

# **CURRICULUM VITAE**

**Sarah D. Holmes, MSW**

**Doctoral Program in Gerontology**

**University of Maryland, Baltimore and Baltimore County**

**Contact information: sarahdeeholmes@gmail.com**

## **EDUCATION**

- 2019            PhD Candidate, Gerontology  
University of Maryland, Baltimore and Baltimore County
- 2012            Master of Social Work  
The Ohio State University, Columbus, Ohio  
Graduate Interdisciplinary Certificate in Aging
- 2010            Bachelor of Arts, Psychology; Minor, Gerontology  
Miami University, Oxford, Ohio

## **PROFESSIONAL EXPERIENCE**

- 2012 – 2015    Research and Outreach Coordinator  
University of Kentucky Sanders-Brown Center on Aging  
Alzheimer's Disease Research Center
- 2011 – 2012    Advanced Social Work Practicum  
Chalmers P. Wylie VA Ambulatory Care Center  
Department of Veterans Affairs, Columbus, OH
- Spring 2011    Social Work Practicum  
Ohio House of Representatives  
The Honorable State Representative Vernon Sykes
- Fall 2010        Social Work Practicum  
National Multiple Sclerosis Society

## **TEACHING EXPERIENCE**

- 2016 – Present    Instructor  
University of Maryland, Baltimore  
Inter-Professional Education Program in Geriatrics
- 2018                Adjunct Faculty  
University of Maryland Baltimore County, Social Work Baccalaureate Program  
SOWK 389: Human Behavior in the Social Environment II
- 2017                Guest Lecturer  
University of Maryland Baltimore County, Social Work Baccalaureate Program  
SOWK 389: Human Behavior in the Social Environment II
- 2012                Guest Lecturer  
The Ohio State University, Master’s Program in Social Work  
SOWK 695.24: Caregiving Across the Life Span

## **PROFESSIONAL SERVICE**

### **University Service**

- 2016 – Present    Secretary, Sigma Phi Omega, Delta Lambda Chapter  
Gerontology International Honors Society
- 2016 – 2018        Graduate Student Representative  
University of Maryland, Baltimore
- 2016 – 2018        Graduate Assistant Advisory Committee Member  
University of Maryland, Baltimore
- 2016 – 2018        GPILS Awards Committee Member  
University of Maryland, Baltimore
- 2015 – 2016        Grants Committee Member  
University of Maryland, Baltimore County
- 2015 – 2016        Graduate Student Representative  
University of Maryland, Baltimore County
- 2011 – 2012        Graduate Student Representative,  
The Ohio State University

### **Academic Service**

- 2018 – Present Ad-Hoc Reviewer  
International Journal of Older People Nursing
- 2016 – 2018 Ad-Hoc Reviewer  
Journal of Aging and Health
- 2016 – 2017 Ad-Hoc Reviewer  
The Gerontologist
- 2016 – 2017 Ad-Hoc Reviewer  
Journal of Gerontology
- 2017 Abstract Reviewer  
International Association of Gerontology and Geriatrics World Congress

### **Community Service**

- 2013 – 2015 Board Member  
Senior PRIDE Initiative, Lexington, Kentucky
- 2013 – 2015 Steering Committee Member  
I Know Expo, Lexington, Kentucky
- 2013 – 2015 Planning Committee Member  
Markesbery Symposium, Lexington, KY
- 2013 – 2014 Planning Committee Member  
Summer Series on Aging Annual Conference, Lexington, KY
- 2013 – 2014 Planning Committee Member  
Dementia Care Workforce Training Conference, Lexington, KY
- 2013 – 2014 Planning Committee Member  
Making Memories Fundraiser for Alzheimer's Association, Lexington, KY
- 2012 – 2014 Planning Committee Member  
Dementia Training for Health Care Providers, Lexington, Kentucky

### **PROFESSIONAL MEMBERSHIPS**

- 2017 – Present American Geriatrics Society (AGS)
- 2017 – Present Society for Behavioral Medicine (SBM)
- 2016 – Present Sigma Phi Omega, International Gerontology Honors Society
- 2014 – Present Association for Gerontological Education in Social Work (AGESW)
- 2012 – Present Gerontological Society of America (GSA)
- 2010 – Present National Association of Social Workers (NASW)

## HONORS AND AWARDS

- 2018 James McKenney Student Award  
Association for Gerontology in Higher Education
- 2017 Gerontology Early Career Development Award  
Doctoral Program in Gerontology  
University of Maryland, Baltimore and Baltimore County
- 2016 Carol A. Schutz Endowed Student Award  
Gerontological Society of America
- 2016 GGEAR Outstanding Presentation Award in Aging Research  
Graduate Research Conference, University of Maryland Baltimore
- 2012 Social Administration Student of the Year  
The Ohio State University, College of Social Work
- 2010 Dr. Carol J. Greco-Delaney Endowed Scholarship  
The Ohio State University, College of Social Work
- 2010 Outstanding Gerontology Minor of the Year  
Miami University, Department of Sociology and Gerontology
- 2006 – 2010 University Scholars Scholarship  
Miami University

## PUBLICATIONS

Gibson, A., Holmes, S.D., Fields, N., & Richardson, V.E. (in press). The need for culturally responsive services for caregivers of persons with dementia in rural areas. *Journal of Gerontological Social Work*.

Holmes, S.D., Smith, E., Resnick, B., Brandt, N., Cornman, R., Doran, K., & Mansour, D. (in press). Students' perspectives on clinical interprofessional education in geriatrics: A qualitative analysis. *Gerontology & Geriatrics Education*.

Resnick, B., Boltz, M., Galik, E., Holmes, S.D., Vigne, E., Fix, S., Zhu, S., Renn, C., Dorsey, S. (in press). Pain assessment, management, and impact among older adults in assisted living. *Pain Management Nursing*.

Resnick, B., Galik, E., Boltz, M., Vigne, E., Holmes, S.D., Fix, S., Zhu, S., Lewis, R. (2019). Psychometric testing of the assessment of environment and policy for optimizing function and physical activity in assisted living. *Journal of Housing for the Elderly*, 33(2), 153-172.

- Resnick, B., Galik, E., Boltz, M., Holmes, S.D., Fix, S., Lewis, R., & Vigne, E. (2018). Reliability and validity of the checklist for Function-Focused Care in service plans. *Clinical Nursing Research*.
- Resnick, B., Galik, E., Boltz, M., Vigne, E., Holmes, S.D., & Fix, S. (2018). Physical activity and function in assisted living residents. *Western Journal of Nursing Research*, 40(12), 1734-1748.
- Holmes, S.D., Galik, E., & Resnick, B. (2018). The mediating effect of resilience between social support for exercise and satisfaction in assisted living. *Journal of Housing for the Elderly*, 1-16.
- Resnick, B., Galik, E., Boltz, M., Holmes, S.D., Fix, S., Vigne, E., Zhu, S., & Lewis, R. (2018). Polypharmacy in assisted living and the impact on clinical outcomes. *Consultant Pharmacist*, 33(6), 321-330.
- Galik, E., Holmes, S.D., & Resnick, B. (2018). Differences between moderately to severely cognitively impaired fallers versus non-fallers. *American Journal of Alzheimer's Disease & Other Dementias*, 33(4), 247-252.
- Bardach, S.H., Moore, C., Holmes, S.D., Murphy, R.R., Gibson, A., Jicha, J.A. (2018). Positive life experiences following a dementia diagnosis. *OBM Geriatrics*, 2(3), 1-10.
- Bardach, S.H., Holmes, S.D., & Jicha, G.A. (2018). Motivators for Alzheimer's disease clinical trial participation. *Aging Clinical and Experimental Research*, 30(2), 209-212.
- Broster, L.S., Jenkins, S.L., Holmes, S.D., Edwards, M.G., Jicha, G.A., & Jiang, Y. (2018). Electrophysiological repetition effects in persons with mild cognitive impairment depend on working memory demand. *Neuropsychologia*, 11(7), 13-25.
- Richardson, V.E., Fields, N., Won, S., Bradley, E., Gibson, A., Rev, G., & Holmes, S.D. (2017). At the intersection of culture: Ethnically diverse dementia caregivers' service use. *Dementia*. doi:10.1177/1471301217721304
- Broster, L.S., Jenkins, S.L., Holmes, S.D., Jicha, G.A., Jiang, Y. (2017). Low arousal positive emotional stimuli attenuate aberrant working memory processing in persons with mild cognitive impairment. *Journal of Alzheimer's Disease*, 60(4), 1333-1349.
- Holmes, S.D., Galik, E., & Resnick, B. (2017). Factors that influence physical activity among residents in assisted living. *Journal of Gerontological Social Work*, 60(2), 120-137.
- Galik, E., Resnick, B., Vigne, E., Holmes, S.D., & Nalls, V. (2017). Reliability and validity of Resistiveness to Care Scale among cognitively impaired older adults. *Journal of American Medical Directors Association*, 18(1), 59-64.

Tarrant, S.D., Bardach, S.H., Bates, K., Nichols, H., Towner, J., Clay, T., Caban-Holt, A., Van Eldik, L.J., Schmitt, F. A., Murphy, R.R., Sperling, R., & Jicha, G.A. (2017). The effectiveness of small group community-based information sessions on clinical trial recruitment for the secondary prevention of Alzheimer's disease. *Journal of Alzheimer's Disease and Associated Disorders*, 31(2), 141-145.

Anderson, K.A., Dabelko-Schoeny, H.I., & Tarrant, S.D. (2012). A constellation of concern: Exploring the present and future challenges for adult day services. *Home Health Care Management & Practice*, 24(3), 132-139.

## **PRESENTATIONS**

Holmes, S.D., Galik, E., & Resnick, B. (2019). Testing the reliability and validity of the Resident Satisfaction Index in assisted living. Poster presented at the University of Maryland Baltimore Aging Research Symposium, Baltimore, MD.

Mattocks, N., Baik, S., Cheon, J.H., Holmes, S.D., Millar, R. (2019). Identifying pathways from neighborhood environments to hypertension in Baltimore City. Poster presented at the University of Maryland Baltimore Aging Research Symposium, Baltimore, MD.

Holmes, S.D., Galik, E., Boltz, M., & Resnick, B. (2019). Measurement of the assisted living environment and influence on function and physical activity. Poster presented at the annual meeting of the Society for Behavioral Medicine, Washington, D.C.

Resnick, B., Boltz, M., Galik, E., Holmes, S.D. (2018). Implementing function focused care in assisted living: Measurement challenges and solutions. Symposium presented at the annual meeting of the Gerontological Society of America, Boston, MA.

Galik, E., Resnick, B., Vigne, E., Holmes, S.D. (2018). Function and behavior focused care in nursing homes: From outcome to treatment fidelity. Symposium presented at the annual meeting of the Gerontological Society of America, Boston, MA.

Jao, Y., Liu, W., Galik, E., Chaudhury, H., Parajuli, J., Holmes, S.D. (2018). Does person-environment fit play a role on apathy in long-term care residents with dementia? Poster presented at the annual meeting of the Gerontological Society of America, Boston, MA.

Resnick, B., Holmes, S.D., & Galik, E. (2018). Function-Focused Care: Changing behavior in caregivers and cognitively impaired older adults. Symposium presented at the Society for Behavioral Medicine, New Orleans, LA.

Holmes, S.D., Smith, E., Resnick, B., Brandt, N., Cornman, R., Doran, K., & Mansour, D. (2018). Interprofessional education in geriatrics: Enhancing student interest and collaboration. Paper presented at the Association for Gerontology in Higher Education, Atlanta, GA.

Holmes, S.D., Gibson, A., Barnhart, S., Fields, N., & Richardson, V.E. (2017). It takes a community: Identifying support for rural-community dementia caregivers. Poster presented at the International Association of Gerontology and Geriatrics World Congress, San Francisco, CA.

Bardach, S.H. Holmes, S.D., Murphy, R.R., Ying, L., & Jicha, G.A. (2017). The relation between purpose in life, cognition, and health behaviors. Poster presented at the International Association of Gerontology and Geriatrics World Congress, San Francisco, CA.

Galik, E., Holmes, S.D., & Resnick, B. (2017). Reliability and validity of the Resistiveness to Care Scale among cognitively impaired older adults. Poster presented at the International Association of Gerontology and Geriatrics World Congress, San Francisco, CA.

Holmes, S.D., Galik, E., & Resnick, B. (2017). The mediating effect of resilience between social support for exercise and life satisfaction among older adults. Poster presented at the University of Maryland Baltimore Graduate Research Conference, Baltimore, MD.

Holmes, S.D., Galik, E., Resnick, B. (2016). Factors that influence physical activity among residents in assisted living. Poster presented at the annual meeting of Gerontological Society of America, New Orleans, LA.

Bardach, S.H., Holmes, S.D., & Jicha, G.A. (2016). Motivators for Alzheimer's disease clinical trial participation. Paper presented at the annual meeting of Gerontological Society of America, New Orleans, LA.

Holmes, S.D., Galik, E., Resnick, B. (2016). The use of psychotropic medications among residents with dementia. Paper presented at the annual meeting of Gerontological Society of America, New Orleans, LA.

Galik, E., Holmes, S.D., & Resnick, B. (2016). The relationship of psychotropic medication use and change in physical function and mood over time among long-term care residents with dementia. Poster presented at the annual meeting of the American Association for Geriatric Psychiatry, Washington, D.C.

Holmes, S.D., Galik, E., & Resnick, B. (2016). Factors that influence physical activity among residents in assisted living. Poster presented at the University of Maryland Baltimore Graduate Research Conference, Baltimore, MD.

Alam, M.A., Roy, N., Holmes, S.D., Gangopadhyay, A., Galik, E. (2016). Automated functional and behavioral health assessment of older adults with dementia. Paper presented at the IEEE Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE), Washington D.C.

Holmes, S.D. & Jicha, G.A. (2015). Purpose in life in persons with mild cognitive impairment and dementia compared to cognitively intact persons: An item level analysis. Poster presented at the annual meeting of the Alzheimer's Association International Conference, Washington, D.C.

Holmes, S.D. & Jicha, G.A. (2015). Attitudes about purpose in life among elders across the cognitive continuum. Poster presented at the annual meeting of the Gerontological Society of America, Orlando, FL.

Tarrant, S.D., Abner, E.L., Albrektson, K.R., Kenlan, D.E., Pursell, A.B., Welleford, A.S., & Jicha, G.A. (2014). Self-report of bio-psycho-social function in elders as a predictor for mild cognitive impairment. Poster presented at the annual meeting of the Gerontological Society of America, Washington, D.C.

Gibson, A. & Tarrant, S.D. (2014). Exploring the experiences of rural-community caregivers of persons with dementia. Paper presented at the annual meeting of the Gerontological Society of America, Washington, D.C.

Kenlan, D.E., Tarrant, S.D., Welleford, A.S., Pursell, A.B., Albrektson, K.R., & Jicha, G.A. (2014). Refined sugar intake associated with lower cognitive performance across the cognitive continuum but not associated with preclinical cognitive decline in intact elderly subjects. Poster presented at the annual meeting of the American Academy of Neurology, Washington, D.C.

Albrektson, K.R., Tarrant, S.D., Kenlan, D.E., Pursell, A.B., Welleford, A.S., & Jicha, G.A. (2014). An inverted U-shaped dose-response curve for aerobic exercise intensity associated with improved cognitive function in an elderly, community-dwelling cohort. Poster presented at the annual meeting of the American Academy of Neurology, Washington, D.C.

Fields, N., Won, S., Bradley, E., Rivera, G., Gibson, A., Tarrant, S.D., & Richardson, V.E. (2013). Cultural variability among dementia caregivers: A qualitative ethnocultural inquiry. Paper presented at the annual meeting of the Gerontological Society of America, New Orleans, LA.

Tarrant, S.D. & Gibson, A. (2012). Traumatic brain injury and dementia: Projected service needs for aging veterans. Paper presented at the annual meeting of the Ohio Association of Gerontology and Education, Youngstown, OH.



Tarrant, S.D. & Ripke, A. (2012). Managed long-term care: Ethical implications for elders and social workers. Paper presented at the annual meeting of National Association of Social Workers-Ohio Chapter, Columbus, OH.

Tarrant, S.D., Anderson, K.A., & Dabelko-Schoeny, H.I. (2011). A constellation of concern: Exploring the present and future challenges for adult day services. Paper presented at the annual meeting of the Ohio Association of Gerontology and Education, Columbus, OH.

Tarrant, S.D. & Thomas, R.D. (2010). Exploring the relationship between frontal lobe function and performance on face-name learning tasks. Poster presented at the Undergraduate Research Forum, Miami University, Oxford, OH.

## ABSTRACT

**Title:** Examining the Assisted Living Environment and Residents' Satisfaction with Assisted Living

**Sarah D. Holmes, Doctor of Philosophy, 2019**

**Dissertation Directed by:**

Barbara Resnick, PhD, CRNP, FAAN, FAANP, Professor, School of Nursing

Elizabeth Galik, PhD, CRNP, FAAN, FAANP, Professor, School of Nursing

**Background:** Understanding satisfaction with assisted living (AL) is essential for creating supportive environments that are specifically targeted toward the needs and desires of residents. Moreover, the AL environment may play an important role in residents' satisfaction with AL. Unfortunately, few measures have been developed and tested to evaluate residents' satisfaction with living in these settings. Additionally, limited research has examined the impact of the AL environment on residents' satisfaction with AL.

**Purpose:** The purpose of this dissertation was to: (1) develop and test a comprehensive AL environment measurement model; (2) evaluate the psychometric properties of the Resident Satisfaction Index (RSI) in a sample of AL residents; and (3) test the impact of the AL environment on residents' satisfaction with AL. Guided by the ecological theory of aging, it was hypothesized that controlling for residents' age, gender, functional level, cognition, and comorbidities, the AL environment would be significantly associated with residents' satisfaction with AL.

**Methods:** Secondary data analysis using baseline data from a study testing the Dissemination and Implementation of Function Focused Care in AL. A total of 501

residents in 54 AL facilities across three states were included in the sample. Structural equation modeling was used to test the AL environment model and examine associations between the AL environment and residents' satisfaction with AL. Rasch analysis and differential item functioning (DIF) analysis was used to evaluate the RSI.

**Results:** Findings showed that the AL environment model fit the data ( $\chi^2/df=1.861$ ,  $p<.05$ ; CFI=.858, RMSEA=.126). In addition, the RSI is a reliable and valid measure. Significant and substantive differences were noted on 6 items by cognition and gender. Finally, gender and function were significantly associated with residents' satisfaction with AL and accounted for 2.6% of the variance. The AL environment, based on staffing, health care services, amenities, and physical environment, was not related to residents' satisfaction with AL.

**Conclusions:** Understanding the interplay between individual and environmental factors that influence residents' satisfaction with AL will inform strategies to modify the environment to target the needs and preferences of residents and thereby improve residents' satisfaction with AL.

Examining the Assisted Living Environment and  
Residents' Satisfaction with Assisted Living

by  
Sarah D. Holmes

Dissertation submitted to the Faculty of the Graduate School of the  
University of Maryland, Baltimore in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
2019

©Copyright 2019 by Sarah D. Holmes  
All Rights Reserved.

## **DEDICATION**

This work is dedicated to my Grammie, Helen Oshel Tarrant.

I love you to the moon and back.

## ACKNOWLEDGEMENTS

I want to recognize and thank my village of people who have been with me as supporters and mentors throughout this academic journey. First and foremost, to my co-chairs and mentors, Dr. Barbara Resnick and Dr. Elizabeth Galik, I will be forever grateful for your guidance, patience, and encouragement over the past four years.

You have been committed to my success since day one in the doctoral program and have selflessly devoted countless hours to help guide me through every step of the way. I have so much admiration for you both. You have taught me the value of teamwork in research and I hope to continue to be on your team as I move forward beyond the dissertation.

I am thankful to my committee members, Dr. Ann Gruber-Baldini, Dr. Nancy Kusmaul, and Dr. Nancy Lerner. Your feedback and insights in the development of this research and encouragement throughout the process have been truly remarkable.

To all of my fellow doctoral students in gerontology, I am grateful for your wonderful friendship and support over the years. I have learned so much from each of you. Thanks for always being there and understanding the difficulty of this journey.

To my family, thank you for your unconditional love. Joey, you have shown me that every accomplishment, no matter how small, deserves a celebration. I am so grateful to be on this incredible life adventure with you. Jack, you have expanded my heart beyond belief and gave me the greatest distraction from research and writing.

My parents, John and Martha, you have always been my biggest cheerleaders and helped me believe that I can accomplish anything in life. Rebecca, Jonathan, and Olivia, thank you for your positive energy and continual encouragement. Last, but certainly not least, Grandpa Dee, you will forever and always be my inspiration.

## TABLE OF CONTENTS

DEDICATION.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS .....	v
LIST OF TABLES .....	vii
LIST OF FIGURES.....	viii
LIST OF ABBREVIATIONS.....	ix
CHAPTER 1: Introduction and Background.....	1
Residents’ Satisfaction with Assisted Living .....	3
Conceptual Framework.....	3
Purpose and Overview of Manuscripts.....	4
Developing and Testing an Assisted Living Environment Model (Manuscript 1) .....	5
Reliability and Validity of the Resident Satisfaction Index (Manuscript 2).....	5
Testing the Associations Between the Assisted Living Environment and Residents’ Satisfaction with Assisted Living (Manuscript 3).....	6
Definition of Terms .....	7
Assumptions of the Study.....	9
Summary.....	9
CHAPTER 2: Developing and Testing A Model of the Assisted Living Environment ...	10
Abstract.....	10
Background.....	11
Staffing .....	11
Services and Amenities .....	12
Physical Environment.....	13
Measures of the Environment .....	14
Methods .....	15
Results .....	19
Discussion.....	20
Study Limitations and Conclusion .....	25
CHAPTER 3: Reliability and Validity of the Resident Satisfaction Index in Assisted Living .....	29
Abstract.....	29
Background.....	30
Satisfaction with Assisted Living.....	31



Measurement of Satisfaction with Assisted Living.....	32
Methods .....	35
Results .....	40
Discussion.....	42
Study Limitations and Conclusion.....	46
CHAPTER 3: Testing the Associations Between the Assisted Living Environment and Residents' Satisfaction with Assisted Living .....	51
Abstract.....	51
Background.....	52
Satisfaction with Assisted Living.....	53
Factors that Influence Residents' Satisfaction with Assisted Living.....	53
Individual factors.....	54
Environmental factors.....	55
Methods .....	57
Results .....	64
Discussion.....	67
Study Limitations.....	70
CHAPTER 5: Discussion, Implications, and Recommendations.....	75
Introduction.....	75
Summary of Study Findings.....	76
Measurement of the Assisted Living Environment.....	76
Measurement of Residents' Satisfaction with Assisted Living .....	79
The Assisted Living Environment and Residents' Satisfaction with Assisted Living .....	82
Practice Implications .....	84
Recommendations for Future Research.....	85
Limitations and Strengths.....	86
Summary.....	86
References.....	87

## LIST OF TABLES

Table 1. Sample Description of Assisted Living Facilities .....	26
Table 2. Assisted Living Environment Model Estimates.....	27
Table 3. Resident Satisfaction Index.....	47
Table 4. Sample Description of Assisted Living Residents .....	48
Table 5. Rasch Analysis Fit Statistics for Resident Satisfaction Index .....	49
Table 6. Sample Description of Assisted Living Facilities and Residents .....	72
Table 7. Standardized Estimates for Final Multilevel Model.....	73

## LIST OF FIGURES

Figure 1. Assisted Living Environment Measurement Model.....	28
Figure 2. Item Mapping by Person Ability and Item Difficulty .....	50
Figure 3. Final Multilevel Model.....	74

## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Terms</b>
AL	Assisted living
CFI	Comparative fit index
CCRC	Continuing care retirement community
CIRS	Cumulative Illness Rating Scale
EAOFP	Environment Assessment to Optimize Function and Physical Activity
ESC	Evaluation to Sign Consent
DIF	Differential item functioning
FFC-AL-EIT	Function Focused Care in Assisted Living Using the Evidence Integration Triangle
ICC	Intraclass correlation
LSR	Life Satisfaction Ratings
MSPSS	Multidimensional Scale of Perceived Social Support
NCAL	National Center for Assisted Living
QuIS	Quality of Interaction Schedule
RMSEA	Root mean square error of approximation
RSI	Resident Satisfaction Index
SWLS	Satisfaction with Life Scale
SD	Standard deviation
SRMR	Standardized root mean square residual
SEM	Structural equation modeling
TESS-RC	Therapeutic Environment Screening Survey for Residential Care

## **CHAPTER 1: Introduction and Background**

Nearly one million older adults in the United States currently live in assisted living (AL) and these numbers are expected to continue to increase with the growth of the older population (Park-Lee et al., 2011). AL is a residential long-term care setting that provides a combination of housing and health care services to meet the individualized needs of residents (National Center for Assisted Living [NCAL], 2019). AL settings are appropriate for individuals who need long-term custodial care or supportive care, but do not require skilled nursing care. In recent decades, there has been substantial growth in the AL industry due to an increase in the older population, a desire to age in place within supportive care environments, and a desire to reside in a more homelike setting with greater emphasis on a social model of care rather than a medical model of care that is common among nursing homes. (Stevenson & Grabowski, 2010). Moreover, AL settings are the preferred long-term care option among older adults compared with nursing homes (Zimmerman et al., 2003) because they emphasize specific principles and philosophy of care (e.g., resident autonomy, privacy, and dignity) within their daily operations and environmental features.

AL settings are regulated at the state level (NCAL, 2019) and thus there is much heterogeneity across settings with regards to the staffing requirements, service delivery, and features of the physical environment. The majority of residents in AL receive assistance from direct care staff with activities of daily living including bathing (72%), dressing (52%), toileting (35%), eating (22%), and transferring (13%) as well as help with medication administration (87%) (Khatutsky et al., 2016). Additional health care services provided for residents may include medical care, psychiatric services, dental

care, podiatry care, dermatology services, or medication oversight by consultant pharmacists. States vary with regards to regulatory requirements for the provision of certain services and staffing levels (Stevenson & Grabowski, 2010). For example, only 14 states are required to have a consultant pharmacist provide a review of medications on a regular basis for all residents to ensure appropriateness and identify potential medication errors (Carder, O’Keefe, & O’Keefe, 2015). Likewise, approximately 19 states specify required staffing ratios for the number of direct care workers per resident in AL settings, although these ratios vary greatly across states (Carder, O’Keefe, & O’Keefe, 2015).

Whether health and supportive services are offered on site and adequately trained providers are available to address the needs of residents can affect the quality of care and potentially influence the likelihood of adverse outcomes for residents such as increased hospitalizations (Castle & Ferguson-Rome, 2015; Lerner, Johantgen, Trinkoff, Storr, & Han, 2014; Thomas, Mor, Tyler, & Hyer, 2012). Such differences in the organizational structure and service delivery across AL settings can also enable these environments to be tailored around the residents’ individualized needs and preferences and ultimately promote residents’ satisfaction with AL. Currently, there is limited information about the impact of the AL environment on residents’ satisfaction with living in AL. Given the recent growth in the AL industry and projected increase in demand, there is a need to understand how these settings can be designed to optimize residents’ satisfaction with AL to improve the quality of care for the growing number of residents expected to live in these settings in the future.

## Residents' Satisfaction with Assisted Living

Residents' satisfaction with living in the AL setting involves the evaluation of many components that are central in their daily lives such as meaningful relationships, participation in social activities, and a home-like physical environment (Edelman, Guihan, Bryant, & Munroe, 2006; Sikorska-Simmons, 2001; Street & Burge, 2012). Having access to health care services and positive interactions with care staff are also critical aspects of residents' life in AL (Abrahamson, Bradley, Morgan, Fulton, & Ibrahimou, 2013; Street & Burge, 2012). The Resident Satisfaction Index (RSI) (Sikorska-Simmons, 2001) is one of few measures that was specifically designed to assess residents' satisfaction with AL. However, there has been limited psychometric testing of the RSI, and what has been done has included relatively small samples from a single state (Sikorska-Simmons, 2001). Having a reliable and valid measure of residents' satisfaction with AL will help create supportive care environments that are specifically targeted at the needs and preferences of AL residents. Additionally, collecting information about residents' satisfaction with AL is important for AL owners and administrators, as resident satisfaction can have important implications on occupancy rates and residents' ability to successfully age in place (Campbell, 2015).

## Conceptual Framework

The ecological theory of aging (Lawton & Nahemow, 1973) is used as a guiding conceptual framework for understanding the many factors that may influence residents' satisfaction with AL. According to this theory, an older person's ability to function is the result of the fit between characteristics of the individual and his or her environment. This dynamic relationship between individuals' abilities and their environment determines the

extent to which a person will have favorable outcomes such as being satisfied with living in the setting. The ecological theory of aging suggests that certain environments may impose greater challenges or ‘press’ on individuals than others, and the degree of environmental press is balanced by the degree of abilities or ‘competence’ that the individual has to meet these challenges (Lawton & Nahemow, 1973). For example, having barriers in the physical environment such as cluttered pathways and limited access to outdoor areas may pose challenges for older adults in navigating their environment and thus negatively impact residents’ satisfaction with AL (Fleming, Goodenough, Low, Chenoweth, & Brodaty, 2016). In addition, too little challenge in the environment, such as having limited opportunities for social participation and lacking meaningful activities, can produce boredom or precipitate functional decline because individuals are not motivated to remain engaged with their environment (Horowitz & Vanner, 2010; Street & Burge, 2012). Understanding the interplay between individual and environmental factors that influence residents’ satisfaction with AL will inform strategies to modify the environment to specifically target the needs and preferences of residents and thereby improve residents’ satisfaction with AL.

#### Purpose and Overview of Manuscripts

The primary aims of this dissertation were to develop and test a comprehensive AL environment measurement model, evaluate the psychometric properties of the Resident Satisfaction Index in a sample of AL residents, and test the associations of the AL environment and residents’ satisfaction with AL. Using the ecological theory of aging (Lawton & Nahemow, 1973), it was hypothesized that controlling for residents’ age,



gender, functional level, cognition, and comorbidities, the AL environment would be significantly related to residents' satisfaction with AL.

#### Developing and Testing an Assisted Living Environment Model (Manuscript 1)

Manuscript #1 describes the development and testing of a comprehensive AL environment measurement model that includes staffing, health care services, amenities, and the physical environment. Prior studies have generally used singular measures of the environment that focus on the physical environment (e.g., spatial design of facilities, access to outdoor areas, walkability) (Lu, 2010; Fleming et al., 2016; Andersson, Ryd, & Malmqvist, 2014) or the social environment (e.g., social support, cohesion, relationships with staff) (Abrahamson et al., 2013; Street & Burge, 2012). This study contributes to the literature by providing a comprehensive model for measuring the AL environment that is multidimensional including staffing, health care services, amenities, and the physical environment. Using a sample of 54 AL facilities across three states, structural equation modeling was used to test the proposed model. Having a comprehensive AL environment measurement model will advance future research that explores the impact of the environment on resident outcomes.

#### Reliability and Validity of the Resident Satisfaction Index (Manuscript 2)

Manuscript #2 provides an evaluation of the psychometric properties of the Resident Satisfaction Index (RSI) (Sikorksa-Simmons, 2001). The RSI is a 22-item measure of residents' satisfaction with AL that 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., are staff kind and caring), and physical and social activities (e.g., satisfaction with activities offered,

opportunities to participate in interesting activities). This measure was evaluated in a sample of 501 AL residents using Rasch analysis. In addition, differential item functioning (DIF) analysis was used to examine how residents' satisfaction scores differed across subgroups of AL residents by age, gender, and cognitive status. Having a reliable and valid tool for measuring residents' satisfaction with AL is important for determining whether residents' needs and preferences are being met in AL settings.

Testing the Associations Between the Assisted Living Environment and Residents' Satisfaction with Assisted Living (Manuscript 3)

The ecological theory of aging recognizes that an optimal living environment is designed to meet the specific needs and preferences of older adults and was used as a framework for organizing factors in the AL environment that may contribute to residents' satisfaction with AL (Lawton & Nahemow, 1973). Guided by the ecological theory of aging, the purpose of this study was test the hypothesis that controlling for residents' age, gender, functional level, cognition, and comorbidities, the AL environment would be significantly related to residents' satisfaction with AL. Baseline data from a study testing the Dissemination and Implementation of Function Focused Care in AL was used in this study. The sample included a total of 501 residents from 54 AL facilities across three states. Multilevel structural equation modeling was used to test the proposed model. Findings from this study will help to inform clinicians and AL administrators about areas that can be modified to effectively implement a resident-oriented model of care and improve satisfaction with AL for residents.

## Definition of Terms

The conceptual and operational definitions of terms used in this study are as follows:

1. **Assisted living:** Assisted living is defined as a residential care setting for older adults that provides housing, 24-hour supervision, supportive services, and health care, or a combination of services to meet the individualized needs of residents (NCAL, 2019).
2. **Satisfaction with assisted living:** Residents' satisfaction with AL is conceptually defined as an evaluation of residents' perceptions of various aspects of life in AL such as health care services, relationships with staff, sense of home, and meaningful social activities which serve as an important indicator of the quality of care from the resident's perspective (Sikorska-Simmons, 2001). It is operationally defined as the total composite score on the Resident Satisfaction Index (Sikorska-Simmons, 2001) based on the four subscales that include perceptions of health care, the physical environment, relationships with staff, and activities.
3. **Assisted living environment:** The assisted living environment is defined as a multidimensional concept that has many interrelated components which include aspects of the organizational setting and service delivery such as staffing, health care services, amenities, and the physical environment (Greenfield, 2012; Moos, 1980). The AL environment is measured in this study based on indicators of the physical environment, staffing, health care services, and amenities.
4. **Health care services:** Health care services are defined as services provided to residents in AL settings that are intended to meet their chronic health care needs including medical care, psychiatric services, dental care, podiatry care,

- dermatology services, or pharmacist consultation. Health care services are operationalized as the total number of health care services provided at each AL setting.
5. Amenities: Amenities are defined as features or spaces in the AL setting that provide personal comfort or opportunities for social and recreational activity such as a beauty salon, gym or exercise facility, library, computer room, or common areas. Amenities are operationalized as the total number of amenities offered at each AL setting.
  6. Physical environment: The physical environment is composed of objective, measurable characteristics that may influence residents' physical and functional activities such as architectural features, accessibility, visual cues and signage, and lighting, and represents one component of the total AL environment (Cutler, 2000; Resnick et al., 2019). The physical environment is operationally defined as the total score on the Environment Assessment to Optimize Function and Physical Activity (EAOFP) (Resnick et al., 2019).
  7. Staffing ratios: Staffing ratios represent the direct care workforce in AL settings and ensure that there is sufficient staff that are qualified to provide services that meet the care needs of AL residents. Staffing ratios are operationally defined as the total number of working hours provided by direct care workers per resident per day in the AL setting.
  8. Cognitive status: Cognitive status is conceptually defined as the presence or absence of cognitive impairment. It is operationally defined as the score on the Mini-Cog (Borson et al., 2003) three-item recall screening test.

9. Physical function: Physical function is conceptually defined as the level of independence with activities of daily living such as bathing, dressing, grooming, feeding, transfers, and walking. It is operationally defined as the total score on the Barthel Index (Mahoney & Barthel, 1965).

### Assumptions of the Study

The following assumptions underlined the primary aims of the present study:

1. The presence of health care services, amenities, nursing and activity staff, and the physical environment could be measured by the selected instruments and accurately represented the assisted living environment.
2. Residents' satisfaction with assisted living could be measured by the selected instrument and represented an accurate reflection of their satisfaction with living in the setting.
3. Residents' perceptions about their satisfaction with assisted living can be influenced by setting level factors such as the availability of health care services, amenities, staffing, and the physical environment.

### Summary

This chapter described the purpose of this dissertation work, provided a background based on evidence in the empirical literature, and discussed the significance of this work. The ecological theory of aging was explained as the conceptual framework that guided this work. In addition, the research aims and hypotheses, definitions of terms, and assumptions of the study were described.

## **CHAPTER 2: Developing and Testing A Model of the Assisted Living Environment**

### **Abstract**

The assisted living (AL) environment plays an important role in supporting residents' satisfaction and helping them to age in place. The AL environment is multidimensional and has many interrelated components including staffing (e.g. direct care workers, nursing, activity staff), services provided (e.g. medical, mental health, pharmacy), amenities offered at the setting (e.g. beauty salon, library, exercise facilities), and the physical environment. Evidence suggests that aspects of the AL environment can enhance or detract from the physical function, well-being, social engagement, and behavioral outcomes among residents. The purpose of this study was to develop and test a multidimensional AL environment measurement model that includes indicators of staffing, services, amenities, and the physical environment. Baseline data was used from a study testing the Dissemination and Implementation of Function Focused Care in AL. A total of 54 AL facilities across three states were included in the sample. Settings ranged in size from 31 to 164 beds with an average size of 82.2 (SD=26.2) beds and the majority were for profit facilities (n=41, 74.5%). Structural equation modeling was used to test the proposed model. Results showed that the model fit the data ( $\chi^2/df=1.861$ ,  $p<.05$ ; CFI=.858, RMSEA=.126). Having a comprehensive AL environment measurement model will advance future research that explores the impact of the environment on resident outcomes. Findings from this study will inform interventions and programs designed to modify AL environments to optimize residents' satisfaction with AL.

## Background

Assisted living (AL) is a residential long-term care setting that provides a combination of housing and services for nearly one million older adults (Park-Lee et al., 2011). AL is an alternative to nursing home care for residents who do not require skilled nursing care. Settings are often designed to be home-like with specific principles embedded in the environment such as privacy, autonomy, independence, choice, and dignity (NCAL, 2018). As many residents in AL experience functional and cognitive decline over time (Caffrey et al., 2012), the AL environment plays a critical role in meeting their evolving care needs and supporting them to age in place.

The AL environment is multidimensional and has many interrelated components including staff (e.g. direct care workers, nursing, activity staff), health care services (e.g. medical, mental health, pharmacy), amenities (e.g. library, exercise facilities), and the physical environment (e.g. pleasant walking areas, sufficient lighting) (Fleming et al., 2016; Lu, 2010; Nordin et al., 2017a; Moos, 1980). A holistic assessment of the environment involves evaluating and integrating each of these dimensions to comprehensively understand how they impact resident outcomes such as quality of life.

## Staffing

Because the vast majority of AL residents require some assistance from staff with daily activities (Caffrey et al., 2012), the amount and type staffing provided in AL is a critical component of the environment. Personal care and supportive services are typically offered through direct care workers. Direct care workers are involved in caring for residents' daily needs, including personal hygiene, housekeeping, meals, and assisting

with medication administration. Other care staff in AL settings include registered nurses, social workers, activity staff, and rehabilitation therapists (Park-Lee et al., 2011).

Prior research has examined staffing in AL based on staffing ratios measured by calculating the total number of staffing hours per resident per day (Khatutsky et al., 2016). According to a recent review of the literature, the average number of hours for nursing staff (RNs, LPNs, direct care workers) per resident in AL is approximately 2.6 hours per day and the majority of this care is provided by direct care workers (Kisling-Rundgren et al., 2016). The amount of staffing provided at the setting may also be related to the size of the facility which can range from smaller facilities with 5 to 10 beds, to settings with more than 100 beds and multi-level campuses (Park-Lee et al., 2011). Data from the 2010 National Survey of Residential Care Facilities showed that in smaller facilities each resident received, on average, 3.63 hours of care from direct care workers per day compared with only 1.25 hours in larger settings with over 100 beds (Khatutsky et al., 2016).

### Services and Amenities

The transition to AL is often prompted by changes in functional abilities or increased service needs (Koenig, Lee, Macmillan, Fields, & Spano, 2014). With the vast heterogeneity in residents' care needs and service availability across AL settings, assessments of the environment should evaluate whether a wide range of services are available for residents. According to the 2010 National Survey of Residential Care Facilities, the majority of residents receive assistance with activities of daily living including bathing (72%), dressing (52%), toileting (35%), eating (22%), and transferring (13%) (Khatutsky et al., 2016). Additional health care services provided for residents



may include medical care, psychiatric services, dental care, podiatry care, dermatology services, or pharmacist consultation. States vary with regards to regulatory requirements for the provision of services. For example, Maryland requires that AL facilities contract with or employ a licensed pharmacist to conduct an on-site review of medications for residents at least every 6 months (Code of Maryland Regulations [COMAR], 2019).

Whereas in Pennsylvania, AL facilities must provide assistance with medication administration but there are no requirements about consulting with licensed pharmacists as part of the services provided (Pennsylvania Code Chapter 2800, 2019).

The availability of amenities in AL settings represents another aspect of the AL environment. Amenities are defined as those that provide personal comfort (e.g., massage therapy, beauty salon) and social and recreational activities such as a movie theater/television room, a gym/exercise facility, library, computer room, or common areas (Andersson, Ryd, & Malmqvist, 2014; Fleming et al., 2016; Sikorska, 1999). Some AL settings also have cocktail bars, particularly those that are part of continuing care retirement community (CCRC) settings, swimming pools, areas for gardening, and spaces for artistic endeavors such as painting, quilting, and woodworking.

### Physical Environment

The physical environment in AL includes factors such as the building design and architectural features, safety and accessibility, visual cues and signage, lighting, as well as having appropriate bed, chair, and toilet height to meet residents' functional needs (Nordin et al., 2017a; Resnick et al., 2019). Qualitatively, residents have reported that long corridors and the absence of hand rails serve as barriers to engaging in physical

activity. Conversely, smooth flooring and automatic doors facilitate physical activity (Nordin et al., 2017a).

Evidence suggests that the spatial design and features in the AL environment can impact residents' residents' well-being, functioning, and social engagement (Nathan, Wood, & Giles-Corti, 2013; Nordin, McKee, Wijk, & Elf, 2017b; Yang & Stark, 2010). Numerous studies have demonstrated an association between the environment and behavioral and psychological symptoms associated with dementia and quality of life (Bicket et al., 2010; Marquardt, Bueter, & Motzek, 2014; Wood-Nartker, Guerin, & Beuschel, 2014). Physical environmental features related to resident safety such as having walking areas without obstructions, adequate lighting, and handrails are key factors in supporting residents' mobility (Lu, 2010; Nordin et al., 2017a). Likewise, poorly designed environments can impose barriers for residents leading to negative outcomes such as decreased physical activity, functional decline, and social isolation (Benjamin, Edwards, & Caswell, 2009; Kemp, Ball, Hollingsworth, & Perkins, 2012; Lu, 2010).

#### Measures of the Environment

Measures of the environment in AL have tended to focus on the physical environment such as the Therapeutic Environment Screening Survey for Residential Care (TESS-RC) (Zimmerman et al., 2005) and the Environment Assessment to Optimize Function and Physical Activity (EAOFP) (Resnick et al., 2019). These measures involve observing various aspects of facilities such as private apartments, common spaces, and outdoor areas and assessing whether specific features (e.g., safe areas for walking, sufficient lighting) are present or not present. Scores are summed for a total score with

higher positive scores on the TESS-RC suggestive of better environmental quality. Similarly, for the EAOPF, higher scores are indicative of environments that are better for optimizing function and facilitating mobility for residents.

Given that there are factors in the AL environment in addition to the physical aspects of the environment that are important for meeting the health, functional, and social needs of residents, the purpose of this study was to develop and test a comprehensive, multidimensional model of the AL environment (Figure 1). Having an AL environment model that includes factors related to staffing, health care services, amenities, and the physical environment will advance measurement of the AL environment and allow researchers and clinicians to evaluate the impact of the environment on clinical outcomes. In addition, a comprehensive model of the environment in AL can be used to develop interventions to improve the environment and thereby impact clinical outcomes for residents.

## Methods

### Design

This study used baseline data from the first and second cohorts in the dissemination and implementation study, Function Focused Care in Assisted Living Using the Evidence Integration Triangle (FFC-AL-EIT) (Resnick et al., 2018). Function focused care is a philosophy of care in which older adults are encouraged to participate in physical activity during care interactions. The FFC-AL-EIT study was focused on disseminating and implementing the Function Focused Care approach in assisted living 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.

### Recruitment and Sample

The sample included 54 AL facilities in Maryland, Pennsylvania, and Massachusetts. Settings were invited to participate if they: (1) had at least 25 beds; and (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 phone, tablet or computer. AL settings were excluded if they had previously participated in a FFC-AL study.

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. In addition, postings on relevant websites and emails to industry organization listservs were done to generate interest. AL settings that were eligible and expressed interest in participating were randomized to one of three cohorts and then randomized to treatment (FFC-AL-EIT) or the education only control (FFC-EO) groups. The FFC-AL-EIT intervention is implemented by a research nurse who works with an identified in-house function focused care champion and stakeholder team. These individuals help to identify and address setting specific needs and challenges as well as motivate direct care workers to embrace the FFC approach. Settings randomized to the FFC-EO group received only education about the importance of physical activity and maintaining functional abilities for residents. The study was reviewed and approved by a University based Institutional Review Board.

## Measures

Descriptive data were collected about the AL facilities including facility size based on the total number of beds, profit status, number of direct care workers on day shift and evening shift, and numbers of hours per week worked by activity staff in each setting. Information was also collected about whether the following health and supportive services were provided at the setting: medical care, psychiatric services, dental care, podiatry care, dermatology care, pharmacist consultation, and other services. Data was also collected about 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. Research evaluators indicated whether the listed services and amenities were present or not present at each setting. Scores were summed to indicate the total number of services and total number of amenities per setting.

Environment observational assessments were completed in each of the settings by research evaluators prior to implementation of the FFC-AL-EIT intervention using the Environment Assessment to Optimize Function and Physical Activity (EAOFP) (Resnick et al., 2019). The EAOFP includes 18 items which 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 were areas for residents to walk, there were cues in the environment to encourage physical activity, and the environment was 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 the residents. The scores are then summed for a maximum total score of 18. Prior testing of the EAOFP provided evidence of item reliability and inter-rater reliability based on Rasch analysis (item reliability=0.92; item separation=3.47; kappa=0.40) (Resnick et al., 2019).

#### Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software program version 23.0. Descriptive statistics including means, proportions, and ranges were used to describe the sample. Model testing was done using structural equation modeling (SEM) and the AMOS statistic program (Arbuckle, 1997). SEM is a multivariate approach that combines multiple regression and factor analysis to estimate a series of interrelated relationships among multiple variables which are hypothesized a priori (Ullman, 2006). The process of developing and testing the measurement model in this study allows for the assessment of whether observed variables relating to components of AL settings are indeed good indicators of the AL environment.

The sample covariance matrix was used as input and a maximum likelihood solution employed. The hypothesized measurement model specified two latent factors which were allowed to covary: (1) physical environment, services, and amenities and (2) staffing. Each observed indicator was constrained to load only on the factor it was designated to measure and the error terms were uncorrelated. Model fit was estimated based on chi square divided by degrees of freedom ( $\chi^2/df$ ), root mean square error of approximation (RMSEA), and comparative fit index (CFI). The larger the probability associated with  $\chi^2/df$  the better the fit of the model to the data. A ratio of  $\leq 3.0$  is considered to be a good fit (Bollen, 1989; Loehlin & Beaujean, 2016). A RMSEA value

of  $< .10$  is considered good, and  $< 0.06$  is very good (Steiger & Lind, 1980). The CFI evaluates model fit relative to the null model. The results range between 0 and 1 with numbers closer to 1 indicative of better model fit (Ullman, 2006).

For reliability testing, squared multiple correlations ( $R^2$ ) were examined to estimate the percent of variance in a given indicator variable explained by its latent factor which was interpreted as the reliability of the indicator. Ideally,  $R^2$  should be  $\geq .50$  (Bollen, 1989). Validity testing was based construct validity and how well the measured variables function within the model as theoretically expected. Standardized estimates for each factor loading were evaluated based on the magnitude of parameter estimates and statistical significance at the  $p < .05$  level.

## Results

As shown in Table 1, the size of AL settings ranged from 31 to 164 beds with an average size of 82.2 (SD=26.21) beds. The majority of the settings were for profit ( $n=41$ , 74.5%). On average, there were 6.60 direct care workers on day shift per setting (SD=2.19) and 5.93 direct care workers on evening shift per setting (SD=2.36). The mean number of hours per week for activity staff at each setting was 77.6 (SD=42.03). The mean number of health and supportive services provided on site was 4.19 (SD=1.80) and the majority of settings offered medical care ( $n=53$ , 98.1%), podiatry care ( $n=43$ , 79.6%), pharmacist consultation ( $n=35$ , 64.8%), dental care ( $n=33$ , 61.1%), dermatology care ( $n=30$ , 55.6%), and psychiatric services ( $n=30$ , 55.6%). The mean number of amenities available on site was 6.04 (SD=1.39) and most settings had a beauty salon ( $n=54$ , 100%), social and recreational activities area ( $n=54$ , 100%), library ( $n=50$ , 92.6%), transportation

services (n=49, 90.7%), café or coffee room (n=40, 74.1%), computer room (n=37, 68.5%), and gym or exercise facilities (n=34, 63.0%).

### Validity Testing

The hypothesized two-factor measurement model is presented in Figure 1. The proposed model fit the data ( $\chi^2/df=1.861$ ,  $p<.05$ ; CFI=.858, RMSEA=.126). The path parameter results are shown in Table 2. All four indicators of staffing were significantly associated with one latent factor, labeled staffing, with standardized estimates ranging from .361 to .942. Likewise, the three indicators representing physical environment, services, and amenities loaded onto a second latent factor, labeled Physical Environment and Services, with standardized estimates ranging from .385 to .885.

### Reliability Testing

The  $R^2$  for variables associated with the Staffing latent factor were .89 for day shift direct care workers, .62 for evening shift direct care workers, .25 for facility size, and .13 for activity staff. The  $R^2$  for variables associated with the Physical Environment and Services latent factor ranged from .73 for amenities, .49 for on-site services, and .15 for the physical environment.

## Discussion

The findings from this study provide some support for a comprehensive measurement model of the AL environment that includes staffing, services, amenities, and the built environment. The factor loadings for all indicators were statistically significant at the  $p<.05$  level suggesting that they were acceptable measures of the latent factors. The hypothesized two-factor model had a good fit with the observed data. Specifically, the  $\chi^2/df$  value was below the recommended cut point of 3.0 and the CFI



value of .858 is considered acceptable. The RMSEA value of .126 is above the ideal target of less than .06 and may be due to the relatively small sample size used in this study. RMSEA is a population-based index that calculates how well the hypothesized covariance matrix in the proposed model fit the observed covariance matrix per degree of freedom (Kline, 2015). The RMSEA decreases if there are more degrees of freedom and/or a larger sample size (Kline, 2015). Prior research suggests that studies with small sample sizes can have artificially large RMSEA values and falsely indicate a poor fitting model (Kenny, Kaniskan, & McCoach, 2015). Post-hoc model modifications were not conducted because it was determined that the goodness-of-fit indices suggest the model fit was adequate.

Several of the observed indicators in the proposed AL environment model had low  $R^2$  values reflecting a large amount of error associated with those measures and the latent variable. Specifically, activity staff hours had an  $R^2$  of .13 and the measure of the physical environment had an  $R^2$  of .15. It is possible that including additional items in the model could help to better explain the latent factors and minimize error. For example, registered nursing hours could be included within the staffing component of the model, as facilities with high turnover among nursing staff have been associated with poor clinical outcomes in long-term care (Dellefield, Castle, McGilton, & Spilsbury, 2015; Lerner, Johantgen, Trinkoff, Storr, & Han, 2014). Additionally, other amenities in AL settings could be examined such as the availability of complementary medicine including massage or acupuncture, and more details about each of the amenities may further inform the model and improve the fit (e.g., the types of activities provided such as bingo, field trips or exercise classes; the frequency and types of health and supportive services).

The majority of AL facilities in this study reported the provision of a number of services and amenities on site such as medical care, podiatry care, pharmacist consultation and dental care as well as a beauty salon, activities area, library, and transportation services. All (100%) of the AL facilities reported that a beauty salon and library was available on site. Because the AL facilities in this sample were considered relatively large with at least 25 beds, they may have had more resources than smaller AL settings and were therefore able to offer a number of services and amenities for residents (Kisling-Rundgren et al., 2016). Large AL facilities (i.e. more than 25 beds) make up about 35 percent of all AL settings nationally and represent approximately 81 percent of the AL resident population (Park-Lee et al., 2011). More research in smaller AL facilities may be warranted to accurately describe the services and amenities in these settings.

Having a gym or exercise facility on site was the least frequent amenity reported at AL settings with only 34 facilities (63%) responding that a gym or exercise area was available for residents. This is particularly concerning given that the majority of residents in AL spend most of their time being sedentary (Hall & McAuley, 2011; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2010; Wyrick, Parker, Grabowski, Feuling, & Ng, 2008). Prior research indicated that not having access to a gym or exercise equipment decreased motivation of residents to engage in physical activity (Nathan et al., 2013). The focus of this study was on the measurement of the environment and the availability of services and amenities and not on how often these resources were actually being utilized by the residents. Quantification of use will be necessary to continue to expand the understanding of the impact of the environment on clinical outcomes among residents.

There was variability in the types of health care services provided for residents across AL settings which may be reflective of differences in regulatory requirements for the provision of services (Carder et al., 2015). The most frequent service available was medical care (98.1%) provided by a physician, physician's assistant, or nurse practitioner. It is not known how prevalent on-site medical services are in AL nationally, as few studies have explored medical care in AL and the 2010 National Survey of Residential Care Facilities did not measure whether this service is available for residents (Caffrey et al., 2012). One prior study suggests that physicians perceive numerous barriers to providing medical care for AL residents such as administrative and regulatory issues (e.g., more phone calls and paperwork) and a lack of confidence in AL staff that make providing care more complex and time consuming compared with other types of settings (Sloane et al., 2011). Traditionally, AL has been viewed as a community-based social model of care with an emphasis on values such as autonomy, privacy, choice, independence, and dignity as opposed to a medical model of service delivery that is associated with the more institutionalized nursing home care which may contribute to the unique challenges in providing medical services in these settings. Given that the majority of AL residents have multiple chronic conditions which require ongoing medical management (Caffrey et al., 2012), the provision of medical services in AL represents a poorly understood yet important component of the AL environment.

This study also found that 61.1% of AL facilities in our sample provide dental care for residents which is much higher than has been documented in prior research (Dounis, Ditmyer, McCants, Lee, & Mobley, 2012). It has been previously reported that only one-third of AL residents have used dental services in the past year and one-quarter

have at least one oral health problem (Saarela, Soini, Muurinen, Suominen, & Pitkälä, 2013), thus improving accessibility to dental care for AL residents could have a significant impact on clinical outcomes in this population such as reducing adverse health events (e.g., hospitalizations, emergency department visits).

Although this study focused on measures of staffing, services, amenities, and the physical environment to describe the AL environment, additional factors may be important to include in this environmental model. For example, given that extensive research continues to suggest the importance of social relationships for older adults (e.g., relationships between residents and staff, co-resident relationships, social support) (Kemp et al., 2012; Park et al., 2012; Street & Burge, 2012), including measures of the social environment may be of particular importance in future research. For example, the Multidimensional Scale of Perceived Social Support (MSPSS) has been used in prior research to assess older adults' social support adequacy from family, friends, and significant others (Zimet, Dahlem, Zimet, & Farley, 1988; Park et al., 2012). In addition, the Quality of Interaction Schedule (QuIS) (Dean, Proudfoot, & Lindesay, 1993) could be added to better understand interactions between AL residents and staff.

The multidimensional characterization of the AL environment is consistent with the theoretical and conceptual literature (Fernandez-Ballasteros, 2001; Greenfield, 2012; Moos, 1980). Whereas much of the prior research has examined components of the AL environment individually such as characteristics of the built environment (e.g., safety, design, walkability) (Lu, 2010; Nathan et al., 2013; Rodiek et al., 2013) or residents' perceptions about services and amenities in AL (Abrahamson et al., 2013; Andersson et al., 2014), few studies have included and tested all of these indicators in a single model.

The development of a comprehensive measurement model of the environment tested using SEM represents a significant contribution to the empirical literature. The findings from this study provide a foundation for future research to build on the current model of the AL environment.

#### Study Limitations and Conclusion

This study is limited by the small sample size of just 54 facilities and sample selectivity in that it only includes AL settings from a single region of the country. The majority of AL settings in this study were considered large in size with on average 82.2 (SD=26.21) beds. Thus, results cannot be generalized to all AL settings nationally. In addition, there were other components of the AL environment which may be relevant to consider but were not included in this study such as the quality of the interactions between staff and residents, the social environment, and the interaction with the outside community (e.g., local libraries, community centers, or child care centers). Despite these limitations, this study provides a comprehensive model of the AL environment that can be used to describe the AL environment and consider the impact of this environment on clinical outcomes among residents. In addition, the AL environment measurement model developed and tested in this study can be used to inform interventions and programs designed to modify AL environments to optimize residents' life satisfaction in these settings. With the vast heterogeneity across AL settings in regards to services, amenities, staffing, and other environmental features, findings ways to accurately assess the AL environment will support further research aimed at changing the environment to improve the lives of the increasing number of residents expected to live in these settings in the future.

Table 1. Sample Description of Assisted Living Facilities (N=54)

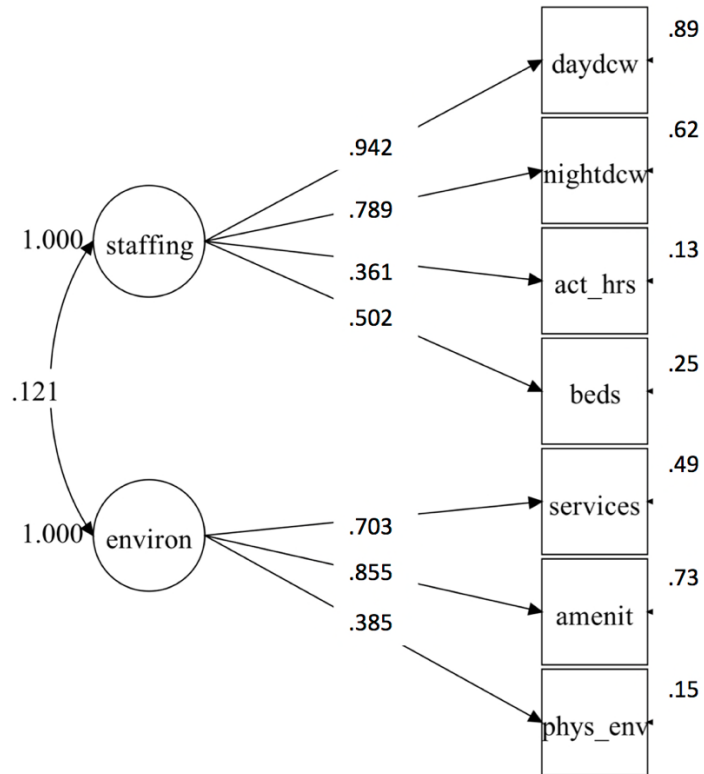
Variable	N	Percent	Range	Mean	Std. Dev.
Facility size (# beds)			31 – 164	82.20	26.21
Profit status					
For profit	41	74.5			
Non profit	8	14.5			
Direct care workers day shift			2 – 10	6.60	2.19
Direct care workers evening shift			0 – 12	5.93	2.36
Activity staff hours per week			0 – 259	77.60	42.03
Function Focused Care Environment			11 – 18	15.38	1.63
Services provided on site (total)			1 – 6	4.19	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	6.04	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			

Table 2. Assisted Living Environment Model Estimates (N=54)

Parameter Estimate	Unstd. (SE)	Std.	Sig.	R <sup>2</sup>
Total # services on site <-- SERVICES	1.00	.703	NA	.49
Total # amenities on site <-- SERVICES	.94 (.40)	.855	.02	.73
Physical Environment <-- SERVICES	.49 (.21)	.385	.02	.15
Direct care workers day shift <-- STAFFING	1.00	.942	NA	.89
Direct care workers evening shift <-- STAFFING	.90 (.19)	.789	.00	.62
Activity staff hours per week <-- STAFFING	7.33 (3.08)	.361	.01	.13
Facility size <-- STAFFING	6.37 (1.93)	.502	.00	.25

*Note: Unstd=unstandardized; SE=standard error; Std=standardized; Sig=significance.*

Figure 1. Assisted Living Environment Measurement Model





## **CHAPTER 3: Reliability and Validity of the Resident Satisfaction Index in Assisted Living**

### **Abstract**

Understanding satisfaction with assisted living (AL) from the residents' perspective is essential for creating supportive environments that are specifically targeted toward the needs and desires of residents. Unfortunately, few measures have been developed and tested to evaluate residents' satisfaction with living in these settings. The purpose of this study was to test the reliability and validity of the Resident Satisfaction Index (RSI) which was designed to measure residents' satisfaction with AL. Baseline data was used from a study testing the dissemination and implementation of function focused care in AL. A total of 501 participants from 54 assisted living facilities across three states were included in the sample. Based on Rasch analysis, there was support for item reliability, with an item separation of 4.54 and item reliability of 0.95. The INFIT and OUTFIT statistics were all in acceptable range suggesting that each item on the RSI fit the appropriate concept. Differential analysis was done to examine differences in the difficulty of each item by age, gender, and cognition. There were significant and substantive differences identified by gender (items 16, 18, 19, 20, 22) and cognition (item 15) for items related to relationships with staff and participation in social activities, although there were no differences by age. Findings suggest the RSI is a reliable and valid measure to assess residents' satisfaction with AL and can be used to guide administrators and clinicians in making changes in these settings to increase residents' satisfaction.

## Background

Assisted living (AL) is broadly defined as a residential care setting for older adults that provides personal care, 24-hour assistance, and social and health-related services (National Center for Assisted Living [NCAL], 2018). Currently, there are more than 835,000 adults in the United States who live in AL (Harris-Kojetin et al., 2016). AL settings are typically appropriate for individuals who need long-term custodial care or supportive care, but do not require skilled nursing level of care. Several studies have recognized the increasingly complex health issues of AL residents (Caffrey et al., 2012; Mitchell, 2013). The average AL resident is over 85 years old, widowed, and has multiple chronic conditions (Park-Lee et al., 2011). Four out of ten residents in AL require assistance with at least three activities of daily living and 42 percent have some level of cognitive impairment (Caffrey et al., 2012). In recent decades, there has been substantial growth in the AL industry due to an increase in the older population, a desire to age in place within supportive care environments, and an avoidance of more institutionalized nursing homes (Stevenson & Grabowski, 2010).

AL settings are designed with specific principles embedded within their daily operations that promote resident autonomy, independence, privacy, and dignity (NCAL, 2018). With an emphasis on a resident-oriented philosophy of care, AL settings are the preferred long-term care option among the majority of older adults compared with nursing homes (Zimmerman et al., 2003). Despite the increasing demand and preference for AL, there are few measures designed to assess whether residents are satisfied with living in these settings. Understanding satisfaction with AL from the residents' perspective is essential for creating supportive environments that are specifically targeted

at the needs and desires of residents. This information is also important for AL owners and administrators, as resident satisfaction can have important implications on occupancy rates and residents' ability to successfully age in place (Campbell, 2015).

### Satisfaction with Assisted Living

Satisfaction with AL is a multidimensional concept that serves as an important indicator of the quality of care from the resident's perspective (Neugarten, Havighurst, & Tobin, 1961; Sikorska-Simmons, 2001). Perceptions of satisfaction with AL are based on the individual comparing their current situation with expectations about the quality of a self-determined standard. Evidence suggests that in long-term care settings, satisfaction involves many components that are considered important to residents including meaningful relationships, social activities, and a home-like physical environment (Edelman, Guihan, Bryant, & Munroe, 2006; Sikorska-Simmons, 2001; Street & Burge, 2012). Having adequate access to health care and positive interactions with care staff are also critical aspects of residents' life in AL (Mitchell, 2013; Rioux & Warner, 2011).

There are a multitude of factors that are associated with satisfaction with AL, including resident characteristics as well as social and organizational factors. Specifically, residents' gender, cognition, health status, social networks, and mood have been shown to influence their satisfaction with AL, such that those who are male, have more depressive symptoms, and fewer social supports report lower levels of satisfaction (Curtis et al., 2005; Resnick et al., 2010). Additionally, residents with more severe physical or cognitive impairments and those who have less cohesive social environments report receiving lower quality of care and unmet care needs which could impact perceptions of their satisfaction with AL (Mitchell, 2013; Moos, 2012). Finally,

organizational factors within AL facilities such as the size, profit status, physical amenities, and social and recreational programming are important predictors of residents' satisfaction with AL (Sikorska, 1999; Sikorska-Simmons, 2005).

#### Measurement of Satisfaction with Assisted Living

There are several benefits of monitoring and assessing residents' satisfaction with AL. Collecting and disseminating current information on residents' satisfaction with AL could help to facilitate consumer choice. Choosing a long-term care setting is often challenging for older adults and their families, thus having information about residents' satisfaction would assist consumers in the selection process (Burge & Street, 2010). In addition, publicly available satisfaction information provides feedback to facility administrators and policymakers to drive efforts in identifying problem areas and developing performance improvement strategies (Crystal et al., 2004; Wilson, 1996). Since 2010, the NCAL has been committed to measuring quality in AL by collecting performance measures annually on a variety of indicators at the facility level including staff training and retention programs, hospital readmissions, the use of antipsychotic medications, and the use of quality improvement tools (NCAL, 2015). The response rate for these annual surveys has been relatively low (less than 10 percent), however, and they do not incorporate the perspective of the residents or specific resident outcomes (NCAL, 2015).

There are a number of measures that have been developed to evaluate satisfaction in the adult population. Unfortunately, some of these measures consist only of a single item such as, "Are you satisfied with life?" (Abrahamson et al., 2013; Andrews & Withey, 1976; Cantril, 1965), which does not take into account the multiple dimensions

that make up the concept of satisfaction with AL. Also, the majority of satisfaction measures were not designed specifically for AL residents and thus may not contain items that are particularly relevant to the daily lives of residents in AL such as their perceptions of staff (Neugarten et al., 1961; Diener et al., 1985).

Neugarten and colleagues (1961) created and refined the Life Satisfaction Ratings (LSR) for the geriatric population. This measure consists of the following five components of life satisfaction rated on a 5-point Likert scale: zest versus apathy, resolution and fortitude, congruence between desired and achieved goals, self-concept, and mood tone. Individuals are considered to score high in life satisfaction if they take pleasure in daily activities, regard their life as meaningful, feel that they have achieved their life goals, have a positive self-image, and maintain an optimistic attitude and mood. The LSR has been used and validated in both urban and rural samples of older adults with some evidence of reliability based on discrimination value and point biserial correlations (Adams, 1969; Wood, Wylie, & Sheafor, 1969) as well as construct validity using standardized measures of psychological well-being (Lohman, 1980). Similar to the LSR, the Satisfaction with Life Scale (SWLS) was developed to assess general life satisfaction, although it differs in that it is intended for use with all age populations from adolescents to adults (Diener et al., 1985). The SWLS contains five items such as, “The conditions of my life are excellent,” and respondents are asked to what extent they agree or disagree on a 7-point Likert scale. Psychometric testing of the SWLS showed evidence of internal consistency (item-total correlations ranged from .61 to .81) and test-retest reliability (Cronbach’s alpha = .87) as well as construct validity based on correlations with other measures of subjective well-being (Diener et al., 1985). Although both of these measures

have been widely used, they do not include items that are considered important for the satisfaction of residents in AL settings such as access to and the quality of health care services and relationships with staff.

Sikorska-Simmons (2001) developed the 22-item Resident Satisfaction Index (RSI) to assess the satisfaction of residents in AL. 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., are staff kind and caring), and physical and social activities (e.g., satisfaction with activities offered, opportunities to participate in interesting activities). For each subdomain, participants were asked to report their levels of satisfaction. Examples of items include, "Is the staff kind of caring?" and "Do you feel at home here?" Prior testing of the RSI in a small sample of residents from 13 AL settings demonstrated evidence of internal consistency for each subdomain and the full measure (Cronbach's alpha overall of .92; subscales .77 to .86) as well as construct validity based on factor analysis (Sikorska-Simmons, 2001). The RSI is currently the most relevant measure to evaluate satisfaction with AL that is available for use in the AL population because it includes specific domains that are relevant to residents' daily lives. However, additional psychometric testing is needed in a larger sample of AL residents to demonstrate further evidence of its reliability and validity.

Therefore, the purpose of this study is to perform a detailed analysis of the psychometric properties of the RSI in a large sample of AL residents using Rasch analysis. Having a reliable and valid measure of residents' satisfaction with AL will help

to inform changes in the service delivery and design of facilities to maximize residents' satisfaction and enable them to continue aging in place in these settings.

## Methods

### Design

This study used baseline data from the first and second cohorts in the dissemination and implementation study, Function Focused Care in Assisted Living Using the Evidence Integration Triangle (FFC-AL-EIT) (Resnick et al., 2018). Function focused care is a philosophy of care in which older adults are encouraged to participate in physical activity during care interactions. The FFC-AL-EIT study was focused on disseminating and implementing the Function Focused Care approach in assisted living 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. AL settings that were eligible and expressed interest in participating were randomized to one of three cohorts and then randomized to treatment (FFC-AL-EIT) or the education only control (FFC-EO) groups. The FFC-AL-EIT intervention is implemented by a research nurse who works with an identified in-house function focused care champion and stakeholder team. These individuals help to identify and address setting specific needs and challenges as well as motivate direct care workers to embrace the FFC approach. The study was reviewed and approved by a University based Institutional Review Board.

### Recruitment and Sample

Participants were recruited from 54 assisted living facilities in Maryland, Pennsylvania, and Massachusetts. Settings 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 phone, tablet, or computer.

Assisted living residents were eligible for the study if they were 65 years of age or older, able to speak English, lived in a participating assisted living setting, and were able to recall at least one out 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 assure 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 total of 833 residents were approached for the study and 820 (98%) were identified as eligible based on age, ability to speak English, current residence, and not being enrolled in hospice. Of the eligible residents, 516 (63%) were consented into the study (251 in cohort 1 and 265 in cohort 2), 284 (35%) refused, and 21 (3%) were unable to provide assent and the legally authorized representative could not be reached. Following consent and cognitive testing, another 6 individuals (1%) were noted to be ineligible and 9 individuals withdrew after consent and prior to completion of baseline data leaving a final sample of 501 participants enrolled in the study.



## Measures

Demographic and descriptive data were collected from participants' medical charts including age, gender, race, ethnicity, marital status, and level of education. Cognitive status was evaluated 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 comprised of a three-item recall and clock drawing task (Borson et al., 2003). The three-item recall assesses short-term memory and consists of presenting three unrelated words to the participant. After a brief distraction, the participant is asked to recall the three words to the evaluator without cues and one point is awarded for each correctly recalled word. Those who were able to correctly recall all three words were classified as not cognitively impaired and those who recalled zero to 2 words were classified as cognitively impaired (Borson, Scanlan, Brush, Vitaliano, & Dokmak, 2000). Evidence suggests that the Mini-Cog has a sensitivity of 99% and specificity of 96% for correctly classifying dementia in a sample of community-dwelling older adults (Borson et al., 2000).

The RSI, as described above, is a 22-item measure of residents' satisfaction with AL (Sikorska-Simmons, 2001). The items are shown in Table 3. For this study, residents' perceptions of housekeeping services were not included as housekeeping was not relevant to the aims of the FFC-AL-EIT study. Items on the RSI were scored as 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.

## Data Analysis

All statistical analyses were done using the Winsteps statistical software program and SPSS Version 23. Descriptive analyses were done to describe the sample.

Unidimensionality of the measure was tested using principal components analysis of the standardized residuals (Smith & Smith, 2004). Unidimensionality assumes that all items on an instrument measure a single underlying construct and accounts for the variation observed in the responses. For confirmation of unidimensionality, the variance explained by the first residual factor should be less than 10% with an eigenvalue lower than 2.0 logits indicating that less than 10% of the random variation in the standardized residuals is from a second dimension (Linacre, 2010). This is calculated by dividing the eigenvalue of the unexplained variance in the first factor by the number of items on the instrument times 100 (Smith & Smith, 2004).

Testing of reliability of the RSI was based on the Rasch measurement model and the item separation index (Smith & Smith, 2004). According to Rasch theory, people with medium ability should agree with the easier items and disagree with the more difficult items. Person reliability and item reliability coefficients range from 0 to 1 and are often interpreted similarly to that used for Cronbach's alpha. The item separation index, which ranges from 0 to infinity, defines how well items can be discriminated from one another on the basis of their difficulty along the measurement construct. The closer the reliability is to 1.0, the less the variability of the measurement can be attributed to measurement error. An equivalent to the alpha coefficient of .70 is considered acceptable evidence of item reliability (Smith & Smith, 2004).

Construct validity was tested based on how well the empirical data fit the Rasch measurement model. Item fit is based on INFIT and OUTFIT statistics which evaluate whether items on the instrument function logically and provide a continuum that is useful for all respondents. INFIT and OUTFIT statistics are based on conventional chi-squared statistics. The INFIT statistic is more sensitive to unexpected patterns of observations by individuals on items that are generally targeted to their ability. OUTFIT statistics are more sensitive to unexpected observations by individuals on items that are relatively easy or hard for them. Values ranging from 0.4 to 1.6 are considered acceptable (Smith & Smith, 2004). A value of less than 0.4 indicates underfitting such that the data are more predictable than expected from the model. In this case, the item may not provide additional information beyond the rest of the items on the scale. A value of greater than 1.6 indicates overfitting and the data are unexpected when compared with predictions based on the model. This suggests there might be potential issues with the item such that it does not define the same construct as the rest of the items, or it is poorly written or ambiguous which could lead to misinterpretation among the participants (Wright & Linacre, 1994). In addition, the psychometric properties of the RSI were examined based on mapping of the items across the continuum of satisfaction and evaluation of the categorical responses for appropriateness.

Differential item functioning (DIF) analysis was conducted to assess whether there were differences observed in item responses on the RSI among subgroups of participants (Tennant & Pallant, 2007). DIF analysis was based on the Rasch model and examined differences by sex (male versus female), age (less than 90 years old versus 90 years or older), and cognitive status (impaired versus not impaired). The cut point of 90

years old for comparing differences by age was established by using the median age of the sample. Cognitive status was differentiated into two categories, impaired and not impaired, based on the three-item recall scores on the Mini-Cog. Scores of 1 or 2 were categorized as impaired and scores of 3 were categorized as not impaired. Differences were determined based on the presence of both statistical significance, a probability score of  $<.05$ , and substantive significance, a difficulty contrast of  $>.5$  logits (Linacre, 2010). We hypothesized that there would not be significant differences in performance on the RSI across the identified subgroups.

### Results

As shown in Table 4, the sample included 501 participants from 54 AL facilities across three states. Participants had a mean age of 87.86 (SD= 7.27) and the majority were women (N=363, 72.5%), White (N=483, 96.4%), not Hispanic or Latino (N=495, 98.8%), and currently either widowed, divorced, or never married (N=383, 76.6%). On average, participants scored 2.40 (SD=0.77) for the three-item recall on the Mini-Cog. The mean total score on the RSI was 19.11 (SD=3.16).

### Reliability and Validity

The unidimensionality of the RSI was examined using principal component analysis of the residuals. The unexplained variance, expressed in eigenvalue units, of the first contrast was 2.2. This indicates that only 10% of the variance was explained (2.2/22 items) by a second factor, which provides support for the unidimensionality of the measure (Smith & Smith, 2004).

Testing of the reliability suggested that there was evidence of internal consistency with an alpha coefficient of 0.95. There was also evidence of item reliability with an item

separation of 4.54 indicating that items were well separated according to their difficulty. With regard to validity, there was evidence of fit for each of the items in terms of INFIT and OUTFIT statistics based on Rasch analysis as shown in Table 5. The INFIT statistics ranged from 0.81 to 1.33 and the OUTFIT statistics ranged from 0.49 to 1.55 which were all within acceptable range, suggesting that each item on the RSI fit the appropriate concept.

Item mapping is provided in Figure 2. Item 10, which referred to perceptions of staff's kindness, was the item most likely to be endorsed in terms of residents' satisfaction with AL. The next two items most likely to be endorsed were item 7 which evaluated general comfortability of the facility and item 11 which assessed courteousness of the dietary staff. The next item most likely to be endorsed was item 15 which referred to satisfaction with personal assistance. Then, the next two items most likely to be endorsed were item 6 which assessed satisfaction with the apartment/room and item 13 which asked about the dependability of the staff. The next three items most likely to be endorsed were item 1 which evaluated staff's concern for resident health, item 3 which assessed satisfaction with staff's skills, and item 4 which referred to communication with staff. Item 20, which referred to having opportunities for social participation, was the next most likely item to be endorsed. The next eight items mostly likely to be endorsed included items 2, 9, 12, 14, 16, 18, 19, and 22. Following these items, item 5 was the next mostly likely item to endorse which referred to space availability. The next two items were equally likely to be endorsed, item 8 which asked about having a home-like atmosphere and item 21 which asked about opportunities to make friends. Finally, item 17 was the least likely item to be endorsed which asked about staff responsiveness. There

were 117 individuals (23%) in the sample that were so high in terms of residents' satisfaction scores that they could not be well differentiated.

### Differential Analysis

There were no significant or substantive differences in the difficulty of each item noted by age group. With regard to gender, out of 22 items on the RSI, there were significant and substantive differences identified for five items. Item 16, "Do you see some staff treating residents in a rude way," was easier to endorse for males (dif= 0.54) compared with females (dif= -0.21, dif contrast= 0.66,  $p<0.05$ ). Item 18, "Do you like the physical and social activities here," was easier for females (dif= 0.95) to endorse than for males (dif= 0.03, dif contrast= 0.93,  $p<0.01$ ). Item 19, "Do you attend the physical and social activities" was easier for females (dif= 0.95) to endorse than for males (dif= 0.26, dif contrast= 0.69,  $p<0.05$ ). Item 20, "Do you have opportunities to participate in activities" was easier for females (dif= 0.62) to endorse than males (dif= -0.14, dif contrast= 0.76,  $p<0.05$ ). Item 22, "Do you have opportunities to participate in activities that are meaningful to you" was easier for females (dif= 0.80) to endorse than males (dif= 0.12, dif contrast= 0.68,  $p<0.05$ ).

With regard to cognitive status, there were significant and substantive differences on item 15, "Are you satisfied with the personal assistance you are getting here". Specifically, it was easier for those who were impaired (dif= -.52) to endorse this item than those who were not impaired (dif= -2.02, dif contrast= 1.50,  $p<0.01$ ).

### Discussion

Findings from this study provide support for the reliability and validity of the RSI. Specifically, there was evidence that the RSI is a reliable measure with sufficient internal

consistency and reliability of the measure when used across groups of residents (e.g., different ages, genders and cognitive abilities). There was support for the validity of the RSI in that the INFIT and OUTFIT statistics were all within acceptable range indicating that the items appropriately fit the construct. In addition, the point measure correlations were all positive and not near zero suggesting that there was no reason to reject any of the items.

The mapping of items suggests that the easiest item to endorse was in regards to residents' perceptions that staff are kind and caring. It is not surprising that having positive perceptions of care staff was important for residents' satisfaction with AL and is consistent with prior research (Abrahamson et al., 2013). Residents often develop close personal relationships with staff through daily care interactions which can have positive or negative effects on a variety of resident outcomes including physical function, psychological well-being, and quality of life (Kelly, 2012; Park, 2009; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2011). Additional research should continue to explore the quality of these care interactions across various service domains and how they affect residents' satisfaction with AL.

The most difficult item to endorse on the RSI referred to staff's responsiveness to residents' needs. This may be because there is a wide range of needs among residents in AL and there is much heterogeneity in terms of staffing levels and the types of services available across facilities (Caffrey et al., 2012; Park-Lee et al., 2011). Further it may indicate that staff are not adequately evaluating residents with regard to personal needs and care preferences. Prior research indicates that residents in AL report having numerous unmet care needs (Mitchell, 2013) and there are currently no regulatory

requirements regarding the delivery of person-centered care in AL. Assessing residents' unique values, preferences, and needs in AL could be a strategy to improve the quality of care and satisfaction among residents in AL.

The participants in this study reported a mean score of 19.11 (SD=3.16) out of 22 possible points on the RSI suggesting a high level of satisfaction with AL. This is consistent with previous studies demonstrating residents' satisfaction with living in AL settings (Abrahamson et al., 2013; Holmes, Galik, & Resnick, 2018). This study used DIF analysis to examine how satisfaction scores differed across subgroups of AL residents by age, gender, and cognitive status. Our hypothesis that all subgroups would perform similarly on the RSI was partially supported, as there were differences noted on 6 items by gender and cognitive status. There were no differences found by age group. The items that displayed DIF are notable because they reflect different subscales on the RSI. In particular, all of the items that were most likely to be endorsed by females in our sample were part of the "Activities" subscale (items 18, 19, 20, 22) and only one item on that subscale (item 21) did not show DIF. This is not surprising considering that women tend to participate in a greater number of social activities compared with men in AL (Cummings & Cockerham, 2008). Further older females tend to enjoy and engage in more social activity than older males (Finkel, Andel, & Pedersen, 2018; Oshio & Oshio, 2012; Zhang, Feng, Lacanienta, & Zhen, 2017) whereas older males are more likely to engage in activities that are not considered social such as reading and exercise (Zhang et al., 2017).

In addition, two items on the "Relationships with Staff" subscale displayed DIF (items 15 and 16). Men were significantly more likely to endorse item 16 which referred



to whether staff treat residents in a rude manner compared with women. In addition, those who were considered cognitively impaired were more like to endorse item 15 which referred to satisfaction with personal assistance. This may be because individuals with cognitive impairment tend to receive more assistance from staff with activities of daily living compared with those who are cognitively intact (Zimmerman, Sloane, & Reed, 2014). In this study, only participants with mild cognitive impairment were included and those with moderate to severe impairment were excluded based on the three-item recall on the Mini-Cog. Although participants were able to answer questions with interviewers, their responses may be variable depending on the situation. Approximately 42 percent of AL residents have some level of cognitive impairment (Caffrey et al., 2010). Thus, there is a need for additional research to examine the extent to which care needs are being met for AL residents with cognitive impairment, as this could be an important predictor of their overall satisfaction with AL.

In this sample of AL residents, there were a large number of individuals that scored so high on the RSI that they could not be differentiated. This suggests that more challenging items are needed to help differentiate between individuals. It may be helpful to add items relative to broader domains of life in AL (e.g., activities, physical environment, services). Examples of these items include asking about residents' satisfaction with specific types of activities (e.g., exercise class, bingo, or group outings) or various aspects of the physical environment (e.g., outdoor areas and common spaces). Evidence suggests that common areas and designated spaces for activities such as activity rooms, café areas, and exercise facilities are important for promoting social engagement and physical activity in the daily lives of residents (Andersson, Ryd, & Malmqvist, 2014;

Zimmerman et al., 2007) and thus it may be important to consider including items about these specific areas. In addition, revisions of the measure should consider adding questions about whether residents perceive the care they receive as addressing their individual needs and preferences. For example, asking residents to what extent care staff incorporate their abilities, values, and personal preferences during care interactions. Assessing residents' perceptions about person-centered care in AL can help to identify areas to improve care that will optimize their satisfaction in these settings.

#### Study Limitations and Conclusion

This study is limited in that it only included AL settings across three states from a single region of the country. In addition, the sample of residents was quite homogenous as the majority of the residents were women and non-Hispanic White. Thus, the findings cannot be generalized to all AL settings or residents. Further testing is required to include a more heterogeneous sample. In addition, this study only used baseline data collected at a single point in time, and thus a psychometric analysis of change scores on the RSI was not evaluated. Despite these limitations, this study provides additional information about the psychometric properties of the RSI. For valid decision making about strategies to improve residents' satisfaction with AL, there is a need for high quality satisfaction measures that have been empirically tested. Findings from this study could be used to support the continued use of the RSI in research and practice, particularly with the addition of more challenging items. Further research is warranted to evaluate the various factors impacting residents' satisfaction with AL to move toward the long-term goal of designing optimal care environments that best meet residents' unique needs and preferences.

Table 3. Resident Satisfaction Index

#	Item
Health Care	
1	Is the staff making every effort to keep you as healthy as possible
2	Do you think that you are not receiving the medical attention you need
3	Are you satisfied with skills of the staff you interact with
4	Do you feel you can talk to the staff if you have health or social concerns
Physical Environment	
5	Do you have a lack of personal space
6	Are you satisfied with your apartment/room
7	Is this facility a comfortable place to live
8	Do you feel at home here
9	Do you feel that there is a sense of community here
Relationships with Staff	
10	Is the staff kind and caring
11	Are the people who serve the food nice and courteous
12	Are you unhappy with staff's attitude or behavior
13	Do you think you have dependable staff taking care of you
14	Do you feel that you have friends among staff members
15	Are you satisfied with personal assistance you are getting here
16	Do you see some staff treating residents in a rude way
17	Is the staff slow to respond to your requests
Activities	
18	Do you like the physical and social activities here
19	Do you attend the physical and social activities here
20	Do you have opportunities to participate in interesting activities
21	Do you meet residents here with whom you share similar interests
22	Do you have opportunities to participate in activities that are meaningful to you

Table 4. Sample Description of Assisted Living Residents (N=501)

Variable	N	Percent	Range	Mean	Standard Deviation
Age	-	-	66 - 104	87.86	7.27
Mini-Cog (3-item recall)	-	-	1 - 3	2.40	0.77
Satisfaction with AL	-	-	5 - 22	19.11	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			

Table 5. Rasch Analysis Fit Statistics for Resident Satisfaction Index

Item #	Item Description (abbreviated)	INFIT (z score)	OUTFIT (z score)	Observed Point Correlations	
				Corr.*	Exp.*
1.	Is staff making effort to keep you healthy	0.85 (-1.1)	0.71 (-1.3)	.41	.33
2.	Are you receiving medical attention you need	1.10 (1.3)	1.19 (1.5)	.39	.45
3.	Are you satisfied with the skills of staff	0.81 (-1.5)	0.71 (-1.3)	.44	.34
4.	Can you talk to staff about your concerns	0.92 (-0.6)	0.73 (-1.3)	.39	.34
5.	Do you have a lack of personal space	1.33 (4.5)	1.55 (4.6)	.30	.49
6.	Are you satisfied with your apartment/room	0.99 (0.0)	0.98 (0.0)	.32	.32
7.	Is this facility a comfortable place to live	0.88 (-0.6)	0.69 (-1.0)	.34	.28
8.	Do you feel at home here	1.06 (1.0)	1.10 (1.1)	.48	.51
9.	Do you feel that there is a sense of community	0.88 (-1.5)	0.87 (-0.9)	.49	.43
10.	Is the staff kind and caring	0.88 (-0.5)	0.49 (-1.4)	.30	.22
11.	Are the people who serve food nice and courteous	1.06 (0.4)	1.09 (0.4)	.26	.29
12.	Are you unhappy with staff's attitude/behavior	0.95 (-0.6)	0.87 (-1.0)	.48	.45
13.	Do you have dependable staff caring for you	0.82 (-1.3)	0.50 (-2.3)	.42	.31
14.	Do you feel that you have friends among staff	1.05 (0.7)	1.01 (0.1)	.44	.46
15.	Are you satisfied with personal assistance	0.93 (-0.4)	0.99 (0.1)	.32	.30
16.	Do staff treating residents in a rude way	1.06 (0.8)	1.08 (0.6)	.40	.43
17.	Is the staff slow to respond to your requests	1.13 (2.2)	1.18 (2.2)	.46	.53
18.	Do you like the physical and social activities	1.01 (0.1)	0.99 (0.0)	.44	.44
19.	Do you attend the physical and social activities	1.16 (2.0)	1.07 (0.6)	.38	.45
20.	Do you have opportunities to participate in interesting activities	0.89 (-1.2)	0.79 (-1.4)	.47	.41
21.	Do you meet residents here with whom you share similar interests	1.05 (0.8)	0.96 (-0.5)	.49	.51
22.	Do you have opportunities to participate in activities that are meaningful to you	0.92 (-0.9)	0.75 (-2.0)	.49	.44

\*Note: Corr = correlated; Exp = expected.

Figure 2. Item Mapping by Person Ability and Item Difficulty

Measure in Logits	Person (Higher Ability)	Item (Easy)
6	#####	10
5		11 7 15 13 6 1 3 4
4		20  18 9 12 16 22 14 19 2
3	.#####	5 8 21 17
2	.##### #####	.
1	.### ##	. #
0		. #
-1		. . . .
Measure in Logits	Person (Lower Ability)	Item (Difficult)

Note: '#' = 9 persons; '.' = 1 to 8 persons.

### **CHAPTER 3: Testing the Associations Between the Assisted Living Environment and Residents' Satisfaction with Assisted Living**

#### **Abstract**

The assisted living (AL) environment is multidimensional and includes components such as staffing, health care services, amenities, and the physical environment which may play an important role in residents' satisfaction with living in AL. Previous research suggests that aspects of the AL environment can enhance or detract from the physical function, well-being, and social engagement among residents. Guided by the ecological theory of aging, the purpose of this study was to examine the AL environment and its relationship to residents' satisfaction with AL. Baseline data was used from a study testing the Dissemination and Implementation of Function Focused Care in AL. A total of 501 residents in 54 AL facilities across three states were included in the sample. Multilevel structural equation modeling was used to test the proposed model. Results showed that the model fit the data ( $\chi^2=29.93$ ,  $df=18$ ,  $p<.05$ ;  $CFI=.881$ ,  $RMSEA=.037$ ;  $SRMR\text{-within}=.001$ ;  $SRMR\text{-between}=0.10$ ). Gender and function were significantly associated with residents' satisfaction with AL and accounted for 2.6% of the variance. The AL environment, based on staffing, health care services, amenities, and the physical environment, was not related to residents' satisfaction with AL. Understanding the interplay between individual and environmental factors that influence the satisfaction of residents with AL will inform strategies to modify the environment to specifically target the needs and preferences of residents and thereby improve residents' satisfaction with living in AL.

## Background

More than 835,000 older adults currently reside in assisted living (AL) in the United States (Harris-Kojetin et al., 2016), and this number is expected to dramatically increase with the growth of the older population (Grabowski, Stevenson, & Cornell, 2012; Spetz, Trupin, Bates, & Coffman, 2015). 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, 2018). Settings are regulated at the state level and thus there is substantial heterogeneity between states in regards to staffing requirements and service delivery (Kisling-Rundgren, Paul, & Coustasse, 2016). Such variability across AL settings can enable environments to be tailored around the residents' particular needs and preferences and ultimately promote residents' satisfaction with AL.

According to the National Center for Assisted Living (NCAL), AL settings are designed with specific principles embedded within their daily operations that promote resident autonomy, independence, privacy, and dignity (NCAL, 2018). With an emphasis on a resident-oriented philosophy of care, AL is the preferred long-term care option among the majority of older adults compared with nursing homes (Zimmerman et al., 2003). 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 providers about ways to improve services and promote the highest possible satisfaction with AL for residents.



## Satisfaction with Assisted Living

Residents' satisfaction with AL is a multidimensional concept that serves as an important indicator of the quality of care from the resident's perspective (Sikorska-Simmons, 2001). It 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 (Sikorska-Simmons, 2001). Prior research exploring satisfaction with AL has led to inconsistent findings regarding factors that are important for residents' satisfaction with AL. Differences can be attributed to setting factors (e.g., facility size, geographic location, range of services) as well as the methods used to measure satisfaction with AL (Abrahamson, Bradley, Morgan, & Fulton, 2012; Kelly-Gillespie, 2012; Sandhu et al., 2013; Street, Burge, Quadagno, & Barret, 2007). Currently, there are few measures that are specifically focused on assessing residents' satisfaction with living in AL. Examining residents' satisfaction with AL provides information about residents' preferences and needs which are 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 impact their satisfaction. For example, environments which 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 such as cluttered pathways and limited access to outdoor areas can pose challenges for older adults in navigating their environment and thus negatively impacts residents' satisfaction with AL (Fleming et al., 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 residents' 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. Prior research has noted that those who are male, 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 activities of daily living 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 and interactions from staff in evaluating their satisfaction relative to those who are independent (Abrahamson, Bradley, Morgan, Fulton, & Ibrahimou, 2013; Street & Burge, 2012).

## Environmental factors

The AL environment is multidimensional and has many interrelated components which may be important for understanding residents' satisfaction with living in the setting including staffing, health care services, amenities, and the physical environment (Greenfield, 2012; Moos, 1980). Prior research suggests that the spatial design and other features in the AL environment can impact residents' satisfaction such that having accessibility to services, fewer barriers in the physical environment, positive social relationships and opportunities for engagement have been associated with higher satisfaction among residents in AL (Abrahamson et al., 2013; Fleming et al., 2016; Nathan, Wood, & Giles-Corti, 2014; Nordin, McKee, Wijk, & Elf, 2017; Street & Burge, 2012; Yang & Stark, 2010).

Numerous studies suggest that having adequately trained staff available to care for residents can influence resident outcomes such that higher nursing staff turnover has been associated with higher rates of hospitalizations among residents and poorer quality of care (Castle & Ferguson-Rome, 2015; Lerner, Johantgen, Trinkoff, Storr, & Han, 2014; Thomas, Mor, Tyler, & Hyer, 2012). In addition, evidence suggests that residents' perceptions about the care provided by direct care workers can have a significant impact on their 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 activities of daily living.

The provision of health care services in AL vary according to state regulations but may include medical care, psychiatric services, dental care, podiatry care, dermatology services, or pharmacist consultation. Having health care services available in AL settings may be beneficial for residents because they are able to receive regular monitoring of chronic medical conditions and it could reduce barriers to accessing services such as lacking transportation to medical appointments. Currently, there is limited information about the extent to which offering a multitude of health care services in the setting is associated with residents' satisfaction with AL. 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 promote socialization and facilitate physical activity among residents (Andersson, Ryd, & Malmqvist, 2014; Fleming et al., 2016; Yang & Stark, 2010) and thus could potentially impact 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 leading 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 having walking areas without obstructions, adequate lighting, and

handrails are key factors in supporting residents' mobility (Lu, 2010; Nordin et al., 2017) and may potentially contribute to residents' satisfaction with AL.

Given the projected increase in demand for AL in the future (Grabowski et al., 2012; Spetz et al., 2015), there is a need to better understand how the AL environment is associated with residents' satisfaction with living at the setting. 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 is to examine the AL environment and its relationship to residents' satisfaction with AL. Increasing the current understanding of factors in the AL environment that are associated with residents' satisfaction with AL will help to inform clinicians and administrators about areas that can be modified to effectively 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 used baseline data from the first and second cohorts in the dissemination and implementation study, Function Focused Care in Assisted Living Using the Evidence Integration Triangle (FFC-AL-EIT) (Resnick et al., 2018). Function focused care is a philosophy of care in which older adults are encouraged to participate in physical activity during care interactions. The FFC-AL-EIT study was focused on disseminating and implementing the Function Focused Care approach in assisted living 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. AL settings that were eligible and expressed interest in participating were randomized to one of three cohorts and then randomized to treatment (FFC-AL-EIT) or the education only control (FFC-EO) groups. The FFC-AL-EIT intervention is implemented by a research nurse who works with an identified in-house function focused care champion and stakeholder team. These individuals help to identify and address setting specific needs and challenges as well as motivate direct care workers to embrace the FFC approach. The study was reviewed and approved by a University based Institutional Review Board.

### Sample

The sample included 501 AL residents from 54 facilities in Maryland, Pennsylvania, and Massachusetts. Settings were invited to participate if they: (1) had at least 25 beds; and (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 phone, tablet or computer. AL settings were excluded if they had previously participated in a FFC-AL study.

AL residents were eligible for the study if they were 65 years of age or older, able to speak English, lived in a participating AL setting, and were able to recall at least one out 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 assure 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 total of 833 residents were approached for the study and 820 (98%) were identified as eligible based on age, ability to speak English, current residence, and not being enrolled in hospice. Of the eligible residents, 516 (63%) were consented into the study (251 in cohort 1 and 265 in cohort 2), 284 (35%) refused, and 21 (3%) were unable to provide assent and the legally authorized representative could not be reached. Following consent and cognitive testing, another 6 individuals (1%) were noted to be ineligible and 9 individuals withdrew after consent and prior to completion of baseline data leaving a final sample of 501 participants enrolled in the study.

## Measures

### Resident measures

Demographic and descriptive data were collected from participants' medical charts including age, gender, race, ethnicity, marital status, and level of education. Cognitive status was evaluated 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 comprised of a three-item recall and clock drawing task (Borson et al., 2003). The three-item recall assesses short-term memory and consists of presenting three unrelated words to the participant. After a brief distraction, the participant is asked to recall the three words to the evaluator without cues and one point is awarded for each correctly recalled word. Scores represent the total number of words participants were able to recall

correctly. The total number of comorbidities was recorded using the Cumulative Illness Rating Scale for Geriatrics (CIRS) (Linn, Linn, & Gurel, 1968; Miller et al., 1992). Residents' functional level was measured by the Barthel Index (Mahoney & Barthel, 1965). The Barthel Index is a 10-item measure of activities of daily living (e.g., bathing, dressing) that is completed for each participant by asking the direct care worker providing care for the resident on the day of testing what he or she is able to complete in terms of activities of daily living. Items are weighted to account for the amount of assistance required. A score of 100 indicates complete independence. Prior testing provides support for reliability with estimates of internal consistency ranging from alpha coefficients of 0.62 to 0.80; inter-rater-reliability based on an intra-class correlation of 0.89 between two observers; and validity was based on correlations with the Functional Inventory Measure ( $r=0.97$ ,  $p<.05$ ) (Mahoney & Barthel, 1965).

The Resident Satisfaction Index (RSI) is a 22-item measure of residents' satisfaction with living in AL settings (Sikorska-Simmons, 2001). The RSI includes 5 subdomains that represent residents' perceptions of health care, housekeeping services, physical environment (e.g., personal space, sense of community), relationships with staff (e.g., are staff kind and caring), and physical and social activities (e.g., satisfaction with activities offered, opportunities to participate in interesting activities). For this study, residents' perception of housekeeping services was not included as it was not relevant to the aims of the FFC-AL-EIT study. For each subdomain, participants were asked to report their levels of satisfaction. Examples of items include, "Is the staff kind of caring?" and "Do you feel at home here?" Items on the RSI were scored as 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. Prior testing of the RSI has demonstrated evidence of internal consistency for each subdomain and the full measure (Cronbach's alpha overall of .92; subscales .77 to .86) as well as construct validity based on factor analysis (Sikorska-Simmons, 2001).

#### Assisted living setting measures

Descriptive data were collected about the AL facilities including facility size based on the total number of beds, profit status, number of direct care workers on day shift and night shift, and numbers of hours per week worked by activity staff in each setting. In addition, information was collected about whether the following health care services were provided at the setting: medical care, psychiatric services, dental care, podiatry care, dermatology care, pharmacist consultation, and other services. Data was also collected about 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. Research evaluators indicated whether the listed services and amenities were present or not present at each setting. Scores were summed to indicate the total number of services and total number of amenities per setting.

Environment observational assessments were completed in each of the settings by research evaluators prior to implementation of the FFC-AL-EIT intervention using the Environment Assessment to Optimize Function and Physical Activity (EAOFP) (Resnick et al., 2019). The EAOFP includes 18 items which 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 were areas for residents to walk, there were cues in the environment to encourage physical activity, and the environment was 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 the residents. The scores are then summed for a maximum total score of 18. Prior testing of the EAOFP provided evidence of item reliability and inter-rater reliability based on Rasch analysis (item reliability=0.92; item separation=3.47; kappa=0.40) (Resnick et al., 2019).

#### Data Analysis

Descriptive statistics including means, proportions, and ranges were done to describe the AL residents and settings in the sample. Multilevel structural equation modeling (SEM) using the Mplus statistical software program (Muthén & Muthén, 1998) was done to test the model presented in Figure 3. SEM combines multiple regression and factor analysis to estimate a series of interrelated relationships which 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 to 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 higher (i.e. AL setting) and lower (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.

The intraclass correlation (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 zero to one with higher values indicative of the need to adjust for a potential clustering effect using multilevel modeling (Thomas & Heck, 2001).

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 non-significant ( $p < 0.05$ ) 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.

Figure 3 shows the final multilevel model including variables at the within-level (i.e., residents) and between-level (i.e., AL settings). At the within-level, two observed variables, gender and function, are regressed on satisfaction with AL. At the between-level, two latent factors named, "Staffing" and "Physical Environment and Services" 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, Physical

Environment and Services, is measured by three indicators of services, amenities, and the physical environment.

Maximum likelihood method was used to estimate the model parameters. Model fit was evaluated based on chi square divided by degrees of freedom ( $\chi^2/df$ ), 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). For the  $\chi^2/df$ , a ratio of  $\leq 3.0$  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 indicative of better model fit (Ullman, 2006). RMSEA is a population-based index that calculates how well the hypothesized covariance matrix in the proposed model fit 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  $< .10$  are considered acceptable and  $< 0.06$  is good (Kline, 2015; Steiger & Lind, 1980). There are currently no established guidelines for interpreting SRMR at the between level and thus the criteria for single-level analyses was applied (Kline, 2015). The squared multiple correlations ( $R^2$ ) were examined to estimate the amount of variance in satisfaction with AL explained by predictor variables and latent factors.

## Results

Participants had a mean age of 87.9 (SD= 7.27) and the majority were women (N=363, 72.5%), White (N=483, 96.4%), not Hispanic or Latino (N=495, 98.8%) and

currently either widowed, divorced, or never married (N=383, 76.6%) as shown in Table 6. On average, participants scored 2.4 (SD=0.77) on the three-item recall based on the Mini-Cog and had a mean score of 4.8 (SD=1.94) on the CIRS. Participants needed some help with activities of daily living as noted by a mean Barthel Index score of 63.6 (SD=19.35). The mean total score for residents' satisfaction with AL based on the RSI was 19.1 (SD=3.16).

The AL facility size ranged from 31 to 164 beds with an average of 82.2 (SD=26.21) beds. The majority of settings were for profit (n=41, 74.5%). The mean number of direct care workers on day shift per setting was 6.6 (SD=2.19) and on average there were 5.9 (SD=2.36) direct care workers on evening shift per setting. The mean number of hours per week for activity staff at each setting was 77.6 (SD=42.03). The mean number of health and supportive services provided on site was 4.2 (SD=1.80) and the majority of settings offered medical care (n=53, 98.1%), podiatry care (n=43, 79.6%), pharmacist consultation (n=35, 64.8%), dental care (n=33, 61.1%), dermatology care (n=30, 55.6%), and psychiatric services (n=30, 55.6%). The mean number of amenities available on site was 6.0 (SD=1.39) and most settings had a beauty salon (n=54, 100%), social and recreational activities area (n=54, 100%), library (n=50, 92.6%), transportation services (n=49, 90.7%), café or coffee room (n=40, 74.1%), computer room (n=37, 68.5%), and gym or exercise facilities (n=34, 63.0%).

#### Model Testing Results

The ICC was .092 which supports the use of multilevel modeling (Thomas & Heck, 2001). The hypothesized multilevel model is presented in Figure 3. The model had

a good fit with the data ( $\chi^2=29.93$ ,  $df=18$ ,  $p<.05$ ;  $CFI=.881$ ,  $RMSEA=.037$ ;  $SRMR$ -within= .001;  $SRMR$ -between= 0.10).

Results for the final multilevel model are shown in Table 7. Gender and function were significantly associated with residents' satisfaction with AL and accounted for 2.6% of the variance in satisfaction with AL. Specifically, those who were female and had better physical function were more likely to be more satisfied with living in AL ( $B=.114$ ,  $p<.05$ ;  $B=.119$ ,  $p<.05$ , respectively). The two latent factors, Staffing and Physical Environment & Services, were not significantly associated with residents' satisfaction with AL and these factors accounted for 6.2% of the between-level variance in residents' satisfaction with AL.

For the latent factor, Staffing, direct care workers on day shift and evening shift, activity staffing, and facility size were all significantly associated with Staffing and had standardized estimates ranging from .359 to .946. The  $R^2$  for variables associated with the Staffing latent factor were .895 for day shift direct care workers, .618 for evening shift direct care workers, .240 for facility size, and .129 for activity staff. For the latent factor, Physical Environment and Services, the three indicators representing physical environment, services, and amenities were all significantly associated with the latent factor and had standardized estimates ranging from .381 to .876. The  $R^2$  for variables associated with the Physical Environment and Services latent factor ranged from .768 for amenities, .487 for on-site services, and .145 for the physical environment.

## Discussion

This study tested a multidimensional model of the AL environment in relation to residents' satisfaction with living in 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 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 having safe walking areas that are free from obstructions and plenty of opportunities for social engagement have been associated with the satisfaction of residents living in AL (Fleming et al., 2016; Nathan et al., 2014; Nordin et al., 2017; Yang & Stark, 2010).

There are a number of plausible explanations 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 with AL. The participants in this study reported a mean score of 19.11 (SD=3.16) out of 22 points on the RSI suggesting a high level of satisfaction with AL. This confirms previous research demonstrating residents' satisfaction with living in AL (Abrahamson et al., 2013; Holmes, Galik, & Resnick, 2018). Although the measure used in this study has evidence of reliability and validity (Sikorska-Simmons, 2001), more

challenging items may need to be added to this measure to better differentiate between residents with high satisfaction with AL. Examples of more challenging items to add to the measure might include asking residents to what extent the staff evaluate their preferences, values, and abilities during daily care interactions. There are currently no regulatory requirements that mandate the provision of person-centered care in AL, although evidence suggests that a person-centered approach may be an effective strategy to improve the quality of care and satisfaction among residents in AL (Edvardsson, Varrailhon, & Edvardsson, 2013). Additional items on the measure could also assess residents' satisfaction with specific types of services (e.g., medical services, personal care) and amenities (e.g., library, exercise or recreational facilities) which may help to better differentiate between residents in measuring their satisfaction with AL.

The resident-level variables included in the final model, gender and physical function, only explained 2.6 percent of the variance in residents' satisfaction with AL. Thus, there was a large amount of variance in residents' satisfaction with AL that was left unexplained. Additional factors that may be considered in future research to more comprehensively explain satisfaction with AL include aspects of the social environment such as residents' social support systems within the setting, staff-resident relationships, and relationships between residents (Kemp et al., 2012; Park, Zimmerman, Kinslow, Shin, & Roff, 2012; Resnick et al., 2010; Street & Burge, 2012). The majority of AL residents require some assistance from staff with daily activities (Caffrey et al., 2012) and these care interactions may affect their overall satisfaction with AL. Future studies could include the Quality of Interaction Schedule (QuIS) (Dean, Proudfoot, & Lindesay, 1993) which is a reliable and valid measure that has been previously used to understand the



quality of care interactions between older adults and health care staff. In addition, having social support from family, friends, and staff is another critical factor to consider in explaining residents' satisfaction with living in AL. Prior research suggests that residents who are able to develop strong positive relationships with staff and other residents in AL 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 (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988) could be used to measure the associations between residents' social support systems with their satisfaction in AL.

The sample of AL settings in this study was relatively homogeneous which may have impacted the ability to detect differences in predicting residents' satisfaction with AL. The majority of AL settings in this study were considered large in size with an average of 82 (SD=26) beds and thus there may be limited variation in the AL environment with regards 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 in larger settings residents receive fewer hours of care provided by direct care workers as compared with smaller settings. Larger settings also tend to have more options for health care services, amenities, and opportunities for social engagement which are important for promoting residents' satisfaction with AL (Street et al., 2007). Conversely, smaller AL 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 thus may increase satisfaction with the AL setting for some residents (Ausserhofer et al., 2016; Sandhu et al., 2013). Future research

would benefit from including a more diverse sample of AL settings with regards to facility size, services, amenities, and staffing levels to understand the impact of the AL environment on residents' satisfaction with AL.

#### Study Limitations

A strength of this study was that it included a large sample of 501 AL residents across 54 settings. These settings, however, were relatively homogenous in terms of facility size, from three states in a single region of the country, and the majority of the residents were women and non-Hispanic white. Consequently, the findings are limited by sample selectivity and cannot be generalized to all AL settings. Additional research is needed to confirm these findings in other geographic locations using a diverse sample of facilities and residents. In addition, the outcome measure used to assess residents' satisfaction with AL was based on self-report from participants and thus the results may have been biased by social desirability and cognitive ability of the residents. In this study, only participants with mild cognitive impairment were included and those with moderate to severe impairment were excluded based on the three-item recall on the Mini-Cog. Considering that approximately 42 percent of AL residents have some level of cognitive impairment (Caffrey et al., 2010), there is a need for additional research with residents who are more cognitively impaired. In addition, measures are needed to evaluate satisfaction with AL for those who are more cognitively impaired.

#### Conclusions

This study provides new information about the relationship between the AL environment and residents' satisfaction with AL. Gaining a better understanding of the impact of the environment on residents' satisfaction with AL will help the industry in

developing appropriate settings that will optimize the satisfaction of the growing number of older adults anticipated to live in these settings in the future.

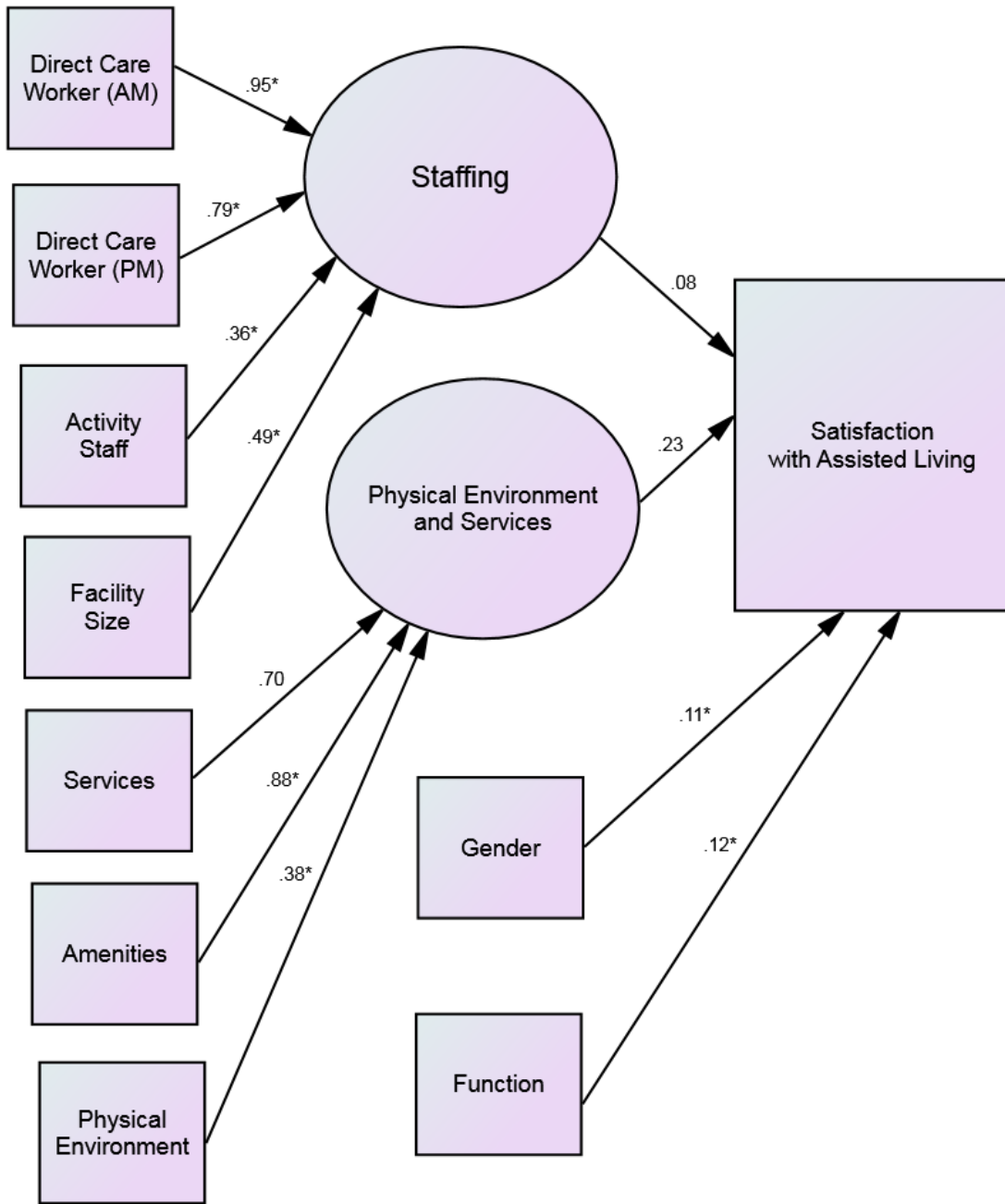
Table 6. Sample Description of Assisted Living Facilities and Residents

Variable	N	Percent	Range	Mean	Std. Dev.
Resident Level (N=501)					
Age			66 – 104	87.9	7.27
Mini-Cog (3-item recall)			1 – 3	2.4	0.77
Function (Barthel Index)			3 – 80	63.6	19.35
Comorbidities (CIRS)			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 (N=54)					
Facility size (# beds)			31 – 164	82.2	26.21
Profit status					
For profit	41	74.5			
Non profit	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			

Table 7. Standardized Estimates for Final Multilevel Model

Dependent Variable	Independent Variable	Estimate	SE	p value	R <sup>2</sup>
Within Level					
Satisfaction with AL	Gender	.114	.047	.014	.026
	Function	.119	.048	.013	
Between Level					
Staffing	Direct care workers (day)	.946	.091	<.001	.895
	Direct care workers (evening)	.786	.087	<.001	.618
	Activity staff hours per week	.359	.149	.016	.129
	Facility size	.490	.118	<.001	.240
Physical Environment & Services	Services	.698	.156	<.001	.487
	Amenities	.876	.175	<.001	.768
	Physical environment	.381	.148	.010	.145
Satisfaction with AL	Staffing	.078	.241	.744	.062
	Physical Environment & Services	.231	.228	.312	

Figure 3. Final Multilevel Model



Note: \* Significance at  $p < .05$

## **CHAPTER 5: Discussion, Implications, and Recommendations**

### Introduction

The purpose of this dissertation was to: (1) develop and test a comprehensive AL environment measurement model; (2) evaluate the psychometric properties of the Resident Satisfaction Index in a sample of AL residents; and (3) test the impact of the AL environment on residents' satisfaction with AL. Using the ecological theory of aging (Lawton & Nahemow, 1973), it was hypothesized that controlling for residents' age, gender, functional level, cognition, and comorbidities, the AL environment would be significantly associated with residents' satisfaction with AL. The three manuscripts are provided in Chapters 2, 3, and 4. The first manuscript titled, "Developing and Testing an Assisted Living Environment Model" tested an AL environment model using structural equation modeling. The second manuscript titled, "Reliability and Validity of the Resident Satisfaction Index" evaluated the psychometric properties of the Resident Satisfaction Index (RSI) using Rasch analysis and differential item functioning (DIF) analysis. The final manuscript titled, "Testing the Associations Between the Assisted Living Environment and Residents' Satisfaction with Assisted Living" examined the relationships between factors in the AL environment and residents' satisfaction with AL. This chapter summarizes the major findings in greater detail, highlights practice implications and recommendations for future research, and discusses the strengths and limitations of this work.

## Summary of Study Findings

### Measurement of the Assisted Living Environment

Using structural equation modeling, this study developed and tested a comprehensive measurement model of the AL environment that included measures of staffing, health care services, amenities, and the physical environment. The hypothesized measurement model specified two latent factors: (1) Environment as measured by the physical environment, health care services, and amenities and (2) Staffing as measured by direct care workers on day shift and evening shift, and activity staff hours. Findings from this study suggested that the hypothesized model had a good fit with the data. Several of the observed indicators in the model were noted to have large residuals or error associated with them. Specifically, activity staff hours on the Staffing latent factor had an  $R^2$  of .13 (error was  $1-.13 = .87$ ) and the measure of the physical environment on the Environment latent factor had an  $R^2$  of .15 (error was  $1-.15 = .85$ ). It is possible that including additional items on the Staffing latent factor, such as registered nursing hours and social worker hours, would help to minimize the amount of error and improve measurement of the AL environment. Studies have shown that facilities with high turnover among nursing staff have been associated with poor clinical outcomes in long-term care (Dellefield, Castle, McGilton, & Spilsbury, 2015; Lerner, Johantgen, Trinkoff, Storr, & Han, 2014). In addition, prior research suggests the important role of geriatric social workers in AL settings to address unmet needs for residents through care planning, coordination of services, and serving as an advocate for residents (Koenig, Lee, Fields, & Macmillan, 2014).



There was limited variance in the measure used to assess the physical environment in this study with most AL settings scoring high with a mean score of 15.38 (SD=1.63) out of 18 possible points indicating these settings had environments that optimize function and physical activity for residents (Resnick et al., 2019). This suggests that the measure may need to be revised to add more challenging items. Additional items could include asking about outdoor areas in AL settings such as having access to pleasant walking paths outside and having rest areas available outdoors. Further, given that extensive research suggests the importance of social relationships for older adults (e.g., relationships between residents and staff, co-resident relationships, social support) (Kemp, Ball, Hollingsworth, & Perkins, 2012; Park, Zimmerman, Kinslow, Shin, & Roff, 2012; Street & Burge, 2012), including measures of the social environment such as interactions between residents and other residents and staff and other sources of social support may be of particular importance to explore in future research.

This study also described the availability of health care services and amenities in AL. With regards to the provision of health care services, the majority of settings provided medical care (n=53, 98.1%), podiatry care (n=43, 79.6%), pharmacist consultation (n=35, 64.8%), dental care (n=33, 61.1%), dermatology care (n=30, 55.6%), and psychiatric services (n=30, 55.6%). Nearly all settings offered medical care on site which was provided by a physician, nurse practitioner, or physician's assistant. This finding was not expected given that traditionally AL has been viewed as a community-based social model of care as opposed to a medical model of service delivery that is typically associated with more institutionalized nursing home care (Sloane et al., 2011; Zimmerman, 2003). Because most AL residents have multiple chronic conditions which

require ongoing medical management (Caffrey et al., 2012), the provision of medical services in AL represents a poorly understood yet important component of the AL environment. As AL facilities are caring for residents with increasingly complex medical conditions and behavioral challenges (Caffrey et al., 2012), the availability of on-site health care services may be important for meeting their needs and enabling them to continue to age in place in these settings.

With regards to the amenities offered on site for residents, the majority of settings had a beauty salon (n=54, 100%), social and recreational activities areas (n=54, 100%), a library (n=50, 92.6%), transportation services (n=49, 90.7%), café or coffee room (n=40, 74.1%), computer room (n=37, 68.5%), and gym or exercise facilities (n=34, 63.0%). The AL settings included in this study sample were considered large with greater than 25 beds, and thus they may have more resources than smaller AL settings and were therefore able to offer a number of amenities for residents (Kisling-Rundgren, Paul, & Coustasse, 2016).

In summary, there are several recommendations for improving the proposed AL environment measurement model that was tested in this study. Incorporating a measure of social interactions between residents and staff in AL such as those evaluated in the Quality of Interaction Schedule (QuIS) (Dean, Proudfoot, & Lindesay, 1993). Given that the majority of AL residents require some assistance from staff with daily activities (Caffrey et al., 2012), residents' perceptions of these care interactions may represent an important component of the AL social environment. Prior research has shown that residents who had positive social interactions and support from care staff in AL were more likely to have a higher quality of life (Naylor et al., 2016). Other measures of the

social environment, such as perceptions of social support and relationships between residents could be evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988). Finally, future research could explore the availability of resources and interactions with the outside community (e.g., local libraries, community centers, or health clubs) which also is an aspect of the overall AL environment. Additionally, examining the utilization of health care services and amenities among residents as well as their preferences for such services in AL may be another area for future studies to explore.

#### Measurement of Residents' Satisfaction with Assisted Living

This study provided support for the reliability and validity of the Resident Satisfaction Index (RSI) (Sikorska-Simmons, 2001) in a sample of AL residents. In addition, differences in satisfaction scores were examined across subgroups of AL residents by age, gender, and cognitive status using differential item functioning (DIF) analysis. There was some evidence that this measure was reliable across these subgroups of AL residents. Differences were noted, however, across genders for 5 items and across different levels of cognitive status for one item on the subscales related to Activities and Relationships with Staff. All of the items appropriately fit the construct of resident satisfaction as anticipated and provided support for the validity of the measure.

Residents' perception of staff's responsiveness to their needs was the most difficult item to endorse on the measure. There are a number of factors which may influence residents' ability to endorse this item. There is a wide range of care needs among residents and heterogeneity in terms of staffing levels and services available in AL settings (Caffrey et al., 2010; Park-Lee et al., 2011). Variability in the level and

frequency of interactions with care staff may influence how residents perceive staff as being responsive to their needs. In addition, this finding may indicate that staff is not adequately evaluating and addressing residents' needs and preferences. Despite the growing recognition for the need to address person-centered care in AL (Love, 2010; Zimmerman, Love, Cohen, Pinkowitz, & Nyrop, 2014), research on person-centered care in AL has been sparse and limited regulatory requirements currently exist with regards to providing person-centered care in AL (Carder, O'Keefe, & O'Keefe, 2015). Assessing residents' individualized needs and preferences could be a strategy to improve the quality of care and satisfaction among residents in AL.

The item on the RSI related to perceiving staff as kind and caring was the easiest to endorse. This finding is consistent with previous research that residents' often develop close relationships with staff through daily care interactions (Abrahamson et al., 2013). Further, having positive relationships between staff and residents can influence a variety of resident outcomes such as physical function, psychological well-being, and quality of life (Kelly, 2012; Park, 2009; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2011). Alternatively, this finding could also indicate that responses on the RSI may have been biased by social desirability, as residents could have a tendency to report more positive perceptions of care staff because they believed it would be viewed as more favorable.

There were significant and substantive differences found by gender and cognitive status for 6 items on the RSI and no differences by age group. Specifically, there were 4 items on the "Activities" subscale which were more likely to be endorsed by females in this study. Prior research suggests that female residents in AL tend to participate in more social activities compared with men, and older men are more likely to engage in activities

that are not considered social such as reading and exercise (Cummings & Cockerham, 2008; Zhang, Feng, Lacanienta, & Zhen, 2017). This study also found that those who were considered cognitively impaired were more likely to endorse the item referring to satisfaction with personal assistance from care staff. Evidence suggests that individuals with cognitive impairment tend to receive more assistance from staff with activities of daily living compared with those who are cognitively intact (Zimmerman, Sloane, & Reed, 2014) and thus may be more likely to endorse this item on the RSI. Additionally, it should be noted that this study excluded participants with moderate to severe dementia based on the three-item recall on the Mini-Cog and only participants with mild impairment or who were cognitively intact were included in the sample. There is a need for additional research to examine the extent to which personal care staff is meeting the needs of AL residents with cognitive impairment, as this could be an important indicator of their overall satisfaction with AL. In addition, reliable and valid measures are needed to evaluate satisfaction with AL for those who are more cognitively impaired.

Participants in this study reported a high level of satisfaction with AL which is consistent with previous research (Abrahamson et al., 2013; Holmes, Galik, & Resnick, 2018). There were 117 individuals (23%) in the sample that had such high satisfaction with AL that they could not be differentiated. This suggests that more challenging items may need to be added to this measure. Examples of more challenging items include asking about residents' satisfaction with specific types of activities (e.g., exercise class, bingo, or group outings) or various aspects of the physical environment (e.g., outdoor areas and common spaces). In addition, items could be added to ask residents to what extent care staff address their abilities, values, and personal preferences during care

interactions. Assessing residents' perceptions of whether staff provide individualized care in AL could help to identify areas that will improve residents' satisfaction with AL.

Revising the RSI to include these more challenging items could help to better differentiate between residents in measuring their satisfaction with AL.

The Assisted Living Environment and Residents' Satisfaction with Assisted Living

The findings from this study suggest that the hypothesized model fit the data. Only gender and physical function were significantly associated with residents' satisfaction with AL. In particular, residents who are female and more functionally independent have higher satisfaction with AL which is consistent with prior research (Abrahamson, Bradley, Morgan, & Fulton, 2012; Resnick et al., 2010). The AL environment, measured by indicators of staffing, health care services, amenities, and the physical environment, was not associated with residents' satisfaction with AL. This finding was in contrast to prior studies examining the influence of factors in the AL environment on residents' satisfaction and quality of life (Abrahamson et al., 2013; Fleming, Goodenough, Low, Chenoweth, & Brodaty, 2016; Nathan, Wood, & Giles-Corti, 2014; Nordin, McKee, Wijk, & Elf, 2017; Yang & Stark, 2010).

There are a number of explanations for the lack of significant relationships between the AL environment and residents' satisfaction with AL found in this study including measurement issues and the lack of variance in outcomes. First, there was limited variance in residents' satisfaction scores measured by the RSI with a mean score of 19.11 (SD=3.16) out of 22 possible points suggesting a high level of satisfaction with AL. As noted above, more challenging items should be added to these measure in future work to better differentiate between residents high in satisfaction with AL. Additionally,

the majority of AL settings in this study were considered large in size with an average of 82.2 (SD=26.21) beds, and thus there was limited variation with regards to staffing levels, services, and amenities. This may have impacted the ability to detect differences in predicting residents' satisfaction with AL. Additionally, it is unclear whether residents in smaller AL settings with fewer services and amenities evaluate their satisfaction with AL differently compared with residents in larger settings. Future research should include a broader range in terms of sizes of facilities and services provided to examine whether these factors in the AL environment impact residents' satisfaction with AL.

It is also possible that factors other than the physical environment, such as social aspects of the environment are most important for residents' satisfaction with AL. As has previously been noted, social interactions with direct care staff play an important role in residents' overall quality of life (Abrahamson et al., 2013; Naylor et al., 2016). Prior research suggests that residents who are able to develop strong positive relationships with staff and other residents in AL tend to have more favorable perceptions about their living environment (Kemp, Ball, Hollingsworth, & Perkins, 2012; Park et al., 2012; Street & Burge, 2012). Adding to the AL environment model by including a social environment measure that evaluates interactions between residents and staff, such as the QuIS (Dean et al., 1993), may be useful to build on prior work and help to explain residents' satisfaction with AL.

In summary, this study provides new information about the relationship between the AL environment and residents' satisfaction with AL. Future studies could build on this work by including additional measures of the AL environment (e.g., the social environment), using a more diverse sample of AL residents and settings, and making the

suggested revisions to add more challenging items to the RSI to improve understanding about the AL environment and residents' satisfaction with AL.

### Practice Implications

There is a recent shift in the culture and philosophy of care provided to older adults living in long-term care settings that emphasizes the need for person-centered care (Koren, 2010; Love, 2010). Person-centered care involves providing care that is responsive to the individual's preferences, needs, and values, and ensuring that those values guide the care process (Brummel-Smith et al., 2016). Evaluating residents' satisfaction with AL and identifying factors in the AL environment that influence their satisfaction may be important for placing residents' needs at the center of care and informing strategies to make changes in the AL environment that aligns with their needs and preferences.

The findings from this study provide some guidance for how to improve measurement of resident's satisfaction with AL. Satisfaction with AL is important to assure facilities are providing person-centered care. This study demonstrated that the RSI is a reliable and valid measure that could be used clinically in the AL population. Nursing staff, social workers, and other providers in AL could use the RSI as part of the care planning process to understand what aspects are most important for supporting residents' satisfaction. In addition, monitoring and responding to residents' changing preferences, needs, and capabilities over time could lead to a better quality of life among residents. Further, from a marketing perspective, this information could also be important for AL owners and administrators. Residents' satisfaction with AL can have implications on occupancy rates and influence residents' ability to successfully age in place (Campbell,



2015; Rodiek, Boggess, Lee, Booth, & Morris, 2013). The AL industry has experienced substantial growth in recent years (Silver, Grabowski, Gozalo, Dosa, & Thomas, 2018) and settings are becoming increasingly competitive to attract potential residents and improving residents' satisfaction with AL is a critically important goal. Evidence suggests that residents who are highly satisfied in AL settings are four times more likely to make word-of-mouth referrals to their community (Wylde, Smith, Schless, & Bernstecker, 2009). Further, informing providers in AL with information about what impacts resident satisfaction can help them to revise services and care environments in such a way that is sensitive to residents' needs and preferences and optimizes their satisfaction with AL.

#### Recommendations for Future Research

The findings from this dissertation provide a foundation for future work to examine the AL environment and residents' satisfaction with AL. Future studies should consider residents' needs and preferences in assessing the quality of care in AL and developing interventions that are designed to improve residents' satisfaction with AL. Because the sample used in this study was relatively homogenous in terms of the characteristics of AL settings included (e.g., facility size, services, amenities, and staffing levels), additional research including a more diverse sample to fully understand the impact of the AL environment on residents' satisfaction with AL. Further, there is a need for additional research that incorporates the social environment (e.g., residents' social support systems, staff-resident relationships, and relationships between residents) as well as organizational and policy factors to explore how they may influence residents' satisfaction with AL.

## Limitations and Strengths

This study was limited in that the sample only included AL settings from a single region of the country. Consequently, the findings are limited by sample selectivity and cannot be generalized to all AL residents nationally. This research included baseline data collected at a single point in time and was therefore correlational in nature. In addition, the resident-level measures were based on self-report from participants and thus the results may have been biased by social desirability. Although the research incorporates numerous indicators of the AL environment, measures of social aspects of environment (i.e. relationships between residents and staff, co-resident relationships) were not included in this study. Despite these limitations, this research represents a unique opportunity to develop and test a model of the AL environment and test the impact of the environment on residents' satisfaction with AL. Findings from this research can be used to inform the AL industry, clinical caregivers and consumers and help to make changes to AL environments that will optimize residents' satisfaction with AL.

## Summary

This chapter summarized the key findings from this dissertation work, and discussed implications for practice and research. The strengths and limitations of this work were discussed relative to the study design and measurement. This dissertation contributes to the empirical literature through advancing the measurement of residents' satisfaction with AL and the AL environment which will inform strategies to improve residents' satisfaction with living in these settings.

## References

- Abrahamson, K., Bradley, D. B., Morgan, K. H., & Fulton, B. R. (2012). Does functional independence influence satisfaction among assisted living residents?. *Seniors Housing & Care Journal*, 20(1), 85-97.
- Abrahamson, K., Bradley, D. B., Morgan, K. H., Fulton, B. R., & Ibrahimou, B. (2013). Influence of Satisfaction with Services on Assisted Living Resident Satisfaction. *Journal of Housing for The Elderly*, 27(1-2), 177-190.
- Adams, D. Analysis of a life satisfaction index. *Journal of Gerontology*, 1969, 24, 470-474.
- Andersson, M., Ryd, N., & Malmqvist, I. (2014). Exploring the function and use of common spaces in assisted living for older persons. *HERD: Health Environments Research & Design Journal*, 7(3), 98-119.
- Andrews, F. M., & Withey, S. B. (1976). *Social indicators of well-being: America's perception of life quality*. New York: Plenum Press.
- Arbuckle, J. (1997). *Amos user's guide, version 3.6*. Chicago, IL: Small Waters Corporation.
- Ausserhofer, D., Deschodt, M., De Geest, S., van Achterberg, T., Meyer, G., Verbeek, H., ... & Ellen, M. (2016). "There's No Place Like Home": a scoping review on the impact of homelike residential care models on resident-, family-, and staff-related outcomes. *Journal of the American Medical Directors Association*, 17(8), 685-693.
- Benjamin, K., Edwards, N., & Caswell, W. (2009). Factors influencing the physical

- activity of older adults in long-term care: Administrators' perspectives. *Journal of Aging & Physical Activity*, 17(2), 181-195.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238-246.
- Bicket, M. C., Samus, Q. M., McNabney, M., Onyike, C. U., Mayer, L. S., Brandt, J., ... & Rosenblatt, A. (2010). The physical environment influences neuropsychiatric symptoms and other outcomes in assisted living residents. *International Journal of Geriatric Psychiatry*, 25(10), 1044-1054.
- Bollen, K. A. (1989). *Structural equations with latent variables*: Wiley-Interscience.
- Borson, S., Scanlan, J., Brush, M., Vitaliano, P., & Dokmak, A. (2000). The mini-cog: A cognitive 'vital signs' measure for dementia screening in multi-lingual elderly. *International Journal of Geriatric Psychiatry*, 15(11), 1021-1027.
- Borson, S., Scanlan, J.M., Chen, P., & Ganguli, M. (2003). The Mini-Cog as a screen for dementia: Validation in a population-based sample. *Journal of the American Geriatrics Society*, 51, 1451-1454.
- Brummel-Smith, K., Butler, D., Frieder, M., Gibbs, N., Henry, M., ... & Saliba, D. (2016). Person-centered care: A definition and essential elements. *Journal of the American Geriatrics Society*, 64(1), 15-18.
- Burge, S. W., & Street, D. (2010). Advantage and choice: Social relationships and staff assistance in assisted living. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences*, 65(B), 358-369.
- Caffrey, C., Sengupta, M., Park-Lee, E., Moss, A., Rosenoff, E., Harris-Kojetin, L.

- (2012). Residents living in residential care facilities: United States, 2010. *NCHS Data Brief*, 91.
- Campbell, N. (2015). Designing for social needs to support aging in place within continuing care retirement communities. *Journal of Housing & The Built Environment*, 30(4), 645.
- Cantril, H. (1965). *The pattern of human concerns*. New Brunswick, NJ: Rutgers University Press.
- Carder, P., O’Keeffe, J., & O’Keeffe, C. (2015). Compendium of residential care and assisted living regulations and policy. *Washington, DC: US Department Health and Human Services*.
- Castle, N. G., & Ferguson-Rome, J. C. (2014). Influence of nurse aide absenteeism on nursing home quality. *The Gerontologist*, 55(4), 605-615.
- Castle, N. G., Lowe, T. J., Lucas, J. A., Robinson, J. P., & Crystal, S. (2004). Use of resident satisfaction surveys in New Jersey nursing homes and assisted living facilities. *Journal of Applied Gerontology*, 23(2), 156-171.
- Chung G. (2013). Understanding nursing home worker conceptualizations about good care. *The Gerontologist*, 53(2), 246–254.
- Code of Maryland Regulations [COMAR] (2019). The Office of Health Care Quality. Retrieved from <http://www.health.maryland.gov/OHCQ/AL/>.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Cummings, S. M., & Cockerham, C. (2008). Depression and life satisfaction in assisted

- living residents: Impact of health and social support. *Clinical Gerontologist*, 27(1-2), 25-42.
- Cutler, L. J. (2000). Assessment of physical environments of older adults. *Assessing older persons: Measures, meaning, and practical applications*, 360-379.
- Cutler, L. J. (2007). Physical environments of assisted living: Research needs and challenges. *The Gerontologist*, 47(suppl\_1), 68-82.
- Dean, R., Proudfoot, R., & Lindesay, J. (1993). The quality of interactions schedule (QUIS): development, reliability and use in the evaluation of two domus units, *International Journal Of Geriatric Psychiatry*, 8(10), 819-826.
- Dellefield, M. E., Castle, N. G., McGilton, K. S., & Spilsbury, K. (2015). The relationship between registered nurses and nursing home quality: An integrative review (2008-2014). *Nursing Economics*, 33(2), 95-108.
- Dickinson, L. M., & Basu, A. (2005). Multilevel modeling and practice-based research. *The Annals of Family Medicine*, 3(Suppl 1), S52-S60.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71-75.
- Dounis, G., Ditmyer, M. M., McCants, R., Lee, Y., & Mobley, C. (2012). Southern Nevada assisted living residents' perception of their oral health status and access to dental care. *Gerodontology*, 29(2), e150-e154.
- Edelman, P., Guihan, M., Bryant, F. B., & Munroe, D. J. (2006). Measuring resident and family member determinants of satisfaction with assisted living. *Gerontologist*, 46(5), 599-608.
- Edvardsson, D., Varrailhon, P., & Edvardsson, K. (2013). Promoting person-

- centeredness in long-term care: An exploratory study. *Journal of Gerontological Nursing*, 40(4), 46-53.
- Fernández Ballesteros, R. (2001). Environmental conditions, health and satisfaction among the elderly: Some empirical results. *Psicothema*, 13(1).
- Finkel, D., Andel, R., & Pedersen, N. (2018). Gender differences in longitudinal trajectories of change in physical social and cognitive/sedentary leisure activities. *Journals of Gerontology B: Psychological Sciences and Social Sciences*, 73(8), 1491-1500.
- Fleming, R., Goodenough, B., Low, L. F., Chenoweth, L., & Brodaty, H. (2016). The relationship between the quality of the built environment and the quality of life of people with dementia in residential care. *Dementia*, 15(4), 663-680.
- Grabowski, D. C., Stevenson, D. G., & Cornell, P. Y. (2012). Assisted living expansion and the market for nursing home care. *Health Services Research*, 47(6), 2296-2315.
- Greenfield, E. A. (2012). Using ecological frameworks to advance a field of research, practice, and policy on aging-in-place Initiatives. *The Gerontologist*, 52(1), 1-12.
- Hall, K. S., & McAuley, E. (2011). Examining indirect associations between physical activity, function, and disability in independent-and assisted-living residents. *Journal of Physical Activity & Health*, 8(5), 716-723.
- Harris-Kojetin, L., Sengupta, M., Park-Lee, E., Valverde, R., Caffrey, C., Rome, V., & Lendon, J. (2016). Long-term care providers and services users in the United States: Data from the national study of long-term care providers, 2013-2014. *Vital and Health Statistics*, 3(38), 1-105.

- Heck, R. H., & Thomas, S. L. (2015). *An introduction to multilevel modeling techniques: MLM and SEM approaches using Mplus*. Routledge.
- Holmes, S. D., Galik, E., & Resnick, B. (2018). The mediating effect of resilience between social support for exercise and resident satisfaction in assisted living. *Journal of Housing For the Elderly*, 1-16.
- Horowitz, B. P., & Vanner, E. (2010). Relationships among active engagement in life activities and quality of life for assisted-living residents. *Journal of Housing for the Elderly*, 24(2), 130-150.
- Kelley-Gillespie, N. (2012). A secondary analysis of perceptions of quality of life of older adults residing in a nursing home and assisted living setting using an integrated conceptual model of measurement. *Applied Research in Quality of Life*, 7(2), 137-154.
- Kelly, G. A. (2012). Examining Resident Social Support Systems in Assisted Living. *Families in Society*, 93(3), 219-225.
- Kemp, C. L., Ball, M. M., Hollingsworth, C., & Perkins, M. M. (2012). Strangers and friends: Residents' social careers in assisted living. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 67(4), 491-502.
- Kenny, D. A., Kaniskan, B., & McCoach, D. B. (2015). The Performance of RMSEA in Models with Small Degrees of Freedom. *Sociological Methods & Research*, 44(3), 486-507.
- Khatutsky, G., Ormond, C., Wiener, J. M., Greene, A. M., Johnson, R., Jessup, E. A. J., ... & Harris-Kojetin, L. D. (2016). Residential care communities and their residents in 2010: A national portrait.



- Kisling-Rundgren, A., Paul III, D. P., & Coustasse, A. (2016). Costs, Staffing, and Services of Assisted Living in the United States: A Literature Review. *The Health Care Manager, 35*(2), 156-163.
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.
- Koenig, T. L., Lee, J. H., Macmillan, K. R., Fields, N. L., & Spano, R. (2014). Older adult and family member perspectives of the decision-making process involved in moving to assisted living. *Qualitative Social Work, 13*(3), 335-350.
- Koren, M. J. (2010). Person-centered care for nursing home residents: The culture-change movement. *Health Affairs, 29*(2), 312-317.
- Król-Zielińska M, Kusy K, Zieliński J, & Osiński W. (2011). Physical activity and functional fitness in institutionalized vs. independently living elderly: A comparison of 70–80-year-old city-dwellers. *Archives of Gerontology & Geriatrics, 53*(1), e10-e16.
- Lawton, M. P. & Nahemow, L. (1973). Ecology and the aging process. In: Eisdorder, C.; Lawton, MP., editors. *Psychology of Adult Development and Aging*. American Psychological Association, Washington, D.C.
- Lerner, N. B., Johantgen, M., Trinkoff, A. M., Storr, C. L., & Han, K. (2014). Are nursing home survey deficiencies higher in facilities with greater staff turnover. *Journal of the American Medical Directors Association, 15*(2), 102-107.
- Linacre, J. M. (2010). *A user's guide to Winsteps, Ministep: Rasch-Model Computer Programs*. Chicago, IL: MESA Press.
- Linn, B. S., Linn, M. W., & Gurel, L. E. (1968). Cumulative illness rating scale. *Journal*

- of the American Geriatrics Society, 16(5), 622-626.*
- Loehlin, J. C., & Beaujean, A. A. (2016). *Latent variable models: An introduction to factor, path, and structural equation analysis*. Taylor & Francis.
- Lohmann, N. A factor analysis of life satisfaction, adjustment and morale measures with elderly adults. *International Journal of Aging and Human Development, 1980, 11, 35-43.*
- Love, K. (2010). Person-centered care in assisted living: An informational guide. *Center for Excellence in Assisted Living (The CEAL)*.
- Lowe, T.J., Lucas, J.A., Castle, N.G., Robinson, J.P., & Crystal, S. (2000). Consumer Satisfaction in Long-Term Care: State Initiatives in Nursing Homes and Assisted Living Facilities. *The Gerontologist, 43(6), 883-896.*
- Lu, Z. (2010). Investigating walking environments in and around assisted living facilities: A facility visit study. *HERD: Health Environments Research & Design Journal, 3(4), 58-74.*
- Mahoney, F. I., & Barthel, D. W. (1965). Functional Evaluation: The Barthel Index. *Maryland State Medical Journal, 14(1), 61-65.*
- Marquardt, G., Bueter, K., & Motzek, T. (2014). Impact of the design of the built environment on people with dementia: an evidence-based review. *HERD: Health Environments Research & Design Journal, 8(1), 127-157.*
- Miller, M. D., Paradis, C. F., Houck, P. R., Mazumdar, S., Stack, J. A., Rifai, A. H., ... & Reynolds III, C. F. (1992). Rating chronic medical illness burden in geropsychiatric practice and research: application of the Cumulative Illness Rating Scale. *Psychiatry research, 41(3), 237-248.*

- Mitchell, J. M. (2013). Prevalence and predictors of unmet functional care needs in assisted living facilities. *Topics in Geriatric Rehabilitation, 29*(3), 210-216.
- Moos, R. H. (1980). Specialized Living Environments for Older People: A Conceptual Framework for Evaluation. *Journal of Social Issues, 36*(2), 75–94.
- Muthén, L. K., & Muthén, B. O. (1998-2017). MPlus User’s Guide. Eighth Edition. Los Angeles, CA: Muthén & Muthén.
- Nathan, A., Wood, L., & Giles-Corti, B. (2013). Environmental factors associated with active living in retirement village residents: Findings from an exploratory qualitative enquiry. *Research on Aging, 35*(4), 459-480.
- Nathan, A., Wood, L., & Giles-Corti, B. (2014). Perceptions of the built environment and associations with walking among retirement village residents. *Environment and Behavior, 46*(1), 46-69.
- National Center for Assisted Living (NCAL) (2019). Facts and Figures.  
Retrieved from <https://www.ahcancal.org/ncal/facts/Pages/Communities.aspx>
- National Center for Assisted Living (NCAL) (2015). 2015 NCAL Performance Measure Survey Results. Retrieved from  
[https://www.ahcancal.org/ncal/quality/Documents/PM\\_Survey\\_2015.pdf](https://www.ahcancal.org/ncal/quality/Documents/PM_Survey_2015.pdf)
- Naylor, M. D., Hirschman, K. B., Hanlon, A. L., Abbott, K. M., Bowles, K. H., Foust, J., ... & Zubritsky, C. (2016). Factors associated with changes in perceived quality of life among elderly recipients of long-term services and supports. *Journal of the American Medical Directors Association, 17*(1), 44-52.
- Neugarten, B. L., Havighurst, R. J., & Tobin, S. S. (1961). The measurement of life satisfaction. *Journal of Gerontology, 16*, 134-143.

- Nordin, S., McKee, K., Wallinder, M., von Koch, L., Wijk, H., & Elf, M. (2017a). The physical environment, activity and interaction in residential care facilities for older people: a comparative case study. *Scandinavian Journal of Caring Sciences*, 31(4), 727-738.
- Nordin, S., McKee, K., Wijk, H., & Elf, M. (2017b). The association between the physical environment and the well-being of older people in residential care facilities: A multilevel analysis. *Journal of Advanced Nursing*, 73(12), 2942-2952.
- Oshio, T., & Oshio, T. (2012). Gender Differences in the Associations of Life Satisfaction with Family and Social Relations Among the Japanese Elderly. *Journal of Cross-Cultural Gerontology*, 27(3), 259-274.
- Park, N. S. (2009). The relationship of social engagement to psychological well-being of older adults in assisted living facilities. *Journal of Applied Gerontology*, 28(4), 461-481.
- Park, N. S., Zimmerman, S., Kinslow, K., Shin, H. J., & Roff, L. L. (2012). Social engagement in assisted living and implications for practice. *Journal of Applied Gerontology*, 31(2), 215-238.
- Park-Lee, E., Caffrey, C., Sengupta, M., Moss, A. J., Rosenoff, E., & Harris-Kojetin, L. D. (2011). Residential care facilities: A key sector in the spectrum of long-term care providers in the United States. *NCHS Data Brief*, (78), 1.
- Pennsylvania Code Chapter 2800 (2019). Department of Human Services. Retrieved from <http://www.dhs.pa.gov/provider/human-services-licensing/assisted-living/>.
- Polivka, L. (2010). Research and regulation in assisted living. In M. M. Ball, M. M.

- Perkins, C. Hollingsworth, & C. Kemp (Eds.), *Frontline Workers in Assisted Living*. Baltimore, MD: Johns Hopkins University Press.
- Resnick, B., Galik, E., Boltz, M., Vigne, E., Holmes, S.D., Fix, S. Zhu, S., Lewis, R. (2019). Psychometric testing of the assessment of environment and policy for optimizing function and physical activity in assisted living. *Journal of Housing for the Elderly*, 33(2), 153-172.
- Resnick, B., Galik, E., Boltz, M., Holmes, S., Fix, S., Vigne, E., ... & Lewis, R. (2018). Polypharmacy in assisted living and impact on clinical outcomes. *The Consultant Pharmacist*, 33(6), 321-330.
- Resnick, B., Galik, E., Gruber-Baldini, A., & Zimmerman, S. (2011). Testing the effect of function-focused care in assisted living. *Journal of the American Geriatrics Society*, 59(12), 2233-2240.
- Resnick, B., Galik, E., Gruber-Baldini, A. L., & Zimmerman, S. (2010). Satisfaction with assisted living: The unexplored role of physical activity. *Geriatric Nursing*, 31, 197-205.
- Resnick, B., Galik, E., Gruber-Baldini, A., & Zimmerman, S. (2010). Perceptions and performance of function and physical activity in assisted living communities. *Journal of the American Medical Directors Association*, 11(6), 406-414.
- Resnick, B., Gruber-Baldini, A., Aboff-Petzer, I., Galik, E., Russ, K., & Zimmerman, S. (2007). Reliability and validity of the Evaluation to Sign Consent measure. *The Gerontologist*, 47(1), 69-77.
- Rioux, L., & Werner, C. (2011). Residential satisfaction among aging people living in place. *Journal of Environmental Psychology*, 31(2), 158-169.

- Rodiek, S., Boggess, M. M., Lee, C., Booth, G. J., & Morris, A. (2013). Can better outdoor environments lead to cost benefits in assisted living facilities through increased word-of-mouth referrals?. *HERD: Health Environments Research & Design Journal*, 6(2), 12-26.
- Saarela, R. K., Soini, H., Muurinen, S., Suominen, M. H., & Pitkälä, K. H. (2013). Oral hygiene and associated factors among frail older assisted living residents. *Special Care in Dentistry*, 33(2), 56-61.
- Sandhu, N. K., Kemp, C. L., Ball, M. M., Burgess, E. O., & Perkins, M. M. (2013). Coming together and pulling apart: Exploring the influence of functional status on co-resident relationships in assisted living. *Journal of aging studies*, 27(4), 317-329.
- Sikorska, E. (1999). Organizational determinants of resident satisfaction with assisted living. *The Gerontologist*, 39(4), 450-456.
- Sikorska-Simmons, E. (2001). Development of an instrument to measure resident satisfaction with assisted living. *Journal of Applied Gerontology*, 20(1), 57-73.
- Silver, B. C., Grabowski, D. C., Gozalo, P. L., Dosa, D., & Thomas, K. S. (2018). Increasing Prevalence of Assisted Living as a Substitute for Private-Pay Long-Term Nursing Care. *Health Services Research*, 53(6), 4906-4920.
- Sloane, P. D., Zimmerman, S., Perez, R., Reed, D., Harris-Wallace, B., Khandelwal, C., ... & Schumacher, J. (2011). Physician perspectives on medical care delivery in assisted living. *Journal of the American Geriatrics Society*, 59(12), 2326-2331.
- Smith E., & Smith, R.M. (2004). *Introduction to Rasch Measurement*. Maple Grove, MN: JAM Press.

- Spetz, J., Trupin, L., Bates, T., & Coffman, J. M. (2015). Future demand for long-term care workers will be influenced by demographic and utilization changes. *Health Affairs, 34*(6), 936-945.
- Steiger, J.H. & Lind, J. (1980). Statistically-based tests for the number of common factors. Paper presented at the Annual Spring Meeting of the Psychometric Society, Iowa City, IA.
- Stevenson, D. G., & Grabowski, D. C. (2010). Sizing up the market for assisted living. *Health Affairs, 29*(1), 35-43.
- Street, D., Burge, S., Quadagno, J., & Barrett, A. (2007). The salience of social relationships for resident well-being in assisted living. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 62*(2), S129-S134.
- Street, D., & Burge, S. W. (2012). Residential context, social relationships, and subjective well-being in assisted living. *Research on Aging, 34*(3), 365-394.
- Tennant, A., & Pallant, J. F. (2007). DIF matters: a practical approach to test if differential item functioning makes a difference. *Rasch Measurement Transactions, 20*(4), 1082-1084.
- Thomas, S. L., & Heck, R. H. (2001). Analysis of large-scale secondary data in higher education research: Potential perils associated with complex sampling designs. *Research in higher education, 42*(5), 517-540.
- Thomas, K. S., Mor, V., Tyler, D. A., & Hyer, K. (2012). The relationships among licensed nurse turnover, retention, and rehospitalization of nursing home residents. *The Gerontologist, 53*(2), 211-221.

- Ullman, J. B. (2006). Structural equation modeling: Reviewing the basics and moving forward. *Journal of Personality Assessment*, 87(1), 35-50.
- Wilson, K. B. (1996). Assisted living: Reconceptualizing regulation to meet consumers' needs and preferences. Washington, DC: Public Policy Institute, American Association of Retired Persons.
- Wood, V., Wylie, M. L., & Sheafor, B. (1969). An analysis of a short self-report measure of life satisfaction: Correlation with rater judgement. *Journal of Gerontology*, 24, 465-469.
- Wood-Nartker, J., Guerin, D. A., & Beuschel, E. (2014). Environmental cues: Their influence within assisted living facilities. *HERD: Health Environments Research & Design Journal*, 7(3), 120-143.
- Wright, B., & Linacre, J.M. (1994). Reasonable mean square fit values. *Rasch Measurement Transactions*, 8, 370.
- Wylde, M., Smith, E., Schless, D., & Bernstecker, R. (2009). Satisfied residents won't recommend your community, but very satisfied residents will. *Seniors Housing and Care Journal*, 17(1), 3-13.
- Wyrick, S., Parker, D., Grabowski, D., Feuling, H., & Ng, A. (2008). Relationships among walking aids, physical activity, depression, fatigue, and perceived health in assisted-living residents - A pilot study. *Journal of Applied Gerontology*, 27(4), 511-522.
- Yang, H. Y., & Stark, S. L. (2010). The role of environmental features in social engagement among residents living in assisted living facilities. *Journal of Housing for the Elderly*, 24(1), 28-43.



- Zhang, W., Feng, Q., Lacanienta, J., & Zhen, Z. (2017). Leisure participation and subjective well-being: Exploring gender differences among elderly in Shanghai, China. *Archives of Gerontology and Geriatrics*, 69, 45-54.
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, 52(1), 30-41.
- Zimmerman, S., Gruber-Baldini, A.L., Sloane, P.D., Eckert, J.K., Hebel, J.R. & Morgan, L.A. et al. (2003). Assisted living and nursing homes: Apples and oranges? *The Gerontologist*, 43, 107-117.
- Zimmerman, S., Love, K., Cohen, L. W., Pinkowitz, J., & Nyrop, K. A. (2014). Person-centeredness in home-and community-based services and supports: domains, attributes, and assisted living indicators. *Clinical Gerontologist*, 37(5), 429-445.
- Zimmerman, S., Mitchell, C. M., Chen, C. K., Morgan, L. A., Gruberbaldini, A. L., Sloane, P. D., ... & Munn, J. (2007). An observation of assisted living environments: Space use and behavior. *Journal of gerontological social work*, 49(3), 185-203.
- Zimmerman S, Sloane PD, Eckert JK, et al. (2005). How good is assisted living? Findings and implications from an outcomes study. *Journal of Gerontology B: Psychological & Social Sciences*, 60, S195–204.
- Zimmerman, S., Sloane, P. D., & Reed, D. (2014). Dementia prevalence and care in assisted living. *Health Affairs*, 33(4), 658-666.