

# The Safety Net of Aging in Place: Understanding How Older Adults Construct, Develop, and Maintain Their Social Circles

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## ABSTRACT

Active engagement in social activities is important to maintain and promote healthy aging. In this study, we further investigate how older adults take the initiative role to support their health and well-being. To understand their active participation towards aging, we conducted an interview study with ten retirees who are “aging in place” (adults 65 and older who live independently). Our findings suggest that older adults are naturally developing a network of connections, which we refer to as their *safety net*. We have identified five social circles inside this safety net: *pre-determined, chosen, interest-based, location-based, and shared-identity* circles. Each circle has a different impact on the support of older adults’ health and well-being. Based on these findings, we suggest taking the safety net into consideration when designing technologies to promote and maintain healthy aging.

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## CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; *Empirical studies in HCI*

## KEYWORDS

Older adults, interviews, safety net, active aging, well-being

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## 1 INTRODUCTION

*Aging in place*, defined as living at home instead of an assistive living environment, is a trend for the modern American older adult population. A recent survey reveals that almost 90% of people who are 65 years old or above choose to reside at home rather than moving to an assistive living center [20]. In the United States, the number of older adults is increasing every year. In 2014, there were approximately 12.1 million older adults who were *aging in place* [18], comprising about 4% of the entire population of the United States. It is estimated that this number may reach up to 20% by the year of 2029 [4].

The emerging issues of health and well-being of this growing *aging-in-place* population has become an important focus in the domains of Human-Computer Interaction (HCI) and health. In particular, many researchers and designers have emphasized the challenges of independent living, suggesting the opportunity for maintaining independence through monitoring and checking in on everyday activities [e.g., 2, 10, 16]. The other focus deals with the issues of obtaining personal care in order to age in place, highlighting the importance of access to assistance from multiple sources including other older adults [24] and neighbors [15].

However, both prior emphases have the tendency to view older adults as dependent on other forces to maintain their well-being [21]. This suggests that *aging-in-place* is a myriad of problems that can be treated with external support and assistance, such as that provided by family and medical professionals. Instead of regarding older people as passive receivers in the aging process, recent research [e.g., 3, 6, 22, 26] has argued that older adults often take a more active role in their healthy aging. This marks a shift towards understanding older people as successful in the maintenance and promotion of their health and well-being through social interaction and connection. In this view, active participation in social activities [22, 26], engaging in leisure activities [13], volunteering [3], and exercising [14] are common beneficial actions for older adults.

Moving forward, we aim to further investigate, through the lens of social well-being, how a better quality of life can be achieved in older adults who live in their own home. To address this, we conducted an interview study with 10 healthy older adults who chose to age in place to answer the following research questions: 1) How do older adults take an active role in socializing and interacting with others? and 2) How do these social activities and experiences influence their health and well-being?

We chose to focus on healthy older adults to broaden the design opportunities for promoting health and well-being. By looking at how healthy adults maintain their social well-being by themselves, this study provides insight on how living socially might promote healthy aging. Moreover, by investigating the influences of social experiences on older adults, we further explain how the influence of tailored active engagement can improve quality of life.

In the reminder of the paper, we use the term *older adults* to describe seniors aged 65 years or above who are aging in their own home. First, we discuss the related literature and how it led to our current focus. Then, we describe our study method and results. Our findings show that the construction, development, and maintenance of social connections and interactions between older adults and other people were closely related to healthy aging. We conclude by discussing design opportunities for promoting well-being that takes into account older adults' role in social engagement.

## 2 RELATED WORK

Our research builds upon previous research in on aging in place, well-being and social engagement. We connect our work back to Jacob's [9] work on identifying how safety and security within a

city district could occur through active interaction between neighbors and their presence in the community. We discuss each of areas of work in this section.

### 2.1 Aging in Place

*Aging in place* is a trending phenomenon in American society [20]. Unlike those who live in an assistive living community that have an easy access to assisted nursing, meal service, and planned social activities, people who are aging in place are dependent on their own resources. For example, they may need to take care of themselves without outside support [e.g., 10, 16, 24], foster social connections to avoid isolation [1], and inform their health providers when unexpected situations take place [10]. One key concern is the risk that older adults may fail to do these things when living in their own home [e.g., 10, 16].

A large body of work has traditionally emphasized ways to maintain independence and live at home. For example, many tracking devices are designed and built for family members [16], friends and peers [24], caregivers [10], and combinations of the above [15] to monitor older adults' daily activities. Those systems highlight the safety issues that can present themselves in independent living, which allow for other people to provide support and care to an uncommon behavior or emergency.

Along these lines, research also highlights different ways that older adults can utilize existing resources to access health advice and strategies when living on their own. For example, White et al. suggested that older adults could seek care and support from their peers, especially when access to professional health care was unavailable [24]. Others suggested that providing learning opportunities to older adults could help them stay mentally healthy, such as brain exercises [5] and memory training through reminiscence [19].

As these lines of research suggest, older adults who are aging in place are often considered dependent on others. However, Carroll [3], Vines [22], and Yuan [26] suggest that there are opportunities to promote older adult's active contributions to their own health and well-being. In other words, older adults themselves can act as the contributor of their own healthy aging.

### 2.2 Well-being, Social Engagement

A recent line of research suggests that older adults and aging should not be viewed from a deficit-based perspective [3]. These studies suggest that older adults can and should take an active role in maintaining and promoting their own well-being [3, 22, 26]. This is often referred to using terms such as active aging [25], also *successful aging* [17], *healthy aging* [12], *positive aging* [14], and *salutogenesis* [26]. In this view, the focus is on active participation in the social aspects of life; that is the creation of social bonds and relationships [17] and engagement in social interactions [14]. This role is important for positive, healthy aging.

In particular, older adults have a capacity for actively participating in different community and social activities to stay physically, emotionally, and socially healthy [3]. For example, simply spending time with a friend can bring a sense of joy [8].

Participating in leisure activities, such as playing games with others, can help older adults to stay physically and cognitively healthy [13]. Sometimes, a serendipitous encounter in the community can strengthen the resilience to deal with unfavorable aspects of life [11]. Engaging in sharing knowledge with others fosters an enjoyable social experience for older adults [23]. When faced with difficulties such as illness, older adults are able to pull personal and social resources in order to stay positive [26].

While preliminary work has shown that active engagement in social life can maintain and promote older adults' well-being, it is still unclear how those social connections and relationships are fostered and maintained. The role older adults play in this process and the impact of social experiences on well-being need further investigation. To explore these two missing aspects, we take Jacobs's work on great communities as an inspiration to understand the role of people's engagement in their life.

### 2.3 People's Role in Creation of Safety Network

In Jacobs's *the Life and Death of Great American Cities* [9], she described people as the essential element for building and maintaining a safe district in a city. In particular, her work suggested the visible and active participation in the community determined the degree of safety of the neighborhood. When people made social connections and interacted within their district, the neighborhood's sense of security and well-being increased. For example, more children played on busy pedestrian sidewalks. On the contrary, a neighborhood that was physically constructed to minimize social connection could easily become deserted and dangerous, despite its affluence or other demographic characteristics.

In Jacobs's description, when people are contributing to the health and well-being of their neighborhood, they are also the beneficiary of these contributions. They feel safe and more comfortable socializing with neighbors and even passersby. This is a beneficial *loop*: that is social participation fosters a safe and pleasant neighborhood, thereby improving the individual's well-being through said participation. This loop breaks down when disengagement occurs: the neighborhood can quickly become unsafe and the resident's quality of life decreases in turn.

This suggests that it is necessary to understand the how role that people take in constructing their own life experiences influences well-being. In our study, we aim to develop a deeper understanding of this role by looking into older adults' social engagement and the influences of social activities on their life.

## 3 METHODOLOGY

To investigate the proposed research questions, we conducted 10 semi-structured interviews with older adults to discuss their social well-being. All participants were healthy adults aged 65 years or above, living in their own home.

### 3.1 Recruitment

We recruited our participants from senior centers and local community groups in two medium-size cities. In order to facilitate constructive conversations with our participants, we used the following recruitment strategies.

First, we visited each senior center once a week for three months to build rapport with the older adults. For example, we held casual conversations and played games with them at the senior centers. Second, we participated in various local community meetings, events, and discussions. The goal here was to understand how the older adults participated in activities and what they liked. For example, we regularly participated in several interest clubs organized by retired people to discuss and share relevant knowledge with them. Third, we organized several workshops on different topics of interest to older adults, e.g. how to navigate Facebook, at two senior centers as a way to gain their confidence and recruit more potential participants for our research. Last, we asked the older adults at the senior centers and local groups whether they were interested in discussing their social well-being with us. Based on their responses and preferences, we carefully selected 10 participants who met the following criteria: 1) healthy adults who were 65 years old and above, and 2) they were currently aging in place, either by themselves or with their family.

**Table 1: Participants demographic**

Pseudonym	Gender	Marital Relationship	Living Situation
Lisa	Female	Married	Lives with husband
Don	Male	Engaged	Lives alone
Peggy	Female	Divorced, has a boyfriend	Lives with daughter
Gloria	Female	Divorced, has a boyfriend	Lives with daughter and daughter's family
Minnie	Female	Widowed	Lives alone
Barbara	Female	Single	Lives alone
Katie	Female	Widowed	Lives alone
Mary	Female	Widowed	Lives alone
Faye	Female	Married	Lives with husband
Kathleen	Female	Married	Lives with husband

### 3.2 Participants

The majority of participants (9 out of 10) were female (see Table 1). More than half were in a romantic relationship; three were married and three were in another form of domestic partnership. Half of the 10 participants were living by themselves, and the other half were living with at least one member of their family.

### 3.3 Study Procedure and Analysis

We conducted 10 semi-structured interviews to understand older adults' social well-being, particularly how they socialized and interacted with others and how those interactions influence their quality of life. For example, we asked about how they felt regarding life after retirement, and for them to share stories that highlighted examples of how they interact with others and what those social experiences meant to them, their health, and their well-being. Each interview lasted from 90-180 minutes and took place at a location convenient for the participant, e.g. in a private room at the senior center.

All interviews were transcribed and coded iteratively among four researchers using the constant comparative analysis introduced by Glaser and Strauss [7]. We first coded five interviews and wrote down memos based on the research questions. Second, we cleaned up the codes to generate a list of new codes. Third, we used the new codes to re-code all the interview and incorporated additional codes when new themes emerged. Finally, we grouped all the codes into themes. Note that in this paper, we present a slice of our analysis. Many themes arose from our data. We chose to discuss the two most important, correlated themes in detail rather than introduce every finding without depth.

## 4 FINDINGS

Our interviews surfaced a strong theme across participants: the active pursuit by older adults in the development, construction, and maintenance of their own social network. This network includes family, romantic partners, friends, neighbors, and others who share an affiliation towards the same organization. We found that older adults construct and maintain a social network that leads to healthy aging. We call this social network the *safety net*.

The safety net comprises five social *circles* that are developed and sustained by older adults. We discuss each circle in the next section. Next, we focus on how the safety net has influenced older adult's activities and experiences with relation to their own well-being.

### 4.1 Circles Within the Safety Net

We found that participants took an active role in constructing and maintaining the following five *circles* inside their safety net (see Figure 1): family as the *pre-determined circle*, romantic partners and friends as the *chosen circle*, interest groups as the *interest-based circle*, neighbors as the *location-based circle*, and religious institutions and shared-identity communities as the *shared-identity circle*.

These five circles are not entirely distinctive in that circles may overlap with each other. It is possible that a friend is also a neighbor or a member of an interest group. For example, we primarily categorize a friendship that developed from another circle as belonging to the chosen circle based on our participant's higher level of interaction and comfort with that person. People who connect through the same interests and do not display deeper qualities of friendship would remain in the interest-based circle. The same can be said for neighbors and shared-identity contacts to remain in their respective circles. In the following paragraphs, we will describe each circle in detail.

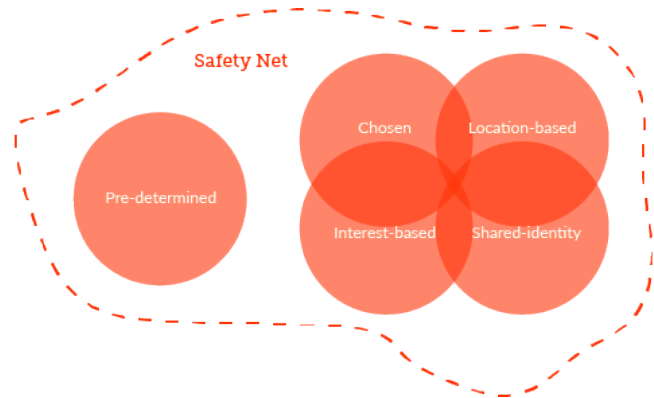


Figure 1. Safety net with five social circles.

**4.1.1 Pre-determined Circle: Family.** The *pre-determined* circle includes those who are biologically or by process of adoption related to the older adult. Membership in this circle is often *not* a choice that a person can make. For example, children cannot choose their birth mother. However, people can choose if and how often they interact with others in this circle. Note that domestic partnerships are excluded from this type of network since we consider this relationship to be a conscious choice.

From our interviews, we found that older adults generally took an active role in supporting their family members and relatives. More than half (8 out of 10) of our participants were closely connected to their family members. For example, they engaged in daily communications and interactions with their family members.

*"I call people, usually, my sister...and that takes anywhere from 15 minutes to an hour...You know, that takes time, but usually I do that in the evening."* (Faye)

Older adults also supported their family in various ways within their physical ability. Peggy, who had previously had surgery, could only engage in limited physical activity. However, she helped clean the house after moving in with her daughter.

*"Sometimes she [Peggy's daughter] cooks. And I vacuum. There's things I can do around the house that I do."* (Peggy)

Similarly, Gloria supported her daughter, a single mother, by looking after her granddaughter while she was at work.

*"I watch my granddaughter Janet [pseudonym] in the summertime a lot, kinda babysit...So she worked evenings, I worked days... She hugged me and goes, 'Thanks, Mom.' I said, 'I know.' I kind of supported her."* (Gloria)

Staying connected and supporting family and relatives are common social activities inside the pre-determined circle. Prior research suggests that well-being is related to active engagement [3, 22]. Our interviews further showed that interacting with family could be one way for older adults achieve healthy aging.

**4.1.2 Chosen Circle: Friends and Romantic Partners.** Older adults foster relationships with their friends and romantic partner, which we refer to as the *chosen circle*. In this context, we consider friends as people who were referred to specifically as *friends* by our participants, thus suggesting overlap between this circle and the others (excluding pre-determined). Romantic partner refers to a spouse, a fiancé or a fiancée, or a boyfriend or a girlfriend.

From the interviews, we noticed that developing and maintaining friendships over time was important to our participants. All participants mentioned that they kept in touch with friends from different periods of their lives. For example, Lisa, a retired librarian, reconnected with her high school classmates through social media and recently attended a class reunion.

*"I went to my high school reunion a while ago, and I got some of their contacts on Facebook, so I've sort of gotten to know them better or re-know them, from when I was at high school or whatever."* (Lisa)

Similarly, Gloria reconnected with her best friend after retirement. The two have developed a routine of going to classes together.

*"My close girlfriend that we grew up together. For a number of years, there was probably a good 10 years that we didn't see each other at all... But we picked up right where we left off...After it was gone we have some time now, so now we go to early classes together."* (Gloria)

However, reaching out to and reconnecting with former classmates and childhood friends was not the only way to build a chosen circle. Regular gatherings with current friends were unanimously mentioned; most commonly socializing over meals.

*"I go out with friends for lunch. About once a month or twice a month, I go out in the evening for dinner. We could say it's about two times a month, or whatever. I go out to lunch quite often."* (Minnie)

Invitations to town events, concert, movies, and sporting events were also popular among older adults looking to socialize within their chosen circle. Some even liked to go on vacation with friends. For example, Peggy told us that she recently organized a trip to a nearby town and invited her friends to go.

*"Last week, I was in the [mountain] for a week...Took some friends over, and we toured around the area over there...I did [organize the trip]...There were only four of us, so it wasn't hard. And we stayed at the resort that I used to manage."* (Peggy)

Compared to friendships, older adults who were in a committed relationship engaged in more frequent and routine activities with their romantic partner. For example, Don and his fiancée went to the movies at least twice a week. Married couples, like Faye and her husband, often went to different places every day, such as running errands.

*"And then after cleaning the table and the dishes, I get ready to go out. And two or three times a week, we [Faye and her husband] go to church, morning mass...at least twice a week we come here to the Senior Center...We do errands, usually, on Mondays or Fridays."* (Faye)

Participation in pre-organized leisure activities is considered an effective way to support healthy aging [13]. Our interviews suggest that older adults take a more active role in organizing leisure activities, e.g., they coordinated trips with friends or their romantic partner. Within the chosen network, older adults themselves managed the relationships that they chose to build. They organized and invited friends to various types of social activities. Within romantic relationships, they developed and engaged in routine activities. This suggests that actively managing friendships and romantic relationships could be another promising way to promote well-being.

**4.1.3 Interest-based Circle: Interest Groups.** In addition to the previous circles, our participants reached out to and shared knowledge with others who had similar interests and hobbies. We call this contribution to the safety net an *interested-based circle*. Members of this circle include people who share the same interests as our participants, regardless of whether or not the participant specifically referred them as a friend.

Older adults were often the initiators of interest-based gathering, or were in a leadership role in existing groups. Lisa and Minnie are two examples of initiators. Lisa started a knitting group because of her interest in knitting.

*"I guess that when I retired I wanted to do the things I liked to do, instead of the work that I had to do. And those [knitting and crocheting] were things I really like to do. So those were the things I continued. I went through my house and got all my supplies and stuff together, and started meeting other people that had the same interests."* (Lisa)

As the leader, Lisa worked with the public library to recruit members, actively stay in touch with members, and collect resources for her knitting group. Similar to Lisa, Minnie's passion for exercise led her to take over an exercise class as the leader when the original instructor left. The class was in danger of being cancelled, so she assumed the instructor role that allowed the class to go on.

*"I started as a participant in it. And somewhere about five years or so ago, I started teaching at first because the instructor had retired, and it just progressed from there and I love it. I love it."* (Minnie)

Other participants (Don, Gloria, Mary, Faye and Kathleen) participated in various interest groups. Even though they did not serve as leaders, they were motivated to join an interest group so

that they could socialize, share information, and learn from their peers. For example, Don often participated in local environmental groups. He often reached out to others who shared his interest to gather information about environmental issues in the community.

*"In fact, I just wrote to friends [shared similar interests] today. I saw something I sent to them and said, 'Can you fill me in? What's going on in local things in your community?' I've been connected with them before that, but I don't know what's happening lately."* (Don)

Active engagement in interest groups shows that social activities are part of the appeal of the group, along with the further development of their interest. In this process, older adults are motivated to host activities, collect and share information, and interact with others. We suggest the participation in an interest-based circle as promising to promote social interactions in relation to well-being.

**4.1.4 Location-based Circle: Neighbors.** Our participants made effort to build and maintain good relationships with their neighbors who lived within close proximity of their home. We call this phenomenon the location-based circle. Social engagement activity within this circle varies.

For example, Mary often did laundry for her neighbor after she realized that her neighbor did not have a washer or dryer. She considered doing laundry an enjoyable way to keep busy.

*"I do her laundry. I have a washer and dryer in my apartment...The girl upstairs used to go to the laundromat...And I told her that she could do her laundry [in my apartment]...I love doing laundry. It's like cleansing to me, it makes me feel good and everything."* (Mary)

Barbara engaged in another form of involvement with her neighborhood by helping her neighbor who had difficulties letting go of material possessions. She proposed an exchange of extra food.

*"I have presented proposals for individuals who are hoarders...And so I put a proposal forward that people who had extra groceries could exchange them for something that they really need."* (Barbara)

Attending to neighbors is one way that older adults socialize and find joy in their life while having a positive influence on their well-being [17]. This suggests that maintaining a location-based circle could be another way to facilitate healthy aging.

**4.1.5 Shared-identity Circle: Shared-identity Communities.** A majority (8 out of 10) of participants actively connected with and supported others who were affiliated with the same organizations, such as religious institutions. People in this circle are similar in at least one aspect of their identity because they belong to a community that is rooted in personal identity. We call this a *shared-identity circle*.

Three participants (Minnie, Katie, and Faye) explicitly mentioned that they felt responsible for church duties and that they enjoyed volunteering at their churches.

*"I run the cash register, I check people out. Answer questions if somebody comes in with a question. I love the people. I'm a Christian, and most of them are Christians. The ones that I talk to all the time are Christians, which is very nice. You feel like you've got brothers and sisters."* (Katie)

Similarly, Minnie and Faye fundraised through their churches. They also went to church for weekly services and to socialize. Sometimes they helped teach Sunday school. Besides religious identity, our participants also mentioned that they enjoyed socializing within other shared-identity communities. For example, Kathleen began volunteering as a museum docent because of the support she received from existing docents. Now, she is a mentor in that community and helps junior docents succeed in their work.

*"I started as a museum docent and received training from the docent community. Now I'm capable of handling a tour by myself...And I volunteer as a mentor in the docent community."* (Kathleen)

In this circle, our study shows that older adults were motivated to support others and strengthen their personal identity through affiliated organizations like churches or the docent community. Involvement in a shared-identity circle through volunteerism is another way that older adults could pursue their health and well-being.

## 4.2 Influences of the Safety Net on Well-being

The five circles that comprise the safety net suggest that older adults choose to positively construct, develop and maintain social relationships. In this section, we discuss themes within the circles that may contribute to well-being: technology learning, openness to new experiences, knowledge sharing, and emotional connection.

**4.2.1. Learning Technology.** We noticed that more than half of the participants (6 out of 10) started to use mobile devices because of their family. These six participants each received a smartphone or a tablet from a younger family member and gradually learned how to use it. For example, Lisa received an iPad from her son as a gift.

*"That's because my son gave me the iPad, got me started."* (Lisa)

Since then, Lisa, continued to use her iPad to browse the web, check email, log in to Facebook and take photos. Similarly, Gloria started using mobile banking on her tablet because her daughter suggested it. In fact, she surprised herself with how comfortable she became with mobile bill payments.

*"I mean, my daughter got me onto [mobile] banking... And I didn't think I'd like it. I'd go, 'No, no', but I really do like it. You can watch, you can see everything."* (Gloria)

In addition, Gloria also told us that learning was a central theme in the activities she participated in with her daughters' family. For example, her granddaughter invited her to play a popular mobile phone game and they learned together how to

play. Gloria said she never would have imagined that a mobile game would lead to quality time with her family.

After becoming familiar with the technology, some older adults learned how to do perform novel tasks on their own. For example, Peggy said that because she managed to do things online, she was able to help other older adults.

*“Oh, I have computer. And I have a tablet. And I use Facebook and internet. My friend will say, ‘What about?’ I’ll say, ‘Well, I’ll look it up’. So I just type in what he wants to know, and I look it up. Make applications for passports and I can do that kind of stuff.”* (Peggy)

However, technology learning is not easily available to those without a strong safety net. Barbara felt hopeless trying to learn new technology because she did not have any family members to lean on. Even though she tried to ask for professional help, such as technology support at the public library, she still failed to learn how to use her tablet. During our interview, she told us that it was because she lacked family connections.

*“And I have a thing that’s useless, the tablet’s useless...I would say of everyone who’s out there, 99% of them have nieces, nephews, grandchildren, cousins, somebody. I have nothing.”* (Barbara)

In our study, we noticed a common phenomenon in that those who learned to use smart devices did so after actively seeking help from family. Most participants (9 out of 10) considered it easier and more convenient to ask their adult children or partner for help using technology. This was especially true for those (5 out of 10) who lived with their family. Unfortunately, older adults tended to have difficulty initially learning how to use a new technology when family was unavailable. This suggests that the pre-determined circle plays a prominent role in older adults’ access to help using new technologies. In particular, this circle provided an environment that facilitated older adults to ask and learn.

**4.2.2 Openness to New Experiences.** Within the chosen circle, participants reported that they enjoyed spending time with their romantic partner and/or friends. Besides routine gatherings, they also initiated or participated in impromptu social activities. Through the impromptu activities, older adults were often exposed to new ideas or experiences.

Influenced by her boyfriend, Gloria tried kayaking for the first time. At the time when she talked to us, she had become an experienced kayaker who participated in competitions.

*“I came up here and I didn’t know anything about kayaking or canoeing. I knew about it, but not where I was where I grew up. And I met some people, and my boyfriend kayaks. So now I can kayak, and I’d go to kayak and canoe races.”* (Gloria)

In a similar vein, Mary liked to invite her friends to try new restaurants. Gloria and her best friend often went to experience new and interesting classes, such as a cheese-making class at the university. They even joined an astronomy club together despite neither of them being familiar with astronomy. Other times, the chosen circle helped older adults overcome their hesitation about trying something new. For example, Gloria was not confident that

she would like a water aerobics class. Her friend Donna (pseudonym) encouraged her to go and try.

*“And Donna [Gloria’s friend pseudonym] teaches the class at the YMCA...and she says, ‘Come to the YMCA. Come to the YMCA’ And I said, ‘Oh, I haven’t been in a bathing suit in 30 years. I don’t even wanna be seen in one.’ She goes, ‘Oh, no, no. You won’t care, we’re all the same, look at me. I’m not exactly svelte or anything.’”* (Gloria)

Our study suggests that older adults are encouraged to try new experiences under the influence of romantic partners or friends. Prior research suggests that older adults look for companionship before joining activities [13]. Our study further explains that they often invite members from their chosen circle to try new experiences together, leading to a more active lifestyle that positively influences their well-being [3].

**4.2.3 Sharing Knowledge.** Of those who were engaged in interest-based circle (6 out of 10) relations, they often connected to others with the same interests for personal interest development. This process facilitated knowledge and information sharing. For Lisa, meeting and sharing experiences with people from different backgrounds at her knitting group was fun and enjoyable.

*“It’s fun, we like it. We talk to each other, and we share things... The knitting group has older people like me, but also college students and teenagers. And I’ve had some kids, we’ve had some men. We’ve had some people with babies. But we each bring different information to each other.”* (Lisa)

For Don, reaching out to people with the same interests was an effective way to stay informed. He told us that he kept a circle of friends who shared and exchanged news on the things they were all interested in.

*“I get friends [people who share the same interests] on Facebook send me things, and I read what’s going on in other communities... Facebook, and also my friends in the [environmental club] and my political connections, people that I know who I agree with on different issues tell me about things affecting those kind of issues.”* (Don)

Sharing knowledge is beyond personal interest development because it is also collaborative and social. For example, older adults within their interest-based circle often helped each other to develop individual skills.

*“And, people who knit and crochet get together, and we talk and share and share what we’ve done and ask for help with each other.”* (Lisa)

In the interest-based circle, participation fulfills a social role as well as an educational one. Our interviews suggest that older adults further developed their personal interests through their interest groups. This indicates that participation in an interest-based circle can facilitate a collaborative sharing of knowledge that can enhance older adults’ social well-being.

**4.2.4 Emotional Connections.** Active engagement in the location-based circle and shared-identity circle was shown to have

a similar impact on older adults' well-being. Our interviews suggest that participants felt included in and connected to these affiliated communities through their participation in these two circles.

When older adults gave support and received care from their neighbors, they often felt emotional attachment to their neighborhood. As Mary mentioned, she felt safe and included in her neighborhood, where people looked after each other in a reciprocal manner.

*"I feel like the part of the family, I feel like they really care about you, they look in on me, and I look in on them."* (Mary)

She provided examples of times when she felt that the relationship was reciprocal and healthy. For example, Mary's neighbors cooked her Thanksgiving dinner when Mary was spending the holiday alone in her apartment. In return, Mary often brought holiday gifts to her neighbors. In contrast, Barbara felt disconnected with her neighbors because she offered help them but did not receive support in return.

*"I said, 'Do you have a hammer?' And she says, 'Yes, I have three.' I said, 'Could I borrow one for a day?' She's, 'Oh no. Oh no, I loaned something to somebody 20, 40 years ago and they never returned it so I don't loan anything to anybody anymore'. A lot of this assistance is one way. I'm helping people because it's in my nature to do it. But I can't always count on someone else."* (Barbara)

Within the shared-identity circle, the social relationship does not need to be reciprocal. Older adults felt connected and rewarded when they volunteered in the circle, which they considered as an improvement to their well-being. However, they didn't feel the need to get something in return. For example, Kathleen felt more connected to her docent community when she volunteered at the museum. As Faye illustrated, socializing and volunteering at church helped her to build a spiritual connection, which she considered an important part of her well-being.

*"I try to be sort of well rounded, physically, mentally, spiritually, emotionally...I [volunteer to] teach catechism [at my church]...and I feel spiritually connected."* (Faye)

Our study shows that the location-based circle and shared-identity circle have similar influences on emotional well-being. When older adults receive support from neighbors in their location-based circle, they are further encouraged to construct and maintain this social circle. On the other hand, they consider themselves outsiders if their neighbors do not return the favor. However, reciprocation is not necessary in the shared-identity circle, where the feeling of emotional connectedness is enough to lead to a healthy relationship with others in the group. In addition, they build a sense of community to maintain their well-being through volunteerism.

## 5 DISCUSSION

Our interviews reveal a relationship between older adults' active engagement in constructing, developing, and maintain their *safety*

*net* and healthy aging. Participants took initiative to produce social experiences which supported a higher quality of life. We argue that the well-being of older adults is deeply rooted in this *aging-in-place* safety net. Healthy aging is also closely related to the which circles of safety net that are most actively called upon.

In the *pre-determined* circle, active and positive aging takes place when older adults support their family members by doing the things they can. Phrases such as "*Keep busy*", "*move around*", and "*stay connected*" were used by participants to describe how they associated house chores or taking care of grandchildren with their well-being. In return, older adults were motivated and willing to learn to use new technology because their family members suggested it. It appears that this circle is unique in this capability.

In the *chosen* circle, older adults often engage in constructing their social well-being with their partner or friends. This construction is more than just passive participation in organized social activities; rather we found that older adults suggest, plan, and organize activities with others in their chosen circle. In particular, they are open to trying new things and exploring new places with their domestic partner or friends. For example, our participants told us that they often tried athletic activities or engaged in new experiences within the chosen circle. This openness broadens older adults' choice of ways to lead a healthy, active life. We argue that a focus on construction and maintenance of the chosen circle could lead to a broader range of activities that promotes well-being. Conversely, not having a strong chosen circle may limit the variety of activities that older adults could engage in.

In the *interest-based* circle, we noticed that many social interactions took place in the process of developing a personal interest. Older adults often take an active role in leading or participating in an interest group. Particularly, older adults' social well-being is fostered through seeking connection with others who share their interests. For example, they connect with people in order to discuss and share information about the interest. In this circle, older adults' activities and behaviors are shaped around the development of the specific interest. Supporting interest sharing can facilitate older adults' interactions with others as they age.

Within the location-based circle, older adults actively contribute to the sense of community in their neighborhood. For example, they attend to their neighbors and help out in times of need. In this circle, we noticed that this support should be reciprocal in order to foster a healthy environment for older adults. That is, older adults consider themselves as an accepted member of their neighborhood when they give support and receive support in return from their neighbors. This indicates that a well-balanced and reciprocal *location-based* circle can foster healthy aging, especially in regard to emotional balance. A neighborhood that does not offer reciprocal support may hinder well-being, regardless of how much time older adults are willing to invest in relationship building.

In the *shared-identity* circle, older adults feel emotionally connected to others through volunteerism, rather than through reciprocal interactions. According to our participants, they felt

connected to the people at the organization or community where they volunteered. They also reported emotional or spiritual satisfaction. This suggests that developing the shared-identity circle not only influences physical well-being, but also emotional well-being. Supporting older adults ability to maintain and strengthen their identity can make them feel good about being active.

*Limitations.* First, we conducted ten interviews in the study. Our key focus was not on obtaining a large number of participants. Rather, we wanted to know which types of relationships older adults were interested in developing, why they engaged, and how they went about it. Therefore, we talked with each participant in depth in order to uncover how they created social relationships. Second, we only recruited healthy older adults in the study. By studying this target group, we aim to examine how and why older adults can maintain a healthy aging by themselves in order to cultivate design opportunities for healthy aging in place. Thus, we suggest that readers keep these limitations in mind while remaining open to how these findings on social practices influence healthy aging and well-being.

## 6 DESIGN IMPLICATIONS

Our study suggests that older adults' well-being is deeply rooted in their safety net. We propose support for the development of the safety net when designing technology for health and well-being. In particular, we suggest the following three design implications: *consider participation of each circle, utilize the influence of the safety net, and consider multiple circles at the same time.*

### 6.1 Consider Participation in Each Circle

This study suggests that certain social activities are deeply rooted in the circles within the *safety net*. For example, participants took care of housework to support their family. They often engaged in social activities with their partner and friends and took initiative to connect with others who share similar interests. All of the above examples suggest that social activities do not just take place. Older adults' engagement choices are highly related to the circle they are socializing in. When designing technology to support well-being, we suggest taking the five circles of safety net into consideration, adjusting strategies to support the construction and maintenance of each one.

For example, to support the development of the interest-based circle, designers can suggest connections based on interests, e.g. platforms such as Meetup. More importantly, the system can facilitate older adults in sharing materials, information, and knowledge about their interests.

### 6.2 Utilize Safety Net Influence

We propose supporting engagement in activities that is tailored to each circle's strength and capacity. For example, participants mentioned that they were often introduced to new technology by their family. They asked for help from family members and learned how to manage technology use. Thus, we can facilitate the

development of healthy aging by supporting technology learning. For example, we suggest incentivizing family to teach their elders.

Influenced by the domestic partner or friend, older adults are often open to new experiences. For example, we observed that our participants tried new social activities such as an exercise class, even though they did not feel confident in the beginning. Previous research proposed facilitation of connections between older adults and others for enjoyment of leisure activities [13]. We further support the notion of broadening social activity options for older adults by encouraging them to do things that their friends do. For example, a system can periodically recommend a different set of social activities to older adults.

While older people may develop new activities through friends, it can be just as important to support their pre-existing interests. We propose supporting social connection within the interest-based circle. For example, a system can highlight people's interests and suggest friends based on personal interests.

Finally, as evidenced by the shared-identity circle, when designing technology we should consider the emotional impact of said technology on older adults. Our participants mentioned the feeling of connectedness when they volunteered at church or other shared-identity community. In this case, a system can recommend different types of activities that members of the organization can participate in together, helping older adults to keep track of which activities they partook in, and highlighting enjoyable prior activities.

### 6.3 Consider Multiple Circles in Tandem

Furthermore, we also want to highlight that there is *variety* within the circles of the safety net. While we propose designing technology based on the specifics of a circle, we do not mean that the design should only speak to one circle. Designing technology for well-being needs to consider this variety, highlighting or removing the social characteristics of each circle based on an older adults' participation in each circle as well as how the social activity influences well-being.

Recall that our study suggests that the location-based circle influences older adults' emotional well-being. They feel included in their neighborhood when they have a reciprocal relationship with their neighbors. For example, Mary helped her neighbor to do laundry and her neighbor picked up groceries in return. In this case, Mary felt included in the neighborhood because her neighbor reciprocated. In contrast, Barbara always considered herself as an outsider in her neighborhood because she didn't receive reciprocal support. In this case, Mary's neighborhood connections should be emphasized but Barbara's lack of location-based resources should not.

We propose that designing technology for well-being considers the variety of support provided by the safety net, highlighting the relevant circle(s) and fading inactive ones. For example, a system can log older adults' emotions in relation to events by prompting them to think about the relationship between the event and how they feel. If the system identifies negative emotions associated with location-based social events, it can shift focus and highlight another circle, which would reduce how often associated location-based circle activities appear.

## 7 CONCLUSION

In order to understand how older adults take an active role in maintaining and promoting their well-being, we conducted a semi-structured interview study with ten healthy older adults who are aging in place. Active and healthy aging is rooted deeply in the connected social circles that older adults construct and maintain. We refer to this as *safety net*, which includes five circles: *pre-determined, chosen, interest-based, location-based and shared-identity*. Each circle plays an important role in shaping older adult's engagement in active aging.

Based on the variety of support provided within the circles that comprise the safety net, as well as the impact of the safety net as a whole on healthy aging, we propose designing technologies to consider the benefits that each circle has on well-being, while tailoring design strategies and features to the uniqueness and influences of each type. In the future, we plan to further investigate how the safety net changes over time and the influence of this change on older adults' health and well-being.

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