strength because the advocacy measures (Millstein, et al., 2016a) had not been tested in a controlled study.

In addition to assessing changes in beliefs and attitudes, the study assessed objective outcomes, including advocacy results and accelerometer-measured physical activity (Jarrott, 2011). A four-month follow up allowed for assessment of longer-term results. The continuation of one of the advocacy groups provided some evidence of program sustainability.

Process evaluation measures helped interpret study results and feasibility of methods. The study showed the feasibility of recruiting from low-income senior housing, and recruiting university students. Participants' attendance rates were high and did not drop off over the course

of the intervention. Program content was delivered with fidelity and quality. The delivery of the intervention was enhanced by the students, who proved helpful during group meetings. Students took attendance, distributed nametags, answered participant questions, and helped ensure participant safety during walks and exercises. Having students as part of the research team allowed senior participants to receive more attention.

Future Research

Advocacy research would benefit from larger studies of longer duration. With more time, participants could advocate for larger, longer-term projects. Advocacy is needed to drive the adoption, implementation, and evaluation of policies that support physical activity. Participants need time to engage in advocacy actions such as coalition building, fund raising, or media engagement, and to evaluate and reflect on their advocacy (Coffman, et al., 2007). Participants expressed desire to spend more time group building (Lawrence-Jacobsen, 2005), take a field trip to a City Council meeting, or visit a community with a good pedestrian environment. Future programs might take time to teach participants leadership skills. Students and seniors could lead more activities and take on greater responsibilities with the goal of sustaining the program on their own.

Importantly, longer studies would allow for quantitative assessment of environmental improvements and objective health benefits for participants or community members. Validated audit tools can document impacts such as improved microscale pedestrian features, quality or availability of recreation facilities, or access to public transportation (Sallis, Cain, et al. 2015). Reporting health benefits, especially when translated into health care cost savings, can help persuade decision makers and build the case for activity-friendly community improvements.

Additional research is needed in more ethnically diverse samples to increase generalizability of study findings. Despite selecting housing sites with racial/ethnic diversity, the

majority of the participants across sites were female and Caucasian. Site managers indicated that it is difficult to recruit a diverse group of participants, especially residents who do not speak English. Future studies might test innovative recruitment strategies to target members of different racial/ethnic backgrounds. Site managers at all four sites indicated that their Chinese and Russian speaking populations have requested physical activity and other programs offered in their languages. At one of the physical activity sites, a group of Mandarin-speaking residents joined the group meetings and participated in the group exercises. The pilot study lacked the resources to translate study materials, but the Mandarin speaking residents seemed to enjoy the exercises and returned each week. The enrolled study participants commented they wanted more opportunities to interact with people from different racial/ethnic backgrounds.

To foster program sustainability, future researchers might consider collaborating with a local college to establish a service-learning course dedicated to intergenerational community building. Service learning courses promote students' personal development, understanding of subject matter, and civic engagement (Long, Larson, Hussey & Travis, 2001). They create a unique opportunity to benefit the community and concurrently empower participants (Kaplan, 1997). Service-learning courses provide hands on experience for students interested in public health, physical activity, urban planning, or careers working with older adults. Schools that want to prepare students for careers in health and science might be interested in a curriculum addressing the link between health and our environment, and requiring students to collect data by auditing their physical activity environment. In the Neighborhoods 2000 project, the intergenerational community building program was built into the social science portion of an elementary school curriculum (Kaplan, 1997). Establishing a regularly offered course provides the structure to develop continuing relationships with senior residences and address long-term advocacy projects.

More research is needed to measure the professed health benefits of intergenerational programs. Research on volunteering indicates volunteering is associated with reduced risk of functional decline, cognitive decline, and mortality (Anderson, et. al., 2014; Fried, et al., 2004). Role theory posits that by engaging in productive roles, older adults increase their access to resources, social network, and perceived power – which in turn leads to better health (Lum & Lightfoot, 2005). Anderson et al. (2014) proposed that volunteering increases physical, social, and cognitive activity, which in turn may lead to improved functioning through psychological and biological mediators. Potential mediators include generativity, altruism, role enhancement, self-efficacy, physical health, brain derived neurotrophic factor, neurogenesis, and functional reorganization (Anderson, et. al., 2014). Qualitative findings from The Senior Change Makers Pilot Study support the notion that intergenerational programs can provide positive social interaction. Future studies might include quantitative assessment of social connections and other potential mediators of health outcomes.

Conclusion

The Senior Change Maker's intergenerational programs engaged two populations which are traditionally excluded from civic engagement and public discourse, yet are major stakeholders in their communities' physical activity environments (Christens & Dolan, 2011). The pilot study showed how community-building programs can train advocates to improve their communities by collecting data identifying pedestrian barriers, providing data to local agencies, and advocating for change (Winter, et al., 2015). Main lessons learned included:

- A brief advocacy program can increase seniors' advocacy confidence and skills, and increase awareness of pedestrian barriers in the built environment.
- Participants can achieve demonstrable advocacy results, such as repairing sidewalks and crosswalks, within 8 weeks.
- Seeing results, even if temporary or small, seems important for developing advocacy confidence and empowerment.

- Employing a mixed methods approach and process evaluation measures enhanced understanding of study outcomes.
- When asked what they liked best about the program, working with students was the seniors most frequently endorsed response.
- Intergenerational programs may increase students' desire for future work with older adults, and more research is needed to understand and decrease students' ageist beliefs.

Findings support the need to continue conducting and evaluating intergenerational programs that advocate for age- and activity-friendly communities.

Acknowledgements

The Senior Change Makers Pilot Study was supported by a grant from the San Diego Foundation. The primary author was the recipient of the Allen and Pearl Reiter Scholarship for research on healthy aging. Accelerometers were donated by Active Living Research. The study was registered at ClinicalTrials.gov in October 2016 as “Senior Change Makers Study: Improving Physical Activity Environments,” number NCT02944838.

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