Research Article

Social Networks in an Assisted Living Community: Correlates of Acquaintance and Companionship Ties Among Residents

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Abstract

Objectives: Social relationships are important for older adults' well-being, including those who live in assisted living (AL) communities. This study explores coresident networks within an AL community and identifies factors associated with residents' social ties.
Methods: Acquaintance and companionship networks within the community are described using cross-sectional survey data ($N = 38$). We use inferential network statistical methods to estimate parameters for factors associated with residents' acquaintance and companionship ties.
Results: Residents reported an average of 10 acquaintances and almost 4 companionships with other residents in the sample. The likelihood a resident had an acquaintance was associated with higher levels of cognitive functioning ($p < .05$), higher levels of physical limitations ($p < .01$), living in the AL community for a longer time ($p < .01$), and less frequent contact with outside family and friends ($p < .05$). Acquaintances were more likely between residents who moved in around the same time as each other ($p < .01$), lived on the same floor ($p < .001$), or had similar levels of physical limitations ($p < .05$). Companionships were more likely to be reported by male residents ($p < .05$) and residents with higher levels of cognitive functioning ($p < .05$) or depressive symptoms ($p < .05$). Longtime residents were more popular as companions ($p < .01$). Companionships were more likely between residents who lived on the same floor ($p < .001$) or were similar in age ($p < .01$).
Discussion: This research contributes to the literature of older adults' nonkin social relationships by providing detailed descriptions of the acquaintance and companionship networks within an AL community, quantifying correlates of residents' social ties, and distinguishing between acquaintances and companions.

Keywords: Exponential random graph models, Friendship, Proximity, Social integration, Social network analysis

Social relationships are important for the health and well-being of older adults (Cornwell & Schafer, 2016), particularly when their networks include nonfamily members (Litwin & Shiovitz-Ezra, 2006). Two important types of nonfamily relationships for older adults are weak ties (i.e., *acquaintances*) and *companions* (Krause, 2006). Weak ties can be a valuable source of informational support (Krause, 2006) and are linked to the well-being of older adults (Greenfield & Reyes, 2015; Huxhold et al., 2020). Nonfamily companions or friends are associated with

lower levels of depressive symptoms (Shouse et al., 2013), reduced odds of disability (Escobar-Bravo et al., 2012), and higher levels of cognitive functioning (Sharifian et al., 2019). Among community-dwelling older adults, poor physical or mental health can be barriers or stigmas influencing social integration (Dobbs et al., 2008; Nicholson et al., 2014).

Like other older adults, residents of assisted living (AL) communities can benefit from having acquaintances and companions (Burge & Street, 2010; Street & Burge, 2012; Street et al., 2007). Moving into AL may facilitate new relationships and provide new opportunities for social engagement (Kemp et al., 2012; Perkins et al., 2013; Street & Burge, 2012), and residents cite social opportunities among their reasons for moving into AL (Ball et al., 2009). However, residents have experienced disruptions to preexisting social networks (Street & Burge, 2012), social isolation, and loneliness in their AL community (Baur et al., 2013; Kemp et al., 2012), and many desire larger social networks within their community (Perkins et al., 2013).

AL provides a unique social environment, catering to older adults with a need for supportive services and offering public spaces for socialization, communal meals, and group activities. These unique features may make the mechanisms associated with AL residents' social networks different from people in other settings. Possibly the services and supports offered in AL buffer the association between poor health and social isolation or destigmatize poor health.

Qualitative research provides a portrait of complex, interrelated, and sometimes contradictory factors influencing coresident relationships in AL. Residents report many types of relationships, but acquaintances are most common (Kemp et al., 2012; Park et al., 2012; Perkins et al., 2013). They suggest it takes time to form relationships (Park et al., 2012; Perkins et al., 2013), but some longtime residents avoid forming relationships because previous friends have moved out or died (Park et al., 2012; Sefcik & Abbott, 2014). A similar rationale has been reported by older residents (Park et al., 2012), and younger residents have reported aversion to forming relationships, citing age differences as unappealing (Kemp et al., 2012). Married couples living together in AL may focus on their spouses to the exclusion of other residents (Kemp, 2008); however, spouses can help partners connect with other residents (Sandhu et al., 2013). Physical limitations, cognitive impairment, and depression can be barriers to forming relationships (Park et al., 2012; Sandhu et al., 2013; Sefcik & Abbott, 2014) or stigmas that prevent other residents from desiring to connect with them (Dobbs et al., 2008; Perkins et al., 2012). Some residents report forming friendships with other residents who are similar to them in terms of age, race, cognitive functioning, and physical limitations (Kemp et al., 2012; Park et al., 2012; Perkins et al., 2013; Sandhu et al., 2013; Sefcik & Abbott, 2014). In contrast, differences in physical functioning have also brought residents together as acquaintances, for example, when a higher functioning resident provides assistance to one with more limitations (Sandhu et al., 2013). Family and friends may encourage residents to be socially involved (Kemp et al., 2012), yet residents with strong family ties may be less reliant on coresident relationships (Kemp et al., 2012; Knight & Mellor, 2007).

Social Network Analysis

Social network analysis (SNA) is a research paradigm with theory and methodological tools to visualize, describe, and explain social networks. We use SNA to frame our inquiry into the social networks of AL residents using a *sociometric* approach, which obtains information from a whole network of individuals to consider multiple perspectives of social ties and network structure as a whole. In SNA theory, social relationships, or *ties*, do not happen randomly but relate to various social phenomena. Two basic mechanisms are (a) *reciprocity*, the tendency for ties to be reciprocated, and (b) *transitivity*, the tendency for two people who have a relationship with a third person to also be connected (Flynn et al., 2010). Individuals may differ in the number of ties they report (i.e., *activity*) or the number of people who report having ties with them (i.e., *popularity*). *Homophily*, the tendency for ties to exist between similar people, is salient, as is *propinquity*, physical proximity (McPherson et al., 2001). It is likely these social mechanisms apply to older adults' networks, but empirical evidence of these mechanisms derives mainly from observations of younger people with scarce empirical support for their applicability in later life (Cornwell & Schafer, 2016).

An exception to the dearth of sociometric network research of older adults is Schafer's (2011, 2015, 2016) SNA of 138 older adults in an independent living (IL) community. The study examined two types of social ties—*confiding in* and *spending time with* others (hereinafter called "acquaintance")—and provides insights into the mechanisms of each in the context of IL. There were more acquaintance ties, $M = 20.1$, $SD = 2.0$, than confidante ties $M = 2.2$, $SD = 2.2$ (Schafer, 2011), which is not unexpected based on the more casual nature of acquaintances. Males and people with higher levels of contact with people outside the IL were more popular as confidantes (Schafer, 2015), but less popular as acquaintances (Schafer, 2016) than their counterparts. It is not clear why there were these differences, especially for gender. Perhaps contact with people outside the IL made residents more attractive as confidantes based on having access to new information, but also made them less available to spend time with other residents. Being partnered (e.g., married) conferred advantages in both networks. Partnered residents were more likely to report having confidantes and acquaintances, and were more popular as acquaintances (Schafer, 2015, 2016), findings that differ from qualitative reports from AL that married residents focus less on other residents (Kemp,

2008). As in the broader literature on social networks, there were homophily effects in both IL networks, specifically with age, partnership status, and tenure in the community (Schafer, 2015, 2016). There was evidence of health relating to status in the networks, with residents more likely to confide in people with better health than they had (Schafer, 2015). Residents were more likely to be acquaintances with people of similar health, particularly at low levels of health (Schafer, 2016). It is unknown if these implications of health as status would generalize to other settings such as AL where poor health is more common.

Paired with findings from qualitative research in AL, this IL study provides support that homophily based on age may be salient across the two settings, yet there remain questions regarding the role of gender, health, partnership status, and frequency of social contact external to the setting. It also suggests that different mechanisms may be involved with creating or maintaining different types of relationships. Additional SNA research of older adults' relationships in other settings can broaden our knowledge of older adults' social networks. Increased understanding of AL residents' social networks may begin to illuminate how the supports and services offered at the AL community relate to social outcomes for its residents and inform efforts to increase social integration across settings.

Current Study

There is much to learn from characterizing the social networks of AL residents including how cohesive their networks are; if they consist of a few highly popular or socially active residents; what proportion of the residents are isolated; the extent to which the networks consist of acquaintances rather than companions; and if there are differences in the factors associated with these types of ties. To address these gaps, we conducted exploratory research in an AL community to describe acquaintance and companionship networks of residents and make statistical inferences for correlates of network ties and structure. In this exploratory study, we do not hypothesize about the direction of effects on ties. However, based on theory and empirical evidence, we examine common network structures (i.e., reciprocity, transitivity, activity, popularity), resident characteristics, and homophily (e.g., the tendency for ties between residents of the same gender or similar age). In our conception, older adults who move into AL may find their physical or mental health are barriers to social relationships. It is possible that residents who live with spouses or those whose frequent contact with family and friends may not rely on relationships with other residents. Because common areas and communal meals support casual interaction, and close connection may be difficult due to residents' health, we examine acquaintances and companionships separately to determine whether different factors are associated with each.

Method

Our inferential SNA is a secondary data analysis of cross-sectional data from Wave 2 of the *SEAL*: Social Experiences in Assisted Living study (Mauldin, 2020; Mauldin et al., 2020) conducted in a large southern city in the United States. *SEAL* examined a variety of self-reported health and psychosocial characteristics and the trajectories of the social networks of AL residents across three waves of data collection in August/September 2017, November/December 2017, and February/March 2018. *SEAL* was informed by a preliminary study consisting of qualitative interviews conducted in the AL community from December 2015 to May 2016. All study protocols were approved by the University of Houston Institutional Review Board.

Research Setting

The research site was a three-story AL community in a large southern U.S. city. It was one of 29 AL communities owned by a private for-profit senior living company that targeted the mid to upper range of the AL market. The AL community offered communal meals, common areas for socialization, and daily organized group activities. It housed 112 AL apartments (131 beds). At the time of the study, administrators indicated it was approximately 65% full (i.e., around 85 residents) because of vacancies and rooms licensed for two beds being occupied by only one person. Due to privacy concerns, the administrators did not provide an exact census count to the research team. The AL administrators provided a general description of their residents whom they indicated averaged 85 years old (with ages ranging from around 60 to 100), were predominantly female, were middle to high socioeconomic status (SES), and of whom about half had dementia, similar to many AL communities across the United States (Harris-Kojetin et al., 2019).

Recruitment and Sample

Eligibility criteria included living in the AL community and passing the Six-Item Screener for cognitive impairment, an instrument that assesses short-term recall and orientation to time using six items from the Mini-Mental State Examination (MMSE; Callahan et al., 2002). The Six-Item Screener has demonstrated acceptable performance for use as a research screener, but is not a clinical assessment tool (Callahan et al., 2002). Residents who did not pass the screener were excluded from participation because the survey interview took approximately 1 hour and required substantial mental effort, and the preliminary study found that residents with moderate to high cognitive impairment tended not to be in the social networks of residents with low to no cognitive impairment.

The AL administrators provided a public space for recruitment and made introductions to residents who did

not visit the recruitment table. Efforts were made to invite all eligible residents to participate. According to administrators, all but a small number of potentially eligible residents (approximately four who were not interested in the research) met with the research team, but the research team did not have access to a census to confirm this. For the remaining residents not screened, the reason was not being cognitively able to communicate with the research team to complete the screener.

Seventy-eight residents were screened and 49 (62.8%) were eligible (the other 29 did not pass the screener). Of these 49, 44 participants were living in the AL community in November/December 2017 and 38 completed surveys at Wave 2 of data collection. These 38 residents (86.4% of participants) comprise the sample for this study. Because SNA is sensitive to missing data, a participation rate of at least 80% is recommended (Kossinets, 2006). We used data from Wave 2 of the study because it had the larger sample and allowed us to examine the social ties of newer residents. Our sample has 1,406 potential social ties between residents (38 × 37 = 1,406), providing ample power for detecting correlates.

Data Collection

The research team administered surveys in face-to-face interviews. Archival data for residents' move-in dates were supplied by the AL administrators for participants who provided authorization on their informed consent document.

Measures

Age, gender (0 = *Male*; 1 = *Female*), living arrangement (0 = *Single occupancy*; 1 = *Living with spouse*), and apartment location were self-reported on the survey. Apartment location was verified onsite by the research team.

Tenure in community

The number of weeks a participant lived in the AL community was calculated using the resident's move-in date and the date of survey completion. We transformed this continuous measure into a categorical variable with four levels (0 = *less than 3 months*, 1 = *3 months to 1 year*; 2 = *more than 1 year to 2 years*; 3 = *more than 2 years*).

Health-related measures

We assessed *physical limitations* using seven activities of daily living (ADLs) and 10 instrumental activities of daily living (IADLs) used in previous research (see, e.g., Markides et al., 2009). We totaled the number of activities the participant reported not being able to perform without help (0 = *can perform without help*; 1 = *cannot perform without help*), for a possible range of 0–17.

Cognitive functioning was measured with the MMSE, a brief 30-item validated assessment (Folstein et al., 1975).

Scores on the MMSE can range from 0 to 30 with higher values indicating better cognitive functioning.

We measured *depressive symptoms* with the 15-item version of the Geriatric Depression Scale (GDS-15; Sheikh & Yesavage, 1986). GDS-15 scores can range from 0 to 15; lower scores indicate fewer depressive symptoms. GDS-15 Cronbach's alpha reliability in this study was 0.84 (95% confidence interval: 0.77–0.91).

Contact with outside family and friends

We measured contact with family and friends outside the AL community with six items modified from Cox et al.'s (1993) Health and Lifestyle Survey (as cited in Krause, 1999). Three items asked how often in the past 2 weeks the respondent had gone out to visit, been visited by, or had contact by phone, letter, or email with outside family; and three items asked the same regarding friends. The items were scored on a 4-point scale (1 = *Not at all*, 2 = *Once or twice*, 3 = *Three to six times*, 4 = *More than six times*), for a composite ranging from 6 to 24.

Social ties

Participants were presented with a roster of names and photographs of the enrolled research participants. They were asked to identify residents with whom they had interacted in the previous 3 months beyond a quick passing greeting. From this subset, social ties were further assessed. Residents who lived in the community for less than 3 months responded based on their current tenure.

Companionship.—We measured companionship ties with a question modified from the Positive and Negative Social Exchanges scale (Newsom et al., 2005), which asked, "Thinking of the past three months, did [resident name] provide you with good company and companionship, include you in things they were doing, or do social or recreational activities with you?"

Acquaintance.—Acquaintance ties were assessed when no companionship tie was indicated by asking, "Would you consider [resident] an acquaintance (someone you know slightly but is not a close friend, e.g., exchange small talk)?"

Analytic Strategy

We calculated descriptive statistics using R version 3.6.3 (R Core Team, 2013), descriptive network measures (Table 2) using UCINET 6.665 (Borgatti et al., 2002), and visualized the networks using NetDraw 2.166 (Borgatti, 2002). For our inferential network analyses, we used a variant of exponential random graph models (ERGMs) called curved exponential family models (CEF models; Hunter, 2007). ERGMs model social ties in a network as a function of small, local configurations of ties as well as individual-level attributes of network members (Robins et al., 2007). The

logic of ERGMs acknowledges that ties may be dependent on one another, and ERGMs model this dependency. We provide the generalized ERGM formula in Supplementary Materials. We used a Markov Chain Monte Carlo maximum likelihood method to fit the models for acquaintance and companionship ties in the *ergm* package (throughout this manuscript, "ergm" refers to the software, while "ERGM" refers to the analytic technique) version 3.11.0 in the *statnet* suite of packages (Handcock et al., 2018). Resident attributes in our models included residents' demographic characteristics, health-related factors, and frequency of contact with outside family and friends. Due to the limitations of ERGMs, we used mean imputation for the value of missing data for one participant's age (2.6% of the sample). Each local network configuration modeled in this study and its corresponding term name in the *ergm* package are presented in Supplementary Table S1.

For categorical variables of gender and living on the same floor, we operationalized homophily as having the same value of the variable. Positive parameter estimates for homophily of categorical variables indicate a tendency for ties between residents with shared characteristics. For continuous variables such as age or weeks living in the community, we operationalized homophily as the absolute value of the difference in values between two residents. In this case, negative parameter estimates indicate homophily. For the configurations of activity spread (i.e., the tendency for some residents to be more active in the network than others), popularity spread (i.e., the tendency for some residents to be more popular than others), transitivity, and outgoing two paths, we use a geometrically weighted effect. Supplementary Materials contain additional information about geometric weighting. We obtained good fits for all models (see Supplementary Materials including Figures S1–S8 for details).

Results

Our sample was largely female, non-Hispanic White, and highly educated, with an average age of 83 years old ($SD = 8$ years). The average length of stay in the AL community was over a year and 8 months ($M = 89$ weeks, $SD = 79$ weeks). On average, participants had five ADL/IADL limitations ($SD = 3.5$), high levels of cognitive functioning, and low levels of depressive symptoms, though 21% ($n = 8$) scored greater than 4 on the GDS-15 indicating a risk of depression (Prakash et al., 2009). Table 1 presents sample descriptive statistics. Network descriptive statistics (including definitions) are given in Table 2. Supplementary Figure S9 presents network visualizations.

Acquaintance Network

A large majority of residents in the sample ($n = 35$, 86.8%) reported having at least one acquaintance. On average,

residents reported having 10 acquaintances among the sample ($SD = 6.4$), with a minimum of 0 and a maximum of 22. In bivariate analysis, the number of acquaintances a resident reported was positively correlated with the length of time they lived in the AL community ($r = 0.37$, $p = .021$), their cognitive functioning ($r = 0.39$, $p = .015$), and the number of companions reported ($r = 0.43$, $p = .007$).

The acquaintance network exhibited cohesion along a variety of metrics. It had a density of 0.28 indicating a moderate density, was not very centralized (degree centralization = 0.34), had a relatively small diameter of 3, and moderate amounts of reciprocity (42% of acquaintances were reciprocated) and transitivity (0.41), suggesting some but not total clustering in the acquaintance network.

Table 3 presents the results of the CEF model of acquaintance ties. Controlling for other network configurations and individual characteristics, there was a tendency for acquaintance ties to be reciprocal ($p < .01$), but not transitive, and for residents to report similar numbers of acquaintances (i.e., negative parameter for activity spread, ($p < .001$). Residents with better cognitive functioning ($p < .05$), higher levels of physical limitations ($p < .01$), or less frequent contact with outside family and friends ($p < .05$) were more likely to report acquaintances than their counterparts. Residents with similar levels of physical limitations were more likely to be acquainted with each other ($p < .05$). Residents who lived on the same floor ($p < .001$) were more likely to be acquaintances.

Tenure in the AL community was associated with acquaintance ties in several ways. Compared to residents who had lived in the AL community between 1 and 2 years, those with less than 3 months tenure were less likely to report having an acquaintance ($p < .05$). Residents who lived in the community for over 2 years were more likely to report an acquaintance ($p < .01$) and be named by others as an acquaintance ($p < .01$) than those who lived in the community between 1 and 2 years. Acquaintances were more likely to exist between residents who moved in around the same time as each other ($p < .01$).

Companionship Network

Participants reported an average of 3.9 ($SD = 4.2$) companionship ties with other residents in the sample, with a minimum of 0 and a maximum of 14. In bivariate analysis, the only study variables correlated with residents' number of companions were the number of acquaintances they reported ($r = 0.43$, $p < .01$).

The density of the companionship network was fairly low (0.10), with almost 1/3 the number of ties as the acquaintance network. It had similar levels of reciprocity (0.42) as the acquaintance network, indicating reciprocated companionship was not uncommon. The companionship network was not very centralized (degree centralization = 0.29), suggesting a somewhat even distribution of companionships throughout the community. Transitivity was also moderate

Table 1. Sample Characteristics and Correlations of Variables (*N* = 38 residents of an AL community)

	n	%	M	SD	Min.	Max.	10	11	12	13	14	15	16	17	18
1. Female	25	69.4													
2. Non-Hispanic White	36	94.7													
3. College degree or higher education	27	71.1													
4. Living alone	31	81.6													
5. Living with a spouse	7	18.4													
6. Less than 3 months in AL community	6	15.8													
7. 3 months to 1 year in AL community	6	15.8													
8. More than 1 year to 2 years in AL community	15	39.5													
9. More than 2 years in AL community	11	28.9													
10. Age	37		82.8	8.1	58	94	—								
11. Weeks lived in AL community	38		89.1	78.7	1.4	325.6	0.22	—							
12. Number of physical (ADL and IADL) limitations (0–17)	38		5.1	3.5	0	15	0.27	0.01	—						
13. Cognitive functioning (MMSE, 0–30)	38		26.6	3.4	15	30	−0.32*	−0.04	−0.28	—					
14. Depressive symptoms (0–15)	38		3.3	3.3	0	13	0.04	−0.28	0.24	0.09	—				
15. Contact with family and friends outside the AL community (6–24)	38		12.8	2.8	8	18	−0.09	0.51**	−0.07	0.14	−0.48***	—			
16. Number of acquaintances reported	38		10.21	6.4	0	22	−0.14	0.37*	0.01	0.39*	−0.26	0.22	—		
17. Number of companions reported	38		3.87	4.2	0	14	−0.16	0.14	−0.04	0.24	−0.09	0.27	0.43**	—	
18. Proportion of companions in resident's aggregate social network (acquaintances and companions combined)[a]	33	24.2%	18.1%		0%	54.5%	−0.06	−0.01	−0.06	−0.09	0.10	0.04	−0.09	0.83***	—

Note: AL = assisted living; min. = minimum; max. = maximum; ADL = activities of daily living; IADL = instrumental activities of daily living; MMSE = Mini-Mental State Examination.

[a]*n* = 33 residents who had at least one acquaintance or companion.

*p < .05, **p < .01, ***p < .001.

Table 2. Properties of the Acquaintance and Companionship Networks of 38 Residents of an Assisted Living Community

Network property	Definition	Acquaintance network	Companionship network
Density	The number of ties present in the network divided by the total number of possible ties; the percent of potential ties that exist in the network	0.28	0.10
Degree centralization	The extent to which ties in the network are associated with one (or a few) individuals; the variability in ties (degree) among people in the network; ranges from 0 to 1 where greater values indicated more centralization	0.34	0.29
Average path length	The mean of the *geodesics* (i.e., shortest distances or shortest path lengths) between every pair of nodes in the network	1.75 (SD = 0.58)	2.45 (SD = 1.05)
Diameter	The length of the longest geodesic (i.e., shortest path between two actors) in the network; how many steps are needed to get from one side of the network to the other	3	6
Arc reciprocity	A tie from actor A to actor B is reciprocated if there is also a tie from resident B to resident A. Arc reciprocity is the number of reciprocated ties divided by the total number of ties in the network	0.42	0.42
Transitivity	The percentage of triads in the network that are transitive (i.e., there is a tie between actors that have a shared partner in the network)	0.41	0.37
Isolates	Number of nodes that have no outgoing or incoming ties	1	7

(0.37), suggesting some, but not complete, clustering of companions. There were substantially more isolates (n = 7, 18.4%) than in the acquaintance network. Coupled with the lower density, this highlights that companionships were rarer than acquaintances.

Table 3 presents the results of the CEF model of companionship ties. Controlling for other network configurations and individual characteristics, there was a tendency for companionships to be reciprocated ($p < .001$), but not transitive. Female residents were less likely to be named as companions than male residents ($p < .05$). Homophily based on age ($p < .01$) and living on the same floor ($p < .001$) was also associated with companionship ties. Higher levels of cognitive functioning were associated with an increased likelihood of reporting a companionship ($p < .05$). Residents with greater depressive symptoms were more likely to report companionships ($p < .05$) and be named as companions ($p < .05$) than those with fewer depressive symptoms. Compared to residents who lived in the community between 1 and 2 years, residents with the longest tenure (i.e., >2 years) were significantly more popular as companions ($p < .01$). Residents with less than 1 year in the community were significantly less popular ($p < .01$), and the newest residents (<3 months) were significantly less likely to report having a companion ($p < .05$) than residents with between 1 and 2 years tenure. Residents with more frequent contact with outside family and friends were less likely to be named as companions than those with less frequent contact ($p < .05$). Table 3 presents detailed results of the CEF model of companionship ties.

Discussion

This research provides insights into the social relationships of older adults living in AL and can inform those seeking to learn more about the types and mechanisms of social networks in communities of older adults. Our findings build upon qualitative inquiries of AL coresident relationships, illuminate potential social mechanisms in AL communities similar to our research site, and can be contrasted with residents in other communities. A strength of our approach is we model effects including network structure simultaneously and examine mechanisms associated with acquaintance and companionship ties separately.

In general, residents in this study had robust social networks. This finding is promising, as our sample had high levels of physical limitations, which has been found to limit social engagement for community-dwelling older adults (Nicholson et al., 2014). As in previous AL research (Kemp et al., 2012; Park et al., 2012; Perkins et al., 2013), we found acquaintances were more common than companionships. In fact, on average, companions made up only a quarter of the people in residents' networks. This could be explained by the relative ease of having acquaintances in AL or by preference to limit close relationships to a select group of people. Future research focusing on the composition of residents' personal networks could shed light on this.

Some physical and mental health-related factors were associated with the likelihood of ties between the AL residents. Residents with higher levels of cognitive functioning were more likely to report social ties than those with lower levels of cognitive functioning. This finding reinforces results from previous research in AL communities (Park et al., 2012; Sandhu et al., 2013; Sefcik & Abbott, 2014). Unlike previous research (Park et al., 2012; Sandhu et al., 2013; Shouse et al., 2013), we found that higher levels of physical limitations were associated with an increased likelihood of reporting an acquaintance, and higher levels of depressive symptoms were associated with increased likelihood of companionship ties. This could result from the research

Table 3. CEF Results Table of Factors Associated With Social Ties Among 38 Assisted Living Community Residents

	Acquaintance network			Companionship network		
	Θ	SE	p	Θ	SE	p
Network structural factors						
Edges	−1.04	1.86	.576	−1.22	1.93	.529
Reciprocity	0.58	0.21	.006**	1.56	0.31	<.001***
Activity spread (*gwodegree*)	−3.00	0.69	<.001***	−1.18	0.71	.098
Gwodegree decay parameter	1.15	0.24	<.001***	1.01	0.72	.163
Popularity spread (*gwidegree*)	−2.30	1.26	.067	−0.91	0.81	.258
Gwidegree decay parameter	0.70	0.56	.214	0.44	0.95	.639
Transitivity (*dgwesp*)	0.08	0.22	.726	0.42	0.24	.080
Dgwesp decay parameter	0.44	0.15	.003**	0.03	0.43	.945
Outgoing two paths (*dgwnsp*)	−0.04	0.02	.028*	−0.13	0.06	.031*
Dgwnsp decay parameter	3.89	0.40	<.001***	0.31	0.78	.693
Demographic factors						
Age—outgoing ties	−0.01	0.01	.119	−0.02	0.01	.140
Age—incoming ties	−0.01	0.01	.538	−0.02	0.01	.137
Age—homophily[a]	0.00	0.01	.747	−0.03	0.01	.004**
Female—outgoing ties	−0.02	0.13	.861	−0.09	0.21	.671
Female—incoming ties	−0.05	0.17	.794	−0.54	0.22	.014*
Gender—homophily[b]	0.22	0.15	.157	0.28	0.19	.140
Living with spouse—outgoing ties	−0.06	0.15	.715	−0.10	0.25	.682
Living with spouse—incoming ties	−0.01	0.18	.969	−0.38	0.29	.186
Tenure in community (ref = more than 1 year to 2 years)						
Less than 3 months—outgoing ties	−0.46	0.20	.026*	−1.55	0.71	.029*
3 months–1 year—outgoing ties	−0.24	0.16	.132	−0.15	0.27	.584
More than 2 years—outgoing ties	0.47	0.16	.004**	0.23	0.21	.281
Less than 3 months—incoming ties	−0.39	0.26	.137	−1.54	0.59	.009**
3 months–1 year—incoming ties	−0.23	0.20	.240	−1.06	0.39	.007**
More than 2 years—incoming ties	0.48	0.18	.009**	0.68	0.24	.004**
Tenure (weeks) in community—homophily[a]	0.00	0.00	.003**	0.00	0.00	.316
Living on same floor	0.43	0.13	<.001***	0.70	0.16	<.001***
Health-related factors						
Physical limitations—outgoing ties	0.05	0.02	.006**	0.00	0.02	.895
Physical limitations—incoming ties	−0.01	0.02	.633	0.00	0.03	.907
Physical limitations—homophily[a]	−0.05	0.02	.041*	0.01	0.03	.679
Cognitive functioning—outgoing ties	0.07	0.03	.016*	0.08	0.04	.039*
Cognitive functioning—incoming ties	0.04	0.03	.177	0.05	0.05	.296
Cognitive functioning—homophily[a]	0.01	0.03	.666	0.02	0.04	.544
Depressive symptoms—outgoing ties	−0.02	0.02	.400	0.07	0.04	.040*
Depressive symptoms—incoming ties	−0.01	0.03	.669	0.10	0.04	.013*
Depressive symptoms—homophily[a]	−0.02	0.03	.391	−0.04	0.04	.279
Contact with outside family and friends						
Outgoing ties	−0.06	0.03	.028*	0.00	0.04	.993
Incoming ties	−0.01	0.03	.695	−0.10	0.05	.037*
AIC	1438			764.3		
BIC	1632			958.5		

Note: CEF = curved exponential family model; gwodegree = geometrically weighted outdegree; gwidegree = geometrically weighted indegree; dgwesp = geometrically weighted edgewise shared partners; dgwnsp = geometrically weighted non-edgewise shared partners; AIC = Akaike information criterion; BIC = Bayesian information criterion.

[a]Homophily is operationalized as an absolute difference in value (indicated by negative parameter estimate).

[b]Homophily is operationalized as the same categorical value (indicated by positive parameter estimate).

*p < .05, **p < .01, ***p < .001.

site offering a plethora of easily accessible opportunities for socialization, its success in supporting socialization for residents with physical limitations or depressive symptoms, or residents who tended to be of middle to high SES being able to afford resources (e.g., personal attendants) to help overcome barriers related to physical limitations. The tendency

toward homophily based on physical limitations in the acquaintance network provides some support for stigma resulting in segregation by physical functioning (Dobbs et al., 2008) rather than for relationships being formed when higher functioning AL residents assist those with lower functioning (Kemp et al., 2012; Sandhu et al., 2013). It is unclear why physical limitations were associated with acquaintances, but not companionships, but the finding is promising inasmuch as it indicates that AL residents with physical limitations were not disadvantaged in terms of forming close companionship ties within an AL community as they may be in other settings (Nicholson et al., 2014).

In addition to physical limitations and depressive symptoms, there were some other interesting differences in the correlates of ties in the acquaintance and companionship networks. Companionships, but not acquaintances, were more likely between residents of similar age. Considering the large age range in our sample (58–94) and generational differences among older adults, this seems to be a reasonable finding for companions. In contrast, potential generational differences may not have been salient for the less intimate acquaintance relationship. The fact that age-related homophily is one of the most common types of homophily in social relationships in general (McPherson et al., 2001) and was present among acquaintances in an IL setting (Schafer, 2016) makes this finding interesting. Also notable is that female residents were less popular than male residents as companions, but not acquaintances. The differential effects of gender based on relationship type parallels findings from an IL community in which female residents were less popular as confidants, but more popular as acquaintances (Schafer 2015, 2016). These nuanced findings highlight the need to consider the type of relationship when examining gender differences in older adults' social integration.

We found that more frequent contact with family and friends outside the AL community was associated with a lower likelihood that residents would report having acquaintances or be named as companions. This supports previous research that strong family ties may inhibit (Kemp et al., 2012; Knight & Mellor, 2007) rather than promote (Kemp et al., 2012) coresident relationships. Our findings can also be considered in light of the era of coronavirus disease 2019 restrictions on visitors in AL communities. If residents with less frequent family contact have social advantages within the AL community, opportunities to cultivate coresident relationships when outside visitation is prohibited or limited may be particularly important for residents with robust networks outside their AL community.

Residents who lived with their spouse were no more or less likely to form ties with other residents. This may reflect the myriad and potentially contradictory ways in which living with a spouse in AL can influence coresident relationships (Kemp et al., 2016; Sandhu et al., 2013). The statistical insignificance of living with a spouse is in contrast to findings from IL (Schafer, 2015, 2016), which found

partnered residents were more active and popular in the networks.

One factor that was significantly associated with both acquaintance and companionship ties was residents' tenure in the AL community. Consistent with previous research in which residents report it takes time to form coresident relationships (Park et al., 2012; Perkins et al., 2013), we found that newer residents were less socially integrated than longer-time residents. Residents with over 2 years of tenure were advantaged in both the acquaintance and companionship networks, which fails to support previous research that long-time residents are more guarded about forming close relationships based on previous social losses within the AL community (Park et al., 2012; Sefcik & Abbott, 2014). Interestingly, there was evidence of cohort effects only in the acquaintance network, with acquaintances more likely between residents who moved in at similar times. Previous research has suggested that early connections are important for coresident relationships (Sefcik & Abbott, 2014), but it is not clear why tenure homophily would be salient for acquaintances but not companionships.

Our findings add empirical evidence about social mechanisms in older adults' networks. As in social network literature and as reported by some AL residents (Kemp et al., 2012; Sandhu et al., 2013), we found physical proximity (i.e., propinquity) in the AL community was associated with resident relationships. This effect was significant for both companionship and acquaintance ties and has practical implications for the placement of resident apartments (e.g., to facilitate relationships among residents with similar interests). Transitivity (i.e., the friend-of-a-friend is my friend effect) was not associated with social ties, in spite of being a common social phenomenon in human networks (Flynn et al., 2010) and a significant factor in IL residents' acquaintance and confidante networks (Schafer, 2015, 2016). Perhaps, the nature of having ample opportunities for social interaction within the AL community reduced the reliance on mutual acquaintances or friends for ties to form between residents.

Our findings also have practice implications. For practitioners (e.g., social workers, administrators) in long-term care settings such as AL, nursing homes, and continuing care retirement communities, providing opportunities for residents to form relationships is critical to the well-being of individuals and the community. In this study, residents were more likely to report acquaintances than companionships. While this may be indicative of personal choice, some older adults may lack opportunities to form close relationships in institutional settings. There are a variety of approaches to increasing opportunities for social engagement, including structured social facilitation, befriending interventions, and shared experiences of leisure and/or skill building (Gardiner et al., 2018). Creative examples that could be applied to the AL setting include group gardening interventions (Tse, 2010), pain management and

education programs (Tse et al., 2016), and group reminiscence programs (Chiang et al., 2010). Adaptability to the specific population served in AL is critical, particularly in terms of reducing barriers to participation and increasing inclusivity (Quan et al., 2020).

Limitations

Our sample reflects a homogenous group of predominantly White older adults of middle to upper SES, and our findings may relate to their cultural characteristics or opportunities afforded by their relative affluence. As previous research has indicated, facility-level characteristics such as policies, programming, and practices at mealtimes can influence coresident relationships (Kemp et al., 2012; Park et al., 2012; Sandhu et al., 2013; Sefcik & Abbott, 2014). It is important to recognize the findings from this exploratory study at one AL community cannot be generalized. It is also important to note that only residents who passed the cognitive screener were included in the sample. In spite of our preliminary study finding that residents with dementia or moderate cognitive impairment tended to be excluded from the social networks of those with higher functioning, each resident is important to understanding the overall social environment in an AL community. Future research could be designed to include residents from a wide spectrum of cognitive functioning. Finally, we call attention to our measure of social ties, which was a retrospective question over the past 3 months. For residents who had less than a 3-month tenure in the community ties were assessed since their move-in date and, as a result, do not cover the same time period as the other residents' ties.

Conclusions

This study adds to the knowledge of AL residents' social networks with quantifiable results regarding the structure of their networks and the factors associated with their social ties. Knowledge of residents' social networks can inform efforts to improve AL residents' social integration. As evidenced by this study, the potential that AL holds for promoting beneficial new relationships can be realized. We support continued efforts to understand and improve residents' social networks, especially by conducting additional social network analyses in additional and more diverse settings. Social relationships among residents may be especially critical for residents who have faced a challenging life transition when moving to AL or who have losses in their previous networks. Further research and evidence-based social network interventions are important to promote AL residents' quality of life and well-being.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

Conflict of Interest

None declared.

Author Contributions

R. L. Mauldin planned the study, conducted data analysis, and wrote the article. K. Fujimoto helped plan the study, assisted with data analysis and reporting results, and helped write the manuscript. C. Wong, S. Herrera, and K. A. Anderson contributed to writing the article.

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