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Volume 28 Number 1

2020 Seniors Housing & Care Journal



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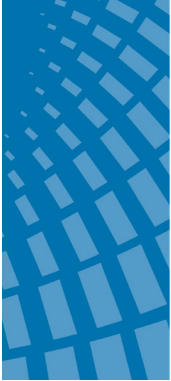
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Testing the Associations Between the Assisted Living Environment and Residents' Satisfaction With Assisted Living

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ABSTRACT

The Problem: This study examined the assisted living (AL) environment and its relationship to residents' satisfaction with AL.

The Resolution: Baseline data from a study testing the dissemination and implementation of function-focused care included a sample of 501 residents in 54 AL facilities. Multilevel structural equation modeling was used. The results showed that the model fit the data. Gender and physical function were associated with residents' satisfaction. The AL environment, measured by staffing, health services, amenities, and physical environment, was not related to residents' satisfaction.

Tips for Success: Given the projected increase in demand in AL, there is a need to understand how settings can be designed to optimize residents' satisfaction. Future research should consider additional factors, such as aspects of the social environment.

Keywords: Assisted living, resident satisfaction, environment

BACKGROUND

More than 800,000 older adults currently reside in assisted living (AL) in the United States (Sengupta, Rome, Harris-Kojetin, & Caffrey, 2017), and this number is expected to dramatically increase with the growth of the older population (Silver, Grabowski, Gozalo, Dosa, & Thomas, 2018). AL is broadly defined as a residential care setting for older adults that provides housing, 24-hour supervision, supportive services, and health care, or a combination of such services to meet the individualized needs of residents (National Center for Assisted Living [NCAL], 2019). AL is regulated at the state level and thus there is substantial heterogeneity between states with regard to staffing requirements and service delivery (Carder, O'Keefe, & O'Keefe, 2015; Kisling-Rundgren, Paul, & Coustasse, 2016). Such variability across AL settings as well as whether settings have resources available to promote person-centered culture change efforts are important for environments to be tailored to residents' needs and preferences and ultimately promote residents' satisfaction with AL.

According to the NCAL (2019), AL settings are designed with specific principles embedded within their daily operations that promote resident autonomy, independence, privacy, and dignity. With an emphasis on a resident-oriented philosophy of care, AL is the preferred long-term care option among older adults compared with nursing homes (Lehnert, Heuchert, Hussain, & Koenig, 2019). Despite the increasing demand and preference for AL, there is limited information about the impact of the AL environment on residents' satisfaction with living in AL. Understanding whether and how the AL environment influences the satisfaction of residents could inform AL administrators and health care providers about ways to improve services and promote the highest possible satisfaction among residents.

Residents' satisfaction with AL is a multidimensional concept that serves as an important indicator of the quality of care from the resident's perspective (Shippee, Akosionu, Brasure, & Beebe, 2019). Resident satisfaction evaluates residents' perceptions of various aspects of life in AL settings such as health care services, relationships with staff, sense of home, and meaningful social activities (Castle, Schwartz, & Gifford, 2019; Sikorska-Simmons, 2001). Prior

research exploring residents' satisfaction with AL has led to inconsistent findings, which can be attributed to setting factors (e.g., facility size, geographic location, range of services, food quality) (Shippee et al., 2019; Shippee, Henning-Smith, C., Kane, & Lewis, 2015; Street, Burge, Quadagno, & Barret, 2007), as well as the various methods used to measure satisfaction with AL (Abrahamson, Bradley, Morgan, & Fulton, 2012; Castle, Schwartz, & Gifford, 2019; Kelley-Gillespie, 2012). Examining residents' satisfaction with AL provides information about residents' preferences and needs, which is useful in implementing a person-centered approach within the setting.

Factors That Influence Residents' Satisfaction With Assisted Living

The ecological theory of aging (Lawton & Nahemow, 1973) is used as a framework for understanding the many factors that contribute to residents' satisfaction with AL. According to this theory, an older person's functioning is thought to be the result of a dynamic relationship between characteristics of the individual and conditions of his or her environment (Greenfield, 2012). Certain environments impose greater challenges on individuals than others, which can affect their satisfaction. For example, environments that afford limited opportunities for social participation and lack meaningful activities may be detrimental to older adults' satisfaction (Horowitz & Vanner, 2010; Park, 2009; Street & Burge, 2012). Likewise, poor accessibility and barriers in the physical environment can pose challenges for older adults in navigating their environment, and thus negatively impact residents' satisfaction with AL (Fleming, Goodenough, Low, Chenoweth, & Brodaty, 2016). Understanding the interplay between individual and environmental factors that influence residents' satisfaction will inform strategies to modify the environment to specifically target the needs and preferences of residents and thereby improve their satisfaction with AL.

Individual factors. Numerous individual factors can potentially influence residents' satisfaction with AL, including demographic characteristics such as age and gender as well as health status, functional abilities, and social resources. Previous research has noted that residents who are male and cognitively impaired and have fewer social supports are less satisfied with AL (Resnick, Galik, Gruber-Baldini, & Zimmerman, 2010).

Evidence suggests that residents who are independent with respect to activities of daily living (ADLs) have higher satisfaction compared with those who are functionally dependent (Abrahamson et al., 2012). Moreover, variability in residents' functional abilities can have differential effects on the degree to which residents consider components of the environment as important to their satisfaction with AL (Mitchell, 2013). Residents who have physical or cognitive impairments may place greater emphasis on the quality of support from and interactions with staff than those who are independent (Abrahamson, Bradley, Morgan, Fulton, & Ibrahimou, 2013; Street & Burge, 2012).

Environmental factors. The AL environment is multidimensional with many interrelated components that may be important for understanding residents' satisfaction with living in the setting (Greenfield, 2012; Moos, 1980). The spatial design and other features in the AL environment can affect residents' satisfaction such that having access to a variety of service domains (Abrahamson et al., 2013), fewer barriers in the physical environment (Fleming et al., 2016; Nathan, Wood, & Giles-Corti, 2014; Nordin, McKee, Wijk, & Elf, 2017), positive social relationships, and opportunities for meaningful engagement (Roberts & Adams, 2018; Shippee et al., 2019) have been associated with higher satisfaction among residents in AL.

Numerous studies have also suggested that having adequately trained staff available to care for residents in nursing home settings can influence outcomes such that higher nursing staff turnover has been associated with higher rates of hospitalization among residents and poorer quality of care (Castle & Ferguson-Rome, 2015; Lerner, Johantgen, Trinkoff, Storr, & Han, 2014; Thomas, Mor, Tyler, & Hyer, 2012). In addition, perceptions about the care provided by direct care workers can have a significant impact on residents' overall satisfaction with living in the setting (Abrahamson et al., 2013; Park, 2009; Street & Burge, 2012). Direct care workers provide the majority of care to residents in AL (Park-Lee et al., 2011), including services such as personal hygiene, housekeeping, meals, medication administration, and assistance with ADLs.

The provision of health care services in AL varies across settings but may include medical care, psychiatric services, dental care, podiatry care, dermatology

services, and pharmacist consultation. Having health care services available in settings may be beneficial for residents because they are able to receive regular monitoring of chronic medical conditions, and such services could reduce barriers to accessing services such as the lack of transportation to medical or dental appointments. To date, limited information is available regarding the extent to which offering a multitude of health care services in the AL setting is associated with residents' satisfaction. In addition, amenities offered in AL tend to include those that provide opportunities for social engagement and recreation (e.g., exercise facilities, community garden, movie theater/television room, common areas) as well as personal amenities (e.g., beauty salon, massage therapy). Offering a range of amenities that are of interest to residents can address personal needs while encouraging socialization and facilitating physical activity (Andersson, Ryd, & Malmqvist, 2014; Fleming et al., 2016); thus, they might influence their satisfaction with living in AL.

The physical environment represents another component of residents' satisfaction with AL (Ausserhofer et al., 2016; Nordin et al., 2017). Poorly designed physical environments (e.g., difficult to navigate hallways) can impose barriers for residents that lead to negative outcomes such as decreased physical activity, functional decline, and social isolation (Benjamin, Edwards, & Caswell, 2009; Kemp, Ball, Hollingsworth, & Perkins, 2012; Lu, 2010). In contrast, environments that include features related to resident safety such as walking areas without obstructions, adequate lighting, and handrails are key factors in supporting residents' mobility (Lu, 2010; Nordin et al., 2017); in addition, access to outdoor spaces (Lee, Lee, & Rodiek, 2019; Rodiek, Nejati, Bardenhagen, Lee, & Senes, 2016) may contribute to residents' satisfaction with AL.

Given the projected increase in demand for AL in the future (Silver et al., 2018), there is a need to better understand how the AL environment is associated with residents' satisfaction. Guided by the ecological theory of aging (Lawton & Nahemow, 1973), which recognizes that an optimal living environment is designed to meet the specific needs and preferences of older adults, the purpose of this study was to examine the AL environment and its relationship to residents' satisfaction with AL. Increasing our understanding of factors in the AL environment that are associated with

residents' satisfaction will help to inform clinicians and administrators about areas that can be modified to implement a resident-oriented model of care and improve satisfaction for the growing number of residents expected to live in these settings in the future.

METHODS

Study Design

This study was a secondary analysis of baseline data from the study, Dissemination and Implementation of Function Focused Care in Assisted Living Using the Evidence Integration Triangle (FFC-AL-EIT) (Resnick et al., 2020). The FFC-AL-EIT study focused on disseminating and implementing the function-focused care approach in AL settings to demonstrate that settings can adopt this philosophy and alter the care provided by direct care workers such that residents maintain or improve function and physical activity. The study was reviewed and approved by a university-based institutional review board.

AL facilities that were eligible and expressed interest in participating were randomized to intervention (FFC-AL-EIT) or the education only control (FFC-EO) groups. The FFC-AL-EIT intervention was designed to help residents engage in physical activity during all care interactions and was implemented by a research nurse who works with an identified in-house function-focused care champion and stakeholder team. The function-focused care champion most commonly is a nurse, a social worker, a nursing assistant, or an activities director, and the stakeholder team works to help identify and address specific needs and challenges as well as motivate direct care workers to embrace the function-focused care approach. Examples of function-focused care activities include such things as walking with residents to the bathroom rather than having them use a commode chair, participating in bathing and dressing at residents' highest capability level, going to an exercise class, participating in a walk-to-dine program, and participating in recreational activities that involve some degree of physical activity. Settings randomized to the FFC-EO control group received education only through a PowerPoint presentation by research staff that focused on teaching staff, families, and residents about the value of physical activity and how to incorporate it into routine daily activities. Following the provision of education, no other treatment

interactions occurred with the FFC-EO control sites. The focus of the current study was to conduct a secondary analysis of baseline data from the FFC-AL-EIT study to examine characteristics at the individual and environmental levels for predicting residents' satisfaction with AL.

Recruitment and Sample

The sample included 501 AL residents from 54 facilities across Maryland, Pennsylvania, and Massachusetts. These three states have similar regulations for AL settings such that each state requires that settings have an administrator, nursing, or coordinator oversight and direct care workers in sufficient numbers to meet the needs of residents. Recruitment of AL facilities was done by mailing invitations to eligible settings, followed by telephone calls to the administrators to provide a description of the study. Approximately 300 letters were mailed to eligible settings, and 54 (18%) responded and agreed to participate. Facilities were invited to participate if they (1) had at least 25 beds; (2) identified a nurse (a direct care worker, licensed practical nurse, or registered nurse) to be the champion and work with the study team in the implementation of FFC-AL-EIT; and (3) were able to access email and websites via a smart phone, tablet, or computer. We excluded AL settings if they had previously participated in an FFC-AL study.

AL residents were eligible for the study if they were 65 years or older, spoke English, lived in a participating AL setting, and were able to recall at least one of three words based on the Mini-Cog (Borson, Scanlan, Chen, & Ganguli, 2003). Residents were excluded from the study if they were enrolled in hospice at the time of recruitment. A five-item Evaluation to Sign Consent (ESC) questionnaire was used to guide the determination of residents' capacity to provide consent to research (Resnick et al., 2007). The items ensure that the resident is aware of what is involved with participating in the research, can state what to do if they no longer want to participate in the study, and can identify the risks associated with the study. If the resident did not pass the ESC, he or she was asked to assent to the study, and consent was obtained from the resident's legally authorized representative.

A research evaluator approached a total of 833

residents in person, of whom 821 (98%) were identified as eligible based on age, ability to speak English, current residence, and absence of enrollment in hospice. Of the eligible residents, 516 (63%) gave their consent to participate, 284 (35%) refused to participate, and 21 (3%) were unable to provide assent and the legally authorized representative could not be reached. Following the consent process and cognitive testing, another 6 individuals (1%) were found to be ineligible and 9 (2%) withdrew after consent and prior to completion of baseline data, leaving a final sample of 501 participants enrolled in the study.

Measures

Resident measures. Trained research evaluators who were blinded to site randomization collected demographic and descriptive data from participants' medical charts at the AL settings; information collected included age, gender, race, ethnicity, marital status, and level of education. The research evaluators collected additional survey data in person with regard to residents' cognition, comorbidities, functional ability, and satisfaction with AL.

Cognition. Cognitive status was evaluated in person with participants using the three-item recall on the Mini-Cog. The Mini-Cog is a brief screening tool developed to detect cognitive impairment in older adults and is composed of a three-item recall and clock drawing task (Borson et al., 2003). The Mini-Cog is used to assess short-term memory and consists of three unrelated words presented to the participant. After a brief distraction, the participant is asked to recall the three words to the evaluator without cues; one point is awarded for each correctly recalled word. Scores represent the total number of words that participants were able to recall.

Comorbidities. The total number of comorbidities was recorded using the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) (Linn, Linn, & Gurel, 1968; Miller et al., 1992).

Functional ability. Residents' functional level was measured with the Barthel Index (Mahoney & Barthel, 1965). The Barthel Index is a 10-item measure of ADLs (e.g., bathing, dressing) that is completed for each participant by asking the direct care worker what the resident was able to complete that day in terms of ADLs. Items are weighted to account for the amount of

assistance required. A score of 100 indicates complete independence.

Residents' satisfaction with AL. The Resident Satisfaction Index (RSI) is a 22-item measure of residents' satisfaction with living in AL settings (Sikorska-Simmons, 2001). The RSI includes five subdomains that represent residents' perceptions of health care, housekeeping services, physical environment (e.g., personal space, sense of community), relationships with staff (e.g., the kindness of staff), and physical and social activities (e.g., satisfaction with activities offered, opportunities to participate in interesting activities). Residents' perception of housekeeping services was not collected in the FFC-AL-EIT study because it was not relevant to the study aims and thus was not available for analysis in this study. For each subdomain, participants were asked to report their levels of satisfaction. Examples of questions include, "Is the staff kind and caring?" and "Do you feel at home here?" Items on the RSI were scored as a dichotomous agree or disagree, and negatively worded items were reverse-coded for scoring. Individual item scores were summed to create a total satisfaction score, with higher scores indicating greater satisfaction with AL.

Assisted living setting measures. Research evaluators collected descriptive data about the AL facilities from administrators; variables included facility size (based on the total number of beds), profit status, number of direct care workers on day and night shifts, and number of hours worked per week by activity staff in each setting. In addition, the evaluators obtained information regarding the health care services, amenities, and physical environment.

Health care services. Research evaluators also asked whether the following health care services were provided at the facility: medical care, psychiatric services, dental care, podiatry, dermatology, pharmacist consultation, and other services.

Amenities. Administrators were asked whether the following amenities were available on site: beauty salon, library, computer room, gym or exercise facilities, transportation services, social and recreational activities area, and other amenities.

Physical environment. At baseline, trained research

evaluators used the Environment Assessment to Optimize Function and Physical Activity (EAOFP) (Resnick et al., 2019) to conduct observational environment assessments in each setting. The EAOFP includes 18 items that evaluate the presence of observed features in the built environment that are important for optimizing function and physical activity among residents. Examples of items include the following: whether or not there are areas for residents to walk, cues in the environment to encourage physical activity, and an environment that is safe for ambulation (e.g., sufficient lighting, no slippery floors or obstructions). Items are scored as “present” or “not present” and coded so that higher scores are indicative of environments that are better for optimizing function and physical activity of residents. The scores are then summed for a maximum total score of 18.

Data Analysis

We used descriptive statistics, including means, proportions, and ranges, to describe the AL residents and settings in the sample. To test the model, we performed multilevel structural equation modeling using the Mplus statistical software program (Muthén & Muthén, 1998).

The **Figure** shows the final multilevel model tested in this study. A maximum likelihood method was used to estimate the model parameters. Model fit was evaluated based on chi square divided by degrees of freedom (χ^2/df), comparative fit index (CFI) (Bentler, 1990), root mean square error of approximation (RMSEA) (Steiger & Lind, 1980), and the standardized root mean square residual (SRMR) (Muthén & Muthén, 1998). Additional information about the statistical analyses is provided in the **Technical Appendix**.

RESULTS

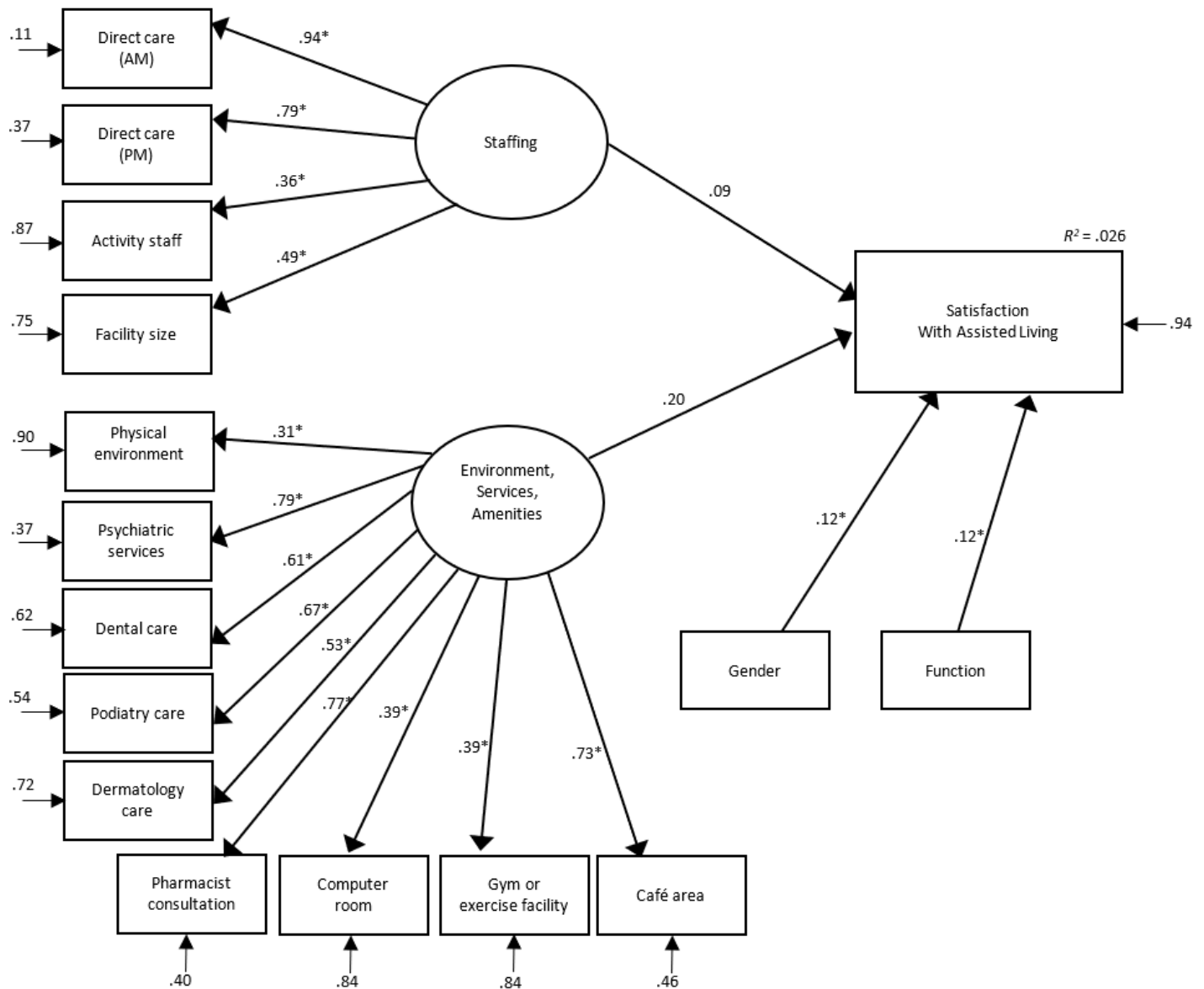
The mean age of participants was 88 years ($SD = 7.3$), and the majority were female ($n = 363$, 72%), White ($n = 483$, 96%), not Hispanic or Latino ($n = 495$, 99%), and currently widowed, divorced, or never married ($n = 383$, 76%), as shown in **Table 1**. Participants had a mean score of 2.4 ($SD = 0.8$) on the Mini-Cog three-item recall and a mean score of 4.8 ($SD = 1.9$) on the CIRS-G. Participants needed some help with ADLs, as noted by a mean Barthel Index score of 63.6 ($SD = 19.3$). The mean score for residents’ satisfaction with

Table 1. Sample Description

Variable	<i>n</i>	%	Range	<i>M</i>	<i>SD</i>
Resident level (<i>N</i> = 501)					
Age, years	—	—	66–104	87.9	7.27
Mini-Cog (3-word recall)	—	—	1–3	2.4	0.77
Function (Barthel Index)	—	—	3–80	63.6	19.35
Comorbidities (CIRS-G)	—	—	1–12	4.8	1.94
Satisfaction with assisted living	—	—	5–22	19.1	3.16
Gender			—	—	—
Male	138	27.5			
Female	363	72.5			
Race			—	—	—
White	483	96.4			
Black	15	3.0			
Asian	1	0.2			
Ethnicity			—	—	—
Not Hispanic or Latino	495	98.8			
Hispanic or Latino	5	0.2			
Marital status			—	—	—
Never married	48	9.6			
Married	104	20.8			
Widowed	293	58.6			
Divorced	42	8.4			
Facility level (<i>N</i> = 54)					
Facility size (number of beds)			31–164	82.2	26.21
Status				—	—
For profit	41	74.5			
Nonprofit	8	14.5			
Direct care workers day shift	—	—	2–10	6.6	2.19
Direct care workers evening shift	—	—	0–12	5.9	2.36
Activity staff hours per week	—	—	0–259	77.6	42.03
Function-focused care environment	—	—	11–18	15.4	1.63
Services provided on site (total)			1–6	4.2	1.80
Medical care	53	98.1			
Psychiatric services	30	55.6			
Dental care	33	61.1			
Podiatry care	43	79.6			
Dermatology care	30	55.6			
Pharmacist consultation	35	64.8			
Other	1	1.9			
Amenities available on site (total)			3–8	6.0	1.39
Beauty salon	54	100.0			
Library	50	92.6			
Computer room	37	68.5			
Gym or exercise facilities	34	63.0			
Café or coffee room	40	74.1			
Transportation services	49	90.7			
Social activities area	54	100.0			
Other	8	14.8			

Note. CIRS-G = Cumulative Illness Rating Scale for Geriatrics.

Figure. Final Multilevel Model



Note. *Significant at $p < .05$.

AL was 19.1 ($SD = 3.2$) out of 22 possible points based on the RSI.

The AL facility ranged in size from 31 to 164 beds, with a mean of 82 beds ($SD = 26.2$). The majority of settings were for profit ($n = 41$, 74%). The mean number of direct care workers on the day shift per setting was 6.6 ($SD = 2.2$), and on average there were 5.9 ($SD = 2.4$) direct care workers on the evening shift per setting. The mean combined total number of hours

worked per week by all activity staff at each setting was 77.6 hours ($SD = 42$). The mean number of health care services provided on site was 4.2 ($SD = 1.8$). The majority of settings offered medical care provided by a physician, nurse practitioner, or physician's assistant ($n = 53$, 98%); podiatry care ($n = 43$, 80%); pharmacist consultation ($n = 35$, 65%); dental care ($n = 33$, 61%); dermatology care ($n = 30$, 56%); and psychiatric services ($n = 30$, 56%). The mean number of amenities available on site was 6.0 ($SD = 1.4$). Most facilities had

a beauty salon ($n = 54$, 100%), social and recreational activities area ($n = 54$, 100%), library ($n = 50$, 93%), transportation services ($n = 49$, 91%), café or coffee room ($n = 40$, 74%), computer room ($n = 37$, 68%), and gym or exercise facilities ($n = 34$, 63%).

The hypothesized multilevel model is presented in the **Figure**. The intraclass correlation (ICC) was .089, which supports the use of multilevel modeling (Thomas & Heck, 2001). Model testing demonstrated that the model had a good fit with the data ($\chi^2/df = 1.89$, $p < .05$; CFI = .733, RMSEA = .043; SRMR-within = .003; SRMR-between = 0.118).

Results for the final multilevel model are shown in **Table 2**. Gender and function were significantly associated with residents' satisfaction with AL, accounting for 2.6% of the variance in residents' satisfaction with AL. Specifically, those who were female and had better physical function were more likely to be satisfied with living in AL ($B = .115$, $p < .05$; $B = .120$, $p < .05$, respectively). Factors representing the AL environment were not significantly associated with residents' satisfaction with AL.

DISCUSSION

This study tested a multidimensional model of the AL environment in relation to residents' satisfaction with AL. The findings suggest that gender and physical function are associated with residents' satisfaction with AL such that residents who are female and more functionally independent have higher satisfaction with AL. These findings are consistent with prior research (Abrahamson et al., 2012; Resnick et al., 2010). Contrary to the hypothesized model, the AL environment, which incorporated measures of staffing, health care services, amenities, and the physical environment, was not significantly associated with residents' satisfaction with AL. Prior research has, however, shown that having access to services and trained staff available to care for residents' needs (Abrahamson et al., 2013; Park, 2009; Street & Burge, 2012), as well as features of the physical environment, such as safe walking areas free from obstructions (Fleming et al., 2016; Nathan et al., 2014; Nordin et al., 2017) and plenty of opportunities for social engagement (Roberts & Adams, 2018; Yang & Stark, 2010), were associated with the satisfaction of residents in AL.

Table 2. Results for Final Multilevel Model

Dependent Variable	Independent Variable	Estimate	SE	p - Value	R ²
Within Level					
Satisfaction with assisted living	Gender	.115	.047	.014	.026
	Function	.120	.048	.012	
Between Level					
Staffing	Direct care workers (day)	.939	.089	< .001	.882
	Direct care workers (evening)	.792	.086	< .001	.627
	Activity staff hours per week	.364	.146	.013	.132
	Facility size	.491	.118	< .001	.241
Environment, services, and amenities	Physical environment				
	Health care services	.308	.143	.031	.095
	Psychiatric services	.793	.066	< .001	.629
	Dental care	.613	.097	< .001	.376
	Podiatry care	.673	.091	< .001	.453
	Dermatology care	.529	.116	< .001	.280
	Pharmacist consultation	.770	.079	< .001	.593
	Amenities				
	Computer room	.391	.128	.002	.153
	Gym or exercise facility	.396	.128	.002	.153
	Café area	.732	.079	< .001	.051
	Satisfaction with assisted living	Staffing	.091	.242	.707
Environment, services, and amenities		.203	.214	.343	

A number of plausible explanations exist for the lack of significant relationships between the AL environment and residents' satisfaction with AL in this study. First, there was limited variance in the measure used to assess residents' satisfaction given that the majority of participants reported a high level of satisfaction with AL, which is consistent with previous research

(Abrahamson et al., 2013; Resnick et al., 2010). Although the satisfaction measure used in this study has evidence of reliability and validity (Sikorska-Simmons, 2001), more challenging items may need to be added to better differentiate between residents with high satisfaction. Potential examples include evaluating residents' satisfaction with specific types of services (e.g., medical services, personal care) and amenities (e.g., library, exercise or recreational facilities). Additional questions could assess whether residents perceive the care they receive as addressing their individual needs and preferences. For example, residents could be asked if care staff incorporate their abilities, values, and personal preferences during care interactions. Evidence suggests that a person-centered approach is an effective strategy to improve the quality of care and satisfaction among residents in AL (Edvardsson, Varrailhon, & Edvardsson, 2013; Shippee et al., 2019).

The resident-level variables included in the final model—gender and physical function—explained only a small amount of variance (2.6%) in residents' satisfaction with AL. Therefore, much of the variance in residents' satisfaction was left unexplained. Additional factors should be considered in future research to more comprehensively explain satisfaction with AL, including aspects of the social environment such as residents' social support systems within the setting, relationships between staff and residents, and relationships between residents (Kemp, Ball, Hollingsworth, & Perkins, 2012; Park, Zimmerman, Kinslow, Shin, & Roff, 2012; Resnick et al., 2010; Street & Burge, 2012). The majority of residents require some assistance from staff with daily activities (Caffrey et al., 2012), and these care interactions may affect their overall satisfaction with AL. Thus, focusing on the quality of care interactions and residents' preferences for care may be particularly important for promoting person-centered approaches and residents' satisfaction with AL.

Future studies could include use of the Quality of Interaction Schedule (Dean, Proudfoot, & Lindesay, 1993), which is a reliable and valid measure that has been used to understand the quality of care interactions between older adults and health care staff. In addition, social support from family, friends, and staff is a critical factor to consider in explaining residents' satisfaction with AL. Earlier research suggests that residents who are able to develop strong positive relationships with

staff members and other residents tend to have more favorable perceptions about their living environment (Kemp et al., 2012; Park et al., 2012; Street & Burge, 2012). The Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988) could be used to measure the associations between residents' social support systems and their satisfaction with AL.

The sample of AL settings in this study was relatively homogeneous; most were quite similar in terms of size, service provisions, environments, and policies, which may have affected our ability to detect differences in predicting residents' satisfaction with AL. The majority of facilities in this study were considered large, with an average of 82 ($SD = 26$) beds; as a result, there may have been limited variation in the AL environment with regard to staffing levels, services, and amenities. Data from the 2010 National Survey of Residential Care Facilities (Khatutsky et al., 2016) showed that staffing levels are impacted by facility size such that residents in larger settings receive fewer hours of care from direct care workers compared with those in smaller settings. Larger settings also tend to have more health care services, amenities, and opportunities for social engagement, which are important for promoting residents' satisfaction with AL (Street, Burge, Quadagno, & Barrett, 2007). Conversely, smaller settings are often more home-like and socially cohesive because residents can easily congregate and interact in common areas without having to walk far, and this may increase some residents' satisfaction with the AL setting (Ausserhofer et al., 2016; Sandhu, Kemp, Ball, Burgess, & Perkins, 2013). Future studies should include a more diverse sample of AL settings with regard to facility size, as well as explore staffing ratios to better understand the impact of the AL environment on residents' satisfaction.

Additional study limitations are worth noting. This study included only AL settings in three states from a single region of the country, and the majority of residents were female and non-Hispanic White. Consequently, the findings cannot be generalized to all AL settings and residents across the United States. In addition, the outcome measure used to assess residents' satisfaction with AL was based on self-reports from participants and, thus, the results may have been biased by social desirability and residents' cognitive ability. In addition, only residents with mild cognitive impairment or intact cognition were included based on their three-item

recall on the Mini-Cog. Considering that approximately 42% of AL residents have some level of cognitive impairment (Caffrey et al., 2010), additional research is needed with residents who are more cognitively impaired, and measures need to be developed to evaluate satisfaction with AL among these residents. Finally, this study was a secondary analysis using baseline data; thus, further investigation is needed into the possible impact of changes in the AL environment on residents' satisfaction.

CONCLUSION

Given the projected increase in demand for AL and trends in the seniors housing industry, we need to understand how these settings can be designed to optimize the quality of care for residents. Examining residents' satisfaction with AL provides information about their preferences and needs that is useful in implementing a resident-oriented model of care. Further, information about factors in the AL environment that influence residents' satisfaction will help inform clinicians and administrators about areas that can be modified to improve satisfaction for the growing number of individuals expected to live in these settings in the future.

ACKNOWLEDGEMENT

This research was supported by grant number 1R01AG050516-01A1 from the National Institute on Aging.

TECHNICAL APPENDIX

Data Analysis

Structural equation modeling combines multiple regression and factor analysis to estimate a series of interrelated relationships that are hypothesized a priori (Ullman, 2006). Because observations within a group or cluster such as residents in an AL setting tend to be more alike compared with observations among other groups, the assumption of independence may be violated (Cohen, Cohen, West, & Aiken, 2003). Thus, multilevel modeling is an approach that allows for the use of clustered data to examine the magnitude of direct and indirect effects of predictors that explain variance at organizational (i.e., AL setting) and individual (i.e., resident) levels in relation to a particular

variable of interest (Heck & Thomas, 2015). It also permits group-level characteristics to be included in models of individual-level outcomes.

Intraclass correlation. The ICC measures the relatedness of individuals within a particular group (Dickinson & Basu, 2005). The ICC was derived for the dependent variable, satisfaction with AL, to calculate the proportion of total variance accounted for by the clustering of participants within AL settings. ICC values range from 0 to 1, with higher values indicative of the need to adjust for a potential clustering effect using multilevel modeling (Thomas & Heck, 2001).

Model fit estimates. For the χ^2/df , a ratio of ≤ 3.0 is considered to be a good fit of the model to the data (Bollen, 1989; Loehlin & Beaujean, 2016). The CFI evaluates model fit relative to the null model. Results range between 0 and 1, with numbers closer to 1 indicating better model fit (Ullman, 2006). RMSEA is a population-based index that calculates how well the hypothesized covariance matrix in the proposed model fits the observed covariance matrix per degree of freedom (Kline, 2015). SRMR is computed at the within and between levels in multilevel modeling and estimates the average standardized difference between the observed correlation and the model-predicted correlation (Muthén & Muthén, 1998). RMSEA and SRMR values of < 0.10 are considered acceptable and < 0.06 is good (Kline, 2015; Steiger & Lind, 1980). No established guidelines exist for interpreting SRMR at the between level and thus the criteria for single-level analyses were applied (Kline, 2015). We examined the squared multiple correlations (R^2) to estimate the amount of variance in satisfaction with AL explained by predictor variables and latent factors.

Description of multilevel model building and testing.

The process of developing and testing the multilevel model in this study proceeded in multiple steps. First, the resident-level model was developed using a random intercept model of residents' satisfaction with AL, with only resident-level predictors including age, gender, functional level, cognition, and comorbidities regressed on satisfaction with AL. All statistically nonsignificant ($p < .05$) relationships in the initial model were excluded from subsequent multilevel model building. Thus, age, cognition, and comorbidities were removed from the model. Once the resident-level model was specified with significant paths only, the setting-level variables

and latent factors were added to the final multilevel model. We did not include the following setting-level variables in the final multilevel model because they had zero or near-zero variance: on-site presence of medical services, beauty salon, library, transportation, and social activities area.

The following describes the final multilevel model shown in the **Figure**. At the within level, two observed variables, gender and function, are regressed on satisfaction with AL. At the between level, two latent factors “Staffing” and “Environment, Services, and Amenities” are regressed on satisfaction with AL and allowed to covary. The latent factor “Staffing” is measured by four indicators, including direct care workers day shift, direct care workers evening shift, activity staff hours, and facility size. The latent factor “Environment, Services, and Amenities” is measured by indicators of health care services, amenities, and the physical environment.

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