Research Article

Older Adults' Utilization of Community Resources Targeting Fall Prevention and Physical Activity

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Abstract

Background and Objectives: Despite the availability of community resources, fall and inactivity rates remain high among older adults. Thus, in this article, we describe older adults' self-reported awareness and use of community resources targeting fall prevention and physical activity.

Research Design and Methods: In-depth, semistructured interviews were conducted in Phase 1 with community center leaders ($n = 5$) and adults ($n = 16$) ≥ 70 years old whose experience with community programs varied. In Phase 2, surveys were administered to intervention study participants ($n = 102$) who were ≥ 70 years old, did not have a diagnosis of dementia, and reported low levels of physical activity.

Results: Four themes emerged from Phase 1 data: (a) identifying a broad range of local community resources; (b) learning from trusted sources; (c) the dynamic gap between awareness and use of community resources; and (d) using internal resources to avoid falls. Phase 2 data confirmed these themes; enabled the categorization of similar participant-identified resources (10); and showed that participants who received encouragement to increase community resource use, compared to those who did not, had significantly greater odds of using ≥ 1 resource immediately postintervention, but not 6 months' postintervention.

Discussion and Implications: Although participants in this study were aware of a broad range of local community resources for physical activity, they used resources that support walking most frequently. Additionally, receiving encouragement to use community resources had short-term effects only. Findings improve our understanding of resources that need bolstering or better dissemination and suggest researchers identify best promotion, dissemination, implementation strategies.

Keywords: Community-based services, Falls, Mixed methods, Physical activity

High rates of falls and low levels of physical activity among older adults are significant, interrelated public health problems. To address these problems, community resources designed to target inactivity have been developed and continue to be disseminated and implemented (Ory & Smith, 2015; Stevens & Burns, 2015; Towne et al., 2015). However,

fall rates continue to increase among older adults. (Centers for Disease Control and Prevention, 2017) and levels of physical activity remain low (Ward, Clarke, Nugent, & Schiller, 2016) suggesting that community resources have yet to make a significant impact. Thus, the assessment of resource utilization is warranted. In this article, we describe

older adults' self-reported awareness and use of community resources targeting fall prevention and physical activity.

There are several community resources targeting fall prevention and physical activity that we categorize into four broad groups for descriptive purposes in this article based on their design, purpose, strategies used, and evidence base. The first group includes programs, typically 8–12 weeks in duration, designed and developed by clinical experts to reduce falls using exercises that target leg strength, balance and, in some cases, informational strategies that target additional fall risk factors such as home and medication safety. Examples include the Otago Exercise Program (Thomas, Makintosh, & Halbert, 2010), Tai Chi (Li et al., 2008), Matter of Balance (Cho et al., 2014), and Stepping On (Lord et al., 2003), which show positive effects on fall risks or fall rates. The second group includes programs, also designed and developed by clinical experts, targeting physical activity; the types, frequencies, and durations that are consistent with recommendations for older adults (Physical Activity Guidelines Advisory Committee, 2008). These programs are typically available to customers at least once per week for an unlimited duration, enabling participants to vary their attendance per personal preferences. Examples include Enhance Fitness (Petrescu-Prahova, Eagen, Fishleder, & Belza, 2017) and SilverSneakers®; for which empirical evidence show positive effects on fall risk and health care utilization (Greenwood-Hickman, Rosenberg, Phelan, & Fitzpatrick, 2015; Nguyen et al., 2008). The third group of resources, such as walking clubs, includes some, yet not all, components of evidence-based programs identified in the first two groups. The fourth group of resources includes community-wide efforts to prevent falls or promote increased physical activity among older adults, ranging from media campaigns to information outreach, improving public access to places for physical activity, and social support interventions within community organizations (Centers for Disease Control and Prevention, 2013). Although evidence supports the positive effects of these on physical activity in the general population (Centers for Disease Control and Prevention, 2013), their specific effects on older adults and on fall rates are unknown.

Community resources targeting fall prevention and physical activity are disseminated and implemented across the United States with the support of national, state, and local agencies (National Council on Aging, 2017; Kulinski, DiCocco, Skowronski, & Sprowls, 2017; Stevens & Burns, 2015). Information about participating in, referral to, and delivering programs described above is available consumers and providers. Additionally, printed and online guides are accessible for providers who want to augment their counseling practices related to health promotion (Minnesota Board on Aging, 2017; Stevens & Burns, 2015). Despite these efforts, the rate of injurious falls continues to increase (CDC, 2017) and fewer than 10% of adults aged 75 years and over meet physical activity guidelines (Ward et al., 2016).

The limited impact of community resources that target fall prevention and physical activity raises questions; the most basic of which pertains to resource utilization (Center for Community Health and Development, 2017). To what extent are older adults using resources that are available in their communities? Although current literature addresses older adults' perspectives of physical activity and fall prevention programs, little is known about the use of community resources. Although current literature includes descriptions of older adults' perspectives of programs that target fall prevention (McMahon, Talley, & Wyman, 2011; Yardley, Donovan-Hall, Francis, & Todd, 2007) and increased physical activity (Mathews et al., 2010; Schutzer & Graves, 2004; van Stralen, De Vries, Mudde, Bolman, & Lechner, 2009), it does not include descriptions of older adults' awareness and use of these programs and other community resources.

Objective

The overarching objective of this mixed methods study is to explore participants' use of community resources guided by the following research questions:

- 1) Which fall prevention and physical activity community resources are older adults aware of and which do they use?
- 2) Do participants in an intervention that receive encouragement to use community resources, compared to those who do not receive such encouragement, increase their resource use postintervention?
- 3) In what ways do findings from an intervention study confirm or extend findings from in-depth interviews?

Answers to these questions will provide information about utilization to improve our understanding of which resources might need to be bolstered or better disseminated, and which needs and gaps might persist (Center for Community Health and Development, 2017).

Methods

Design

This exploratory, sequential mixed methods study was comprised of two phases (See Study Flow in Supplementary Table 1). Phase 1 was a qualitative description of older adults' community resource utilization from semistructured interviews. Phase 2 was a quantitative description of the types of community resources identified and used by participants before and after a physical activity intervention study (Creswell et al., 2011). Data were collected in Minneapolis, Minnesota between 2014 and 2016 from participants who provided verbal and written consent to participate in the research. The Institutional Review Board at the University of Minnesota approved both phases of the study; 1310E44801 and 1402S47802, respectively.

The intervention study is registered in Clinical Trials.gov (NCT02433249), and its effects on primary and secondary outcomes have been reported in previously published papers (McMahon et al., 2017). Samples, data collection, and data analyses for both phases are summarized below.

Phase 1

The qualitative descriptive approach used in Phase 1, as explained by Sandelowski (2000), addressed our first research question—which resources do older adults use and how do they learn about them?

Sample

We recruited English speaking community center leaders (e.g., directors, social workers, nurses, or exercise instructors), as well as community-dwelling adults aged 70 years and older with varied involvement in community center exercise and physical activity programs (participants and nonparticipants) from five neighborhoods in Minneapolis, Minnesota. The five neighborhoods were close to community centers whose goals included strategies that support fall prevention and physical activity. Each center offers weekly exercise programs and evidence-based fall prevention including programs such as Matter of Balance and Tai Chi (Healy et al., 2008; Li et al., 2008). Also, each community center is within 3 miles of a center that includes fitness programs such as Young Womens/Mens Christian Associations or Jewish Community Centers. All participants received \$20.00 for their participation in the semistructured interview.

Data collection

Data were collected during in-depth, semistructured interviews which ranged from 30 to 60 min in length. The interview guide (Supplementary Table 2) included open-ended questions, adapted from prior research (Jilcott, Vu, Morgan, & Keyserling, 2012), to elicit participants' descriptions of fall prevention and physical activity community resources they use and how they learned about those resources. Minimal field notes were taken to avoid interruption or distraction. Data saturation was achieved after interviewing 21 participants.

Data analysis

Interviews were audiotaped and professionally transcribed, verbatim. We stored and managed data using NVivo, a qualitative research software program. A coding team comprised of three researchers, trained in qualitative methods, conducted content analysis (Miles, Huberman, & Saldana, 2014) first by organizing the text data according to an initial list of codes developed from the interview guide. Next, each researcher read and reread the transcripts to become familiar with the general ideas talked about by participants. Using the text data, researchers then modified and expanded the initial list of codes considering the language participants used and the processes they described.

The coding team met weekly to compare and discuss their codes, as well as the memos they maintained throughout the analyses. These discussions guided the teams' development of code list iterations, three in total, through consensus. The coding team reached 85% agreement when reanalyzing the text data with their third code list. A second cycle of coding was conducted during which codes were grouped into themes and subthemes; verbatim quotes were identified to represent each theme and subtheme. Finally, matrix tables were created to compare older adults and community center leaders, regarding themes (not displayed in this article).

Phase 2

The descriptive qualitative and quantitative approaches used in Phase 2, addressed our second and third research questions: whether the themes derived from interviews in Phase 1 were confirmed or extended in a larger sample of older adults, and if older adults who receive an intervention with a strategy that encourages community resource use increase their use of resources, postintervention.

Intervention study

The intervention study has been described previously (McMahon et al., 2017). Briefly, the purpose of the study was to test the effect of two distinct sets of behavior change strategies: interpersonal and intrapersonal, whose separation was based on empirical and theoretical rationale (McMahon et al., 2017). Specific content within the interpersonal strategy set included encouragement to increase social support, to recognize self as a role model, to integrate physical activity into social routines, and to problem-solve social and environmental barriers to physical activity. Information about and encouragement to use relevant community resources was reinforced in discussions and written materials for the latter two interpersonal strategies. Specific content within the intrapersonal strategy set included guidance to set personally meaningful goals, to identify personal benefits and satisfiers of being physically active, to identify and problem-solve personal barriers to physical activity, to integrate physical activity into personal routines, and to develop plans to cope with potential disruptions. To test the distinct and joint effects of the two sets of behavior change strategies, older adults ($n = 102$) were randomized to one of four conditions; the product of a 2 (interpersonal behavior strategies [Yes, No]) $\times$ 2 (intrapersonal strategies [Yes, No]) factorial design. The interpersonal and/or intrapersonal behavior change strategy sets were delivered in combination with an evidence-based physical activity protocol (Otago Exercise Program) (Gardner, Buchner, Robertson, & Campbell, 2001) to small groups of four to six participants during weekly meetings, 90-min each, over 8 weeks.

Sample

Adults living in or near Minneapolis, Minnesota were recruited for the study, primarily through newspaper

advertisements, who were ≥ 70 years old; able to walk; self-reported no diagnosis of a neurocognitive disorder; scored >21 on the telephone Mini-Mental State Exam (Newkirk et al., 2004); and self-reported physical activity levels below national recommendations for older adults (Topolski et al., 2006). All participants received a total of \$60 for their study participation; \$20 per data collection time point.

Data collection

All baseline and survey data were collected by a trained research assistant and managed using REDCap electronic data capture tools hosted at the University of Minnesota (Harris et al., 2009). Baseline data included self-reported demographic variables (age, sex, annual income, education attainment, race, ethnicity) and clinical characteristics (chronic conditions, fall risk) (Stevens & Phelan, 2013). Research assistants administered investigator-developed survey items about awareness and use of community resources 1-week preintervention, immediately postintervention (4–10 days), and 6 months' postintervention. The first item asked participants to identify community resources they are aware of, other than the intervention study. The second item asked participants if—in the last 2 months—they had used community resources.

Data analysis

We estimated that a sample size 100 would enable us to detect medium-sized intervention effects on physical activity with 80% power under two-tailed hypothesis tests at a significance level of 0.05. However, we did not estimate the sample size needed to detect differences in community resource use due to lack of prior quantitative research on this topic. Survey data were analyzed using IBM Statistical Package for the Social Science Statistics (SPSS) for Windows, version 22. Univariate analysis included descriptions of demographic and clinical characteristics and community resource awareness and use, by receipt of interpersonal behavior change strategies using medians, means, standard deviations, and ranges for continuous variables; and, counts and percentages for categorical variables. We coded the community resources named by participants, and grouped them into 10 distinct categories per similarity. We then created graphs to visualize the frequency in which participants reported awareness and use, by resource category and measurement time point. Finally, community resource use among intervention study participants who received interpersonal behavior change strategies was compared to those who did not. Binomial logistic regression was performed to ascertain the effects of receiving interpersonal behavior change strategies within an intervention (Yes, No), on the likelihood that participants would use at least one fall prevention or physical activity community resource (Yes, No), immediately postintervention and 6 months postintervention, controlling for age, sex, and baseline use of community resources.

Results

Phase 1

Twenty-one participants completed the in-depth, semi-structured interviews (Table 1). Sixteen were primarily White (55%), community-dwelling women (75%), with a mean age of 74 (standard deviation [SD] = 8.4). Five were community-center leaders who were primarily White (80%) women (100%), with a median age of 57. Four themes emerged from the content analysis that describe the types of resources older adults use, how they learned about them, and factors influencing their decisions to use them (or not) (Table 2): (a) identifying a broad range of local community resources; (b) learning from trusted sources; (c) the dynamic gap between awareness and use of community resources; and (d) using internal resources to avoid falls. Overall, descriptions by older adults and community leader participants were congruent with a few exceptions, highlighted in the following paragraphs and in Table 2 by labeling perspectives that were unique to community leaders.

Theme 1: Identifying a Broad Range of Local Community Resources

The inventory of physical activity community resources identified by older adult and community leader participants was broad in scope, ranging from public pathways, to exercise groups, health centers, and local business that could be used for multiple purposes. However, whereas older participants frequently named resources that support walking, community leaders frequently named exercise programs, classes, and groups. The physical activity resources named most by older adults were those that support independent walking near home. For example, several older adults described regularly walking in the hallways within their homes or condominium buildings,

Table 1. Phase 1: Participant Characteristics

Characteristics	Community center leaders (<i>n</i> = 5)	Older adults (<i>n</i> = 16)
Age, <i>M</i> (<i>SD</i>)	59 (7)	73 (17)
Sex, <i>n</i> (%)		
Female	5 (100)	11 (69)
Male	0	5 (31)
Race, <i>n</i> (%)		
African American	2 (40)	8 (50)
Caucasian	3 (60)	8 (50)
Community Center, <i>n</i> (%)		
A	1 (20)	3 (19)
B	1 (20)	4 (24)
C	1 (20)	3 (19)
D	1 (20)	3 (19)
E	1 (20)	3 (19)

Note: *M* = Mean; *SD* = standard deviation.

Table 2. Phase 1: Themes and Subthemes

Themes	Subthemes
Identifying a broad range of local community resources	<ul style="list-style-type: none"> • Walking near home <ul style="list-style-type: none"> o Outdoor: neighborhood sidewalks and park pathways^a o Indoor: home, condominium hallways, malls • Structured physical activity <ul style="list-style-type: none"> o Community center exercise classes and programs o YMCA or other health club classes and programs o Pools (e.g., water aerobics)^a • Unstructured physical activity <ul style="list-style-type: none"> o Stairs o Walking to the bus o Volunteering^a
Learning from trusted sources	<ul style="list-style-type: none"> • Learning via observation of role models <ul style="list-style-type: none"> o Positive role models o Negative role models • Learning via word of mouth • Learning via local newspaper or church bulletin • Learning increases awareness but does not guarantee use^a
The dynamic gap between awareness and use of community resources	<ul style="list-style-type: none"> • Multilevel factors influence use <ul style="list-style-type: none"> o Environmental (weather, proximity) o Organizational (affordable/accessible to everyone) o Interpersonal (friendly; opportunities to learn from peers^a) o Intrapersonal (integrated with other personally valued activities; improves symptoms of chronic health conditions or pain; personalized)
Using internal resources to avoid falls	<ul style="list-style-type: none"> • Self-identify, self-manage fall risk based on common sense and personal experience^a • Fall prevention community resources <ul style="list-style-type: none"> o Evidence-based program (Matter of Balance)^b o Written materials (fliers, newspaper) o Lectures^b • Linking fall prevention and physical activity^a

Note: ^aSubthemes identified by older adult participants, not community center leader participants. ^bSubthemes identified by community leader participants, not older adult participants.

on sidewalks in their neighborhoods, or on trails in nearby parks. A few participants also described walking in nearby malls, particularly when the weather prohibited outdoor walking.

“There are 20 condominiums on my floor in my building. I walk from one end to the other, a complete circle, and I call that one complete.”

“During the summertime, I walk through the community and around the block. In the wintertime, I go out to Southdale. I go out there to walk.”

Whereas one community leader recognized that many older adults walk on their own in malls and similar indoor locations, all leaders named exercise classes and programs offered in their center(s) and additional programs at the local YMCAs. A few older adult participants confirmed the existence of these groups as well.

“[Physical activity is] a concern at the senior center that is a huge part of what we do [Community Leader].”

“We have two exercises on Tuesday and Thursday in the morning from 9 to 10, and then we have two exercise classes in the afternoon from 1:30 to 2:30 Monday and Wednesday. We also offer a Tai Chi class which is every Monday and Friday [Community Leader].”

“I come up to the Center here and we exercise, chair exercise, every Tuesday and Thursday”

In addition to walking paths and structured exercise groups, many older participants also named environmental resources and programs that supported an active lifestyle. For example, some participants explained that they use the stairs instead of elevators when possible. Others described using public transportation, so they could walk to the bus. A few participants volunteered for work, which naturally led to increased physical activity.

"When I'm going to catch busses, I get off at least a block ahead of my stop so I can do that walk."

"I volunteer; take care of the mailboxes 3 times a day"

Theme 2: Learning From Trusted Sources

Participants described learning about community resources from observations and conversations with important others. For example, a few participants described wanting to avoid what they had observed in friends or family who, when physically inactive, developed health and mobility problems. Conversely, many of the observations and conversations participants described having with friends, colleagues, families, or acquaintances about community resources were positive:

"Well, I know a guy before I retired. That's where he be going out there walking all the time, and so after I retired that's where I started going out there."

"[I learned] through my girlfriend; she was in here, going to the center, and she told me, Come on, let's go."

Two community leaders described this as "word of mouth"; an effective way to disseminate information to older adults.

"Word of mouth is the best thing among seniors. It's a credibility thing...if a friend of yours or somebody that you know does it, it becomes a more credible..than if you're just walking in off the street. I don't know if they want to study me like a guinea pig [Community Leader]"

Many participants also described learning about resources from local media such as neighborhood newspapers or church bulletins.

"I think it [community resource information] was in one of the church bulletins, and it's probably also been in the Northeaster paper, too."

Theme 3. The Dynamic Gap Between Awareness and Use of Community Resources

Although participants named a broad range of resources and identified ways in which they learned about those resources, they qualified their descriptions with statements alluding to the fact that learning about or gaining awareness of the resources did not always lead to use.

"I say 'I'm going to go to the gym every day.' I'm going to do that, and I don't."

"I really should go someplace and check out a SilverSneaker® program or something like that."

Participants described that this awareness-use gap is a function of multilevel factors, which exert variable influence over their decisions. For example, a few participants described policy and organizational level factors that were key, such as access, convenient timing, and cost.

"My insurance paid for it. See, I'm with the SilverSneakers®; Humana, they paid for it."

Many participants described interpersonal factors that influenced their decisions. For instance, some participants explained that general characteristics were important such as milieu, friendliness, and inclusiveness (e.g., welcoming to those with diverse abilities, cultural backgrounds). Others identified more specific characteristics such as opportunities for peer-to-peer learning.

"I keep learning and I keep going. And like I say, maybe somebody else—somebody knows something that you don't know, and they teach you and you teach them what you know, and then we both know something new."

Many participants also described individual factors that influenced their decisions to participate. For example, some participants explained that they were more likely to participate in programs that included strategies to personalize physical activities according to preferences and diverse physical situations and linked these activities to health-related activities. Some participants described personal benefits and satisfaction they experienced when participating in programs. Finally, some described using resources because they were easy to integrate into their personal routines:

"Do what you can do. She don't force you to do anything; if you can't do something, you do it a different way."

"Monday mornings at 10:00 I've got to be at the community center—they take our blood pressure, and then there's a nurse that comes in and gives us exercise from 10 to 10:30, and boy she is good, too."

"With the class and walking, I'm keeping my weight level and my sugars are fantastic, not real high, not real low."

"Once you get in a good routine if you don't do it, you kind of miss it."

Some participants also explained that these multilevel factors are dynamic in that their influence varies over time. For example, a few participants said that while exercise improves many symptoms of chronic conditions, their use of community resources to support their physical activity can be interrupted when symptoms of chronic conditions become severe, injuries occur, or there are changes in the environment.

"I would say exercise makes you feel better and can improve your outlook and your mental attitude. But sometimes when you have a flare and hurt, you don't feel like doing much."

"I just quit Tai Chi for a little while because I cracked my rib."

"In the summer, it's too busy because there's children, little children, and you have to be careful, you know? They on bicycles; once I broke my ankle, so I'm very protective."

Theme 4. Using Internal Resources to Avoid Falls

Most older adult participants did not name community resources that target fall prevention. Older participants frequently responded to questions about which fall prevention community resources they used, with “none”, a prolonged pause, or a description of self-initiated and managed behaviors to avoid falls, based on their experiences.

I have fell over there at Savers that time and hit my knee. My poor leg was bruised. It healed up though. Now I just pay attention to where I’m going... I pay attention so that nothing’s in front of me to stop me or nothing, you know.”

“Even when I get up in the morning, I sit up on the bed a while and stretch my legs and things, or else I’ll lay in the bed and exercise my legs real good. Then I get up.”

Only a few participants were aware of resources such as brochures or newspaper articles about fall prevention and that some exercises within structured programs help reduce fall risk.

“[No Community Resources] directly related to fall prevention, but just brochures talking about strength, about building muscle strength so you don’t fall, and break your pelvis.”

“When we exercise over here on Monday, well she tells exercise we done prevents...you know; helps your bones, keeps you from falling. She kind of teaches that, but other than that I don’t know about other resources.”

Although community leader participants did not describe internal resources for fall prevention, they did describe lectures or evidence-based programs within their community centers.

“We are doing the Matter of Balance [Community Leader].”

“We had a speaker coming in for fall prevention [Community Leader].”

Phase 2

Phase 2 included 102 community-dwelling older adults who were primarily White (75%), women (75%) with a mean age of 79 ($SD = 6.5$). Table 3 is a summary of participants’ baseline characteristics, by receipt of interpersonal behavior change strategies. Participants were aware of between 0 and 7 resources (median = 3). They used between 0 and 5 resources (median = 1), across all three time points. We grouped participant-identified resources ($n = 1,096$) by similarity into 10 categories: public pathways; health clubs; exercise groups/classes; family/friends; community center services; malls; volunteer work; rehabilitation; swimming pools; and schools. Exercise groups/classes were grouped together when named as such, regardless of host location. Health club and community center services included any activity or program within that location, other than exercise groups or classes. Similar to interview data, baseline survey data show that, participants most frequently reported using public pathways that support walking (49%), exercise groups such as SilverSneakers® (30%), support from friends or family (24%), health clubs such as the YMCA (18%), and community center services (14%) in the last 2 months. Conversely, most participants neither identified nor used resources such as health clubs (51%), exercise groups (52%), friends and family (73%), community center services (74%), or malls (89%). Participants also named home-based routines and materials as community resources at baseline (10%), postintervention (10%) and 6 months’ postintervention (8%). However, this category was excluded in our analyses because although home-based routines are an important resource for staying active, they are not community-based. Figure 1 summarizes the types

Table 3. Phase 2: Participant Characteristics

Variable	Randomized to condition with intervention strategy designed to encourage community resource use ^a	
	Yes ($n = 51$)	No ($n = 50$)
Age, M (SD)	78 (5.9)	79 (7.1)
Education Attainment > HS, n (%)	33 (65)	40 (80)
Female, n (%)	38 (75)	38 (76)
Fear of Falling, n (%)	29 (57)	26 (52)
Difficulty walking, n (%)	20 (39)	19 (38)
SPPB total Score, M (SD)	8.5 (2.4)	8.2 (2.3)
History of heart condition, n (%)	18 (35)	15 (30)
History of arthritis, n (%)	35 (67)	34 (68)
History of Lung condition, n (%)	7 (14)	3 (6)
Community Resources Used		
Range (Median)	0–4 (1)	0–5 (2)

Note: All values represent those collected at baseline. HS = High school; M = Mean; SD = Standard deviation; SPPB = Short Physical Performance Battery.

^aThis included a strategy to encourage the use of physical activity community resources.

Figure 1. Phase 2: Survey Data from 51 participants assigned to the intervention condition which included a strategy to encourage increased use of community resources regarding knowledge of and use of community resources.

and frequencies of resources named and used at baseline and immediately postintervention by participants who received encouragement to use them.

Figure 2 illustrates the percentage of participants who used at least one community resource across measurement time points. More than 65% of participants across the study conditions and time points reported using ≥ 1 community resource to support their physical activity in the previous 2 months. The results of the logistic regression models showed that participants who received the set of interpersonal behavior change strategies—which included encouragement to use community resources—compared to participants who did not receive these strategies, had higher odds of using ≥ 1 resource immediately postintervention (odds ratio [OR] = 5.22 [95% confidence interval {CI}: 1.27, 21.43], but not 6 months' postintervention OR = 2.10 [95% CI: 0.79, 5.55]). Results of models that included all intervention conditions, combined, showed that participants who used community resources at baseline—compared to those who did not—had higher odds of using ≥ 1 resource 6 months' postintervention, but odds were not significantly different by age OR = 1.01 (95% CI: 0.93, 1.09), or sex OR = 1.10 (95% CI: 0.37, 3.24).

Discussion

We observed four main findings in this exploratory, sequential mixed methods study. First, four themes emerged from Phase 1 data reflecting older adults' descriptions of community resources that target falls prevention and physical activity and how they learned about them. Second, these themes were confirmed by data in Phase 2, particularly the identification of a broad range of physical activity resources with an emphasis on those that support walking. Third, findings

from Phase 1 and Phase 2 highlight a gap between awareness and use of community resources. Finally, an intervention that included encouragement to use community resources conferred short-term, but not long-term, effects.

Consistent with prior research (Chippendale & Boltz, 2014), most participants in Phase 1 and Phase 2 identified a broad range of local community resources. However, whereas community center leaders focused on exercise classes and programs, older adults frequently identified and used resources that could be incorporated into their daily routines, particularly those that support walking. This validates ongoing efforts to promote walking across populations (U.S. Department of Health and Human Services, 2015) and suggests that bolstering indoor and outdoor walking paths (e.g., ensuring easy access, maintenance) may be beneficial. Given the popularity of walking, researchers, public health professionals, and policy makers might explore how to expand resources to promote more walking and if they might also be a venue to support movements that target leg strength and balance. For example, it is possible to work with community centers to increase their promotion efforts of daily walking and exercise, outside the walls of the center itself. Community-scale and land use policies could be advanced to ensure that access, appearance, and safety of the environment for older adults are optimized, or even enhanced. Similar to park pathways that integrate information and equipment for rigorous strengthening exercises, public pathways could be enhanced by adding kiosks with information about the benefits of walking and other types of exercise for older adults, as well as equipment to guide the safe performance of leg strength and balance activities. Such approaches would entail integrating knowledge and resources from experts outside health care and research (Reis et al., 2016).

Figure 2. Phase 2: Self-reported use of community resources preintervention, immediately postintervention, and 6 months' postintervention. Participants who received the set of interpersonal behavior change strategies, including encouragement to use community resources—compared to participants who did not receive these strategies—had higher odds of using ≥ 1 resource immediately post-intervention (odds ratio [OR] = 5.22, [95% confidence interval {CI}: 1.27, 21.43], but not 6 months' postintervention, OR = 2.10 [95% CI: 0.79, 5.55].

Few participants identified community resources involving evidence-based fall prevention programs. For example, community leader participants in Phase 1 described these resources, whereas older adult participants described their personal strategies to reduce their fall risk based on experiences, as reflected in the theme: *using internal resources to avoid falls*. In Phase 2 less than 50% of older participants identified or used fall prevention or physical activity programs across the three time points. This finding was unexpected because of ongoing efforts to disseminate, implement, and scale up evidence-based fall prevention and physical activity programs; efforts which are evident in Minneapolis, Minnesota (Minnesota Department of Health, 2013). One possible explanation for this finding is that participants may have used a time-limited evidence-based program in the remote past, which they no longer view as a resource. Additionally, partnerships between clinical and community professionals may be lacking, and thus limit referrals of older adults to relevant programs (Steinman, Fishleder, & Petrescu-Prahova, 2016). Finally, promotion messages and media campaigns may not reach older adults, or the availability of these programs may not be predictable (Silva, Sims, Salazare, & Dykes, 2017). This finding highlights the need for new strategies to better disseminate these programs. For example, strengthened partnerships between professionals and community organizations could augment increased referrals to such programs. Moreover, programs might target individuals with high risk and increase perceived relevance by encouraging self-assessment as a basis for providing personalized recommendations. In the future, it will be important to comprehensively evaluate the dissemination and implementation efforts to understand how, when, by whom, and under what circumstances information about these programs reach and are used by older adults (Milat et al., 2013).

A gap between awareness and use of community resources was also observed in both study phases. Although our findings do not delineate a cause for this gap, data from Phase 1 introduce potential contributing factors. The theme,

the dynamic gap between awareness and use of community resources, and related subthemes are consistent with previous research results that describe older adults' views and expectations of fall prevention and physical activity programs (McMahon et al., 2011; Schulz et al., 2014). It is possible that older adults are aware of resources but do not use them because of bad weather, bad timing, lack of transportation, or cost. Additionally, older adults may not use the resources in which they are aware because they believe they lack valued interpersonal or personal strategies, such as the facilitation of peer to peer learning and the individualization of content per personal preferences and abilities. Finally, it may be that older adults interpret messages used to promote community resources as personally irrelevant or unappealing. Indeed, results from previous research show that older adults respond to positively framed messages that promote walking (Notthoff & Carstensen, 2014) and fall prevention (Yardley, Beyer, et al., 2007), more than messages that are negatively framed. The critical gap that exists between awareness and use of community resources among older adults in this study suggest the need for future research to identify obstacles in this population, including health challenges and competing responsibilities such as caregiving or other priorities, and to identify best implementation and dissemination methods, including mass media campaigns with appropriate messaging.

The theme, *learning from trusted sources* and its subthemes (Phase 1), confirmed the intervention strategy we used in Phase 2 to encourage community resources. However, this strategy had only small and short-term effects on older adults' use of physical activity community resources. This finding raises research questions about which strategies effectively promote long-term use of fall prevention and physical activity resources. It is possible that discussions among small groups of participants in our study were too brief or were not reinforced by important others within each participant's social network. Additional research is needed to examine the type and dose of intervention strategies designed to encourage community resource use. Another possible reason for this finding is that the characteristics of community resources available did not meet the expectations of older adults in our study. To address such discordance and the broader awareness-use gap discussed previously, experts in the field of public health recommend that researchers and health care professionals actively engage older adults when designing, developing, and promoting fall prevention and physical activity resources.

Although our study offers insights into older adults' awareness and use of community resources designed to reduce their fall risk and support their physical activity, it has limitations that warrant careful consideration. First, the sample was not representative; the proportion of interview and survey participants who were female was larger than the proportion of older females (70+) in the general population. However, this is similar to other health promotion and physical activity research (Towne et al., 2015) and raises

questions about the relevance of some programs and interventions to men. Second, considering our sampling methods, volunteer or response bias may have occurred in one of both phases of the study. Either type of bias could have led to over-reporting of community resource awareness and use.

Conclusion

Findings from this exploratory, sequential, mixed methods study provide a description of older adults' awareness and use of community resources targeting fall prevention and physical activity, which improve our understanding of resources that need to be bolstered and better disseminated, as well as persistent gaps. In sum, results support calls to advance the development and evaluation of fall prevention and physical activity community resources. These efforts should include research to strengthen evidence regarding effective dissemination, implementation, and promotion strategies. Such research will benefit from collaboration of experts across diverse sectors such as volunteer and nonprofit organizations, community design, land use, health care, media and public health, as well as the engagement of older adults.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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Conflict of Interest

None reported.

References

- Centers for Disease Control and Prevention. (2013). The Guide to Community Preventive Services What Works Increasing Physical Activity. Retrieved from https://www.thecommunityguide.org/sites/default/files/assets/What-Works-PA-factsheet-and-insert_0.pdf.
- Centers for Disease Control and Prevention. (2017). Centers for Disease Control and Prevention Web-based Injury Statistics Query and Reporting System (WISQARS) [Online]. National Center for Injury Prevention and Control. Retrieved from <https://www.cdc.gov/injury/wisqars/index.html>.
- Chippendale, T., & Boltz, M. (2014). The neighborhood environment: Perceived fall risk, resources, and strategies for fall prevention. *The Gerontologist*, 55, 575–583. doi:10.1093/geront/gnu019
- Cho, J., Smith, M. L., Ahn, S., Kim, K., Appiah, B., & Ory, M. G. (2014). Effects of an evidence-based falls risk-reduction program on physical activity and falls efficacy among oldest-old adults. *Frontiers in Public Health*, 2, 182. doi:10.3389/fpubh.2014.00182
- Center for Community Health and Development. (2017). Chapter 3. Section 11. Assessing Community Needs and Resources | Determining Service Utilization. Lawrence, KS: University of Kansas. Retrieved from <http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/determine-service-utilization/main>.
- Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). *Best Practices for Mixed Methods Research in the Health Sciences* (pp. 2094–2103). Bethesda, MD: National Institutes of Health. doi:10.1037/e566732013-001
- Gardner, M. M., Buchner, D. M., Robertson, M. C., & Campbell, A. J. (2001). Practical implementation of an exercise-based falls prevention programme. *Age and Ageing*, 30, 77–83. doi:10.1093/ageing/30.1.77
- Greenwood-Hickman, M. A., Rosenberg, D. E., Phelan, E. A., & Fitzpatrick, A. L. (2015). Participation in older adult physical activity programs and risk for falls requiring medical care, Washington State, 2005–2011. *Preventing Chronic Disease*, 12, E90. doi:10.5888/pcd12.140574
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42, 377–381. doi:10.1016/j.jbi.2008.08.010
- Healy, T. C., Peng, C., Haynes, M. S., McMahon, E. M., Botler, J. L., & Gross, L. (2008). The feasibility and effectiveness of translating a matter of balance into a volunteer lay leader model. *Journal of Applied Gerontology*, 27, 34–51. doi:10.1177/0733464807308620
- Jilcott, S. B., Vu, M. B., Morgan, J., & Keyserling, T. C. (2012). Promoting use of nutrition and physical activity community resources among women in a family planning clinic setting. *Women & Health*, 52, 55–70. doi:10.1080/03630242.2011.637612
- Kulinski, K., DiCocco, C., Skowronski, S., & Sprowls, P. (2017). Advancing community-based falls prevention programs for older adults—the work of the administration for community living/administration on aging. *Frontiers in Public Health*, 5, 4. doi:10.3389/fpubh.2017.00004
- Li, F., Harmer, P., Mack, K. A., Sleet, D., Fisher, K. J., Kohn, M. A., ... Tompkins, Y. (2008). Tai Chi: Moving for better balance – development of a community-based falls prevention program. *Journal of Physical Activity & Health*, 5, 445–455. doi:10.1123/jpah.5.3.445
- Lord, S. R., Castell, S., Corcoran, J., Dayhew, J., Matters, B., Shan, A., & Williams, P. (2003). The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: A randomized, controlled trial. *Journal of the American Geriatrics Society*, 51, 1685–1692. doi:10.1046/j.1532-5415.2003.51551.x

- McMahon, S. K., Lewis, B., Oakes, J. M., Wyman, J. F., Guan, W., & Rothman, A. J. (2017). Assessing the effects of interpersonal and intrapersonal behavior change strategies on physical activity in older adults: A factorial experiment. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, 51, 376–390. doi:10.1007/s12160-016-9863-z
- McMahon, S. K., Lewis, B., Oakes, M., Guan, W., Wyman, J. F., & Rothman, A. J. (2016). Older adults' experiences using a commercially available monitor to self-track their physical activity. *JMIR mHealth and uHealth*, 4, e35. doi:10.2196/mhealth.5120
- McMahon, S., Talley, K. M., & Wyman, J. F. (2011). Older people's perspectives on fall risk and fall prevention programs: A literature review. *International Journal of Older People Nursing*, 6, 289–298. doi:10.1111/j.1748-3743.2011.00299.x
- Mathews, A. E., Laditka, S. B., Laditka, J. N., Wilcox, S., Corwin, S. J., Liu, R., ... Logsdon, R. G. (2010). Older adults' perceived physical activity enablers and barriers: A multicultural perspective. *Journal of Aging and Physical Activity*, 18, 119–140. doi:10.1123/japa.18.2.119
- Milat, A. J., King, L., Bauman, A. E., & Redman, S. (2013). The concept of scalability: Increasing the scale and potential adoption of health promotion interventions into policy and practice. *Health Promotion International*, 28, 285–298. doi:10.1093/heapro/dar097
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis a methods sourcebook*. Edition 3. Sage.
- Minnesota Department of Health. (2013). Minnesota Falls Prevention. Retrieved from <http://www.mnfallsprevention.org/>.
- Minnesota Board on Aging. (2017). Senior LinkAge Line®. Retrieved from <http://www.mnaging.org/advisor/SLL.htm>.
- National Council on Aging. (2017). *Exercise programs that promote senior fitness*. Retrieved from <https://www.ncoa.org/center-for-healthy-aging/physical-activity/physical-activity-programs-for-older-adults/>.
- Newkirk, L. A., Kim, J. M., Thompson, J. M., Tinklenberg, J. R., Yesavage, J. A., & Taylor, J. L. (2004). Validation of a 26-point telephone version of the Mini-Mental State Examination. *Journal of Geriatric Psychiatry and Neurology*, 17, 81–87. doi:10.1177/0891988704264534
- Nguyen, H. Q., Maciejewski, M. L., Gao, S., Lin, E., Williams, B., & Logerfo, J. P. (2008). Health care use and costs associated with use of a health club membership benefit in older adults with diabetes. *Diabetes Care*, 31, 1562–1567. doi:10.2337/dc08-0624
- Notthoff, N., & Carstensen, L. L. (2014). Positive messaging promotes walking in older adults. *Psychology and Aging*, 29, 329–341. doi:10.1037/a0036748
- Ory, M. G., & Smith, M. L. (2015). Research, practice, and policy perspectives on evidence-based programming for older adults. *Frontiers in Public Health*, 3, 136. doi:10.3389/fpubh.2015.00136
- Petrescu-Prahova, M. G., Eagen, T. J., Fishleder, S. L., & Belza, B. (2017). Enhance® Fitness dissemination and implementation: 2010–2015: A scoping review. *American Journal of Preventive Medicine*, 52(3), S295–S299. doi:10.1016/j.amepre.2016.08.015.
- Physical Activity Guidelines Advisory Committee. (2008). *Physical Activity Guidelines for Americans*. Washington, DC: US Department of Health and Human Services, 15–34.
- Reis, R. S., Salvo, D., Ogilvie, D., Lambert, E. V., Goenka, S., & Brownson, R. C.; Lancet Physical Activity Series 2 Executive Committee. (2016). Scaling up physical activity interventions worldwide: Stepping up to larger and smarter approaches to get people moving. *Lancet (London, England)*, 388, 1337–1348. doi:10.1016/S0140-6736(16)30728-0
- Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description? *Research in Nursing & Health*, 23, 334–340. doi:10.1002/1098-240X(200008)23:4<334::AID-NUR9>3.0.CO;2-G
- Silva, K. S., Sims, K., Salazar, A., & Dykes, P. (2017). *Finding the Fitness Fit: Perceptions of Older Adults Participating in Community-based Exercise Programs*. Poster session presented at the meeting of the New England Nursing Informatics Consortium, Boston, Massachusetts.
- Schutzer, K. A., & Graves, B. S. (2004). Barriers and motivations to exercise in older adults. *Preventive Medicine*, 39(5), 1056–1061.
- Steinman, L., Fishleder, S., & Petrescu-Prahova, M. (2016). Assessing capacity for clinical-community linkages between pts and evidence-based physical activity. *The Gerontologist* 56, 188–189. doi:10.1093/geront/gnw162.736
- Stevens, J. A., & Phelan, E. A. (2013). Development of STEADI: a fall prevention resource for health care providers. *Health Promotion Practice*, 14, 706–714. doi:10.1177/1524839912463576
- Stevens, J. A., & Burns, E. (2015). *Preventing Falls: What Works: A CDC Compendium of Effective Fall Interventions: What Works for Community-dwelling Older Adults* (3rd ed). Atlanta, GA: Division of Unintentional Injury Prevention National Center for Injury Prevention and Control CDC.
- Thomas, S., Mackintosh, S., & Halbert, J. (2010). Does the 'Otago exercise programme' reduce mortality and falls in older adults? A systematic review and meta-analysis. *Age and Ageing*, 39, 681–687. doi:10.1093/ageing/afq102
- Topolski, T. D., LoGerfo, J., Patrick, D. L., Williams, B., Walwick, J., & Patrick, M. B. (2006). The Rapid Assessment of Physical Activity (RAPA) among older adults. *Preventing Chronic Disease*, 3(4), A118.
- Towne, S. D., Smith, M. L., Ahn, S., Altpeter, M., Belza, B., Kulinski, K. P., & Ory, M. G. (2015). National dissemination of multiple evidence-based disease prevention programs: Reach to vulnerable older adults. *Frontiers in Public Health*, 2, 156. doi:10.3389/fpubh.2014.00156
- U.S. Department of Health and Human Services. (2015). *Step it up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities*. Washington, DC: U.S. Dept of Health and Human Services, Office of the Surgeon General. Retrieved from <http://www.surgeongeneral.gov/>.
- van Stralen, M. M., De Vries, H., Mudde, A. N., Bolman, C., & Lechner, L. (2009). Determinants of initiation and maintenance of physical activity among older adults: A literature review. *Health Psychology Review*, 3, 147–207. doi:10.1080/17437190903229462
- Ward, B. W., Clarke, T. C., Nugent, C. N., & Schiller, J. S. (2016). *Early release of selected estimates based on data from the 2015 National Health Interview Survey*. National Center for Health Statistics, May 2016. Retrieved from <http://www.cdc.gov/nchs/nhis.htm>.
- Yardley, L., Beyer, N., Hauer, K., McKee, K., Ballinger, C., & Todd, C. (2007). Recommendations for promoting the engagement of older people in activities to prevent falls. *Quality & Safety in Health Care*, 16, 230–234. doi:10.1136/qshc.2006.019802
- Yardley, L., Donovan-Hall, M., Francis, K., & Todd, C. (2007). Attitudes and beliefs that predict older people's intention to undertake strength and balance training. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 62, P119–P125.