

ENHANCING SOCIAL INTERACTION FOR THE RESIDENTS OF ASSISTED
LIVING FACILITIES BY OPTIMIZING THE PHYSICAL ENVIRONMENT: A
PARTICIPANT-GENERATED IMAGE-BASED APPROACH

A Thesis

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by

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ABSTRACT

Background: Previous studies have examined the benefits of increased social interaction on improved quality of life and overall wellbeing among community-dwelling older adults. However, few studies explored effective environmental factors that could affect social interaction.

Objective: The purpose of this study was to identify environmental factors that facilitate or hinder social interaction by elderly residents from their perspective.

Methods: To record feedback from older adults that dwelling in the assisted living facility within a continuing care retirement community, this exploratory study deployed a participant-generated image method, which includes a photovoice and a photo-elicitation interview. Photos were sorted based on subjects, and interview responses were analyzed using content analysis of qualitative inquiry.

Results: A total of 11 older adults completed this study by recording 254 photos and participating in the follow-up interviews. Among 149 analyzed photos with complete descriptions, participants identified key environmental and non-environmental factors as impactful on social interaction. Five main domains identified are physical space accessibility, locations and layouts, home-like and comfortable ambiance, presence of mediums for interaction, privacy and security, and variation in everyday life.

Conclusion: The findings inform the future design of aging communities to be socialization friendly for community-dwelling older adults with the intention to enhance their quality of life and overall wellbeing.

BIOGRAPHICAL SKETCH

Miao Jia is a graduate student in the MA program in the Department of Design + Environmental Analysis at College of Human Ecology, Cornell University. She studies Interior Design with a concentration on design for special populations, which focus on leveraging design research approaches to direct the design practices of healthcare products and environments.

Prior to matriculating at the current program, Miao received her bachelor's degree in architecture from School of Architecture and Fine Art at the Dalian University of Technology, China. Through her educational experiences, where she developed knowledge and skills as an architect as well as a multidisciplinary designer, she also grew increasingly curious and passionate about research-driven design that empowers and delivers a high-quality experience in both digital and physical environments.

Presently, Miao is pursuing a career path in design research on healthy aging environment, which includes interests in the enhanced physical environments, assisted living systems and implementations for the social well-being of older adults that choose to 'age in place'.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

A substantial body of evidence from previous research has revealed that sufficient social support acts as a salient predictor of health and mental well-being, including improved functional health (Everard, Lach, Fisher, & Baum, 2000), slower cognition decline (Zunzunegui, Alvarado, Del Ser, & Otero, 2003), higher life satisfaction (Jang, Mortimer, Haley, & Graves, 2004), decreased rate of depressive symptoms (Glass, De Leon, Bassuk, & Berkman, 2006) and other crucial components that support successful aging of older adults (Park, 2009; Street, Burge, Quadagno, & Barrett, 2007). The aging population is also most vulnerable to loneliness and social isolation, which indicate the disconnectedness between older adults and their living and social context (Victor, Scambler, Bond, & Bowling, 2000). Insufficient social interaction is the primary struggles that older adults are facing with, especially for those who relocate to the unfamiliar environment of long term care communities (Ayalon, 2018; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Thus, optimizing living environments that could foster engagement of older adults in social interaction is a meaningful topic to explore for the senior housing industry, in both research and design fields.

Former research invested largely on the measurement of the relationships between health outcomes of elderly (such as physical well-being and performance of daily activities) and environmental design interventions (Hays, 2002; Oswald et al., 2007; Shipp, 1999), but less focuses on the environmental solutions for social well-being. The

sophisticated nature of measuring social wellbeing and social interaction (Becker, 1974; Bode, Sutton, Lacey, Fennell, & Leonards, 2017; Larson, 1993) may be attributable for the gap in the research in the environmental design field.

In addition, numerous research focuses on diverse scales and fields of interventions that facilitate social interaction and plenty of previous studies have explored how the environment or living context has a significant impact on the social behaviors (Campbell, 2014; Gory, Ward, & Sherman, 1985; Gory et al., 1985). However, few studies examined how specific environmental factors are associated with the willingness and occurrence of social interaction from an environmental design perspective, especially for older adults dwelling in assisted living facilities.

The present study aims to address this gap by applying the Participant-Generated Image (PGI) Methods (Balomenou & Garrod, 2016), which are commonly used in the ageing research as they facilitate to capture informants from participants' daily life and activities while participants are with declined cognition or memory capacity (Martin, 2015; Orr & Phoenix, 2015; Pilcher, Martin, & Williams, 2016). The PGI Methods used for this study contain a photovoice and a photo-elicitation interview. By using the combined methods to collect both visual and verbal data, the researchers can better explore and understand the viewpoints of participants despite possible barriers such as cognition and memory decline (Drew & Guillemin, 2014; Epstein, Stevens, McKeever, & Baruchel, 2006; Jacelon & Imperio, 2005; Martin, 2015) Overall, this study is intended to inform future design decisions for successfully engaging older adults in social interaction than ever.

1.2 Research Objective

The purpose of this study is to identify important environmental factors that have impacts on the engagement in social interaction from the perspectives of residents. By concluding the environmental factors that provide positive stimuli to the facilitation of social interaction, the study findings would help shape the living situations of older adults to be more socialization-friendly. The long-term goal of this study is to facilitate the generation of design guidelines for assisted living centers, which will contribute to the design of better aging communities.

1.3 Hypotheses

Based on the literature, researchers hypothesized that environmental factors, including ambient environments (e.g., daylight), physical environments (e.g., hallways, objects) and non-environmental factors (e.g., policy, service) might contribute to enhancing social interaction by meeting residents' functional and psychological needs for competent social spaces.

The research questions are as follows:

1. For residents dwelling in the assisted living facilities, what are their demands to successful have social interaction with others?
2. For residents dwelling in the assisted living facilities, what environmental and non-environmental features of the facilities they perceive as facilitators to enhance their social interaction?

3. For residents dwelling in the assisted living facilities, what environmental and non-environmental features of the facilities they perceive as hinderances to differ them from social interaction?

CHAPTER 2

LITERATURE REVIEW

2.1 Social Interaction in aging communities

Social interaction is a universal concept that cuts across most of the categories of the population from the adolescent, to teenagers, adults, and elders (Becker, 1974). It is defined as the way in which individuals, groups, or social systems act toward each other and how they mutually influence one another (Becker, 1974). Social interaction denotes meaningful interactions through human communications (Becker, 1974; Hubbard, Tester, & Downs, 2003). A qualitative study that investigated the content of social interaction among older adults in the care settings (Hubbard et al., 2003) shows that older adults interpret others' presence, behaviors, and speech during interacting with others. In addition, they show a strong awareness of self as well while having social interaction.

In the aging communities, social interaction can be divided into two types: informal social interaction, which has emphasis mainly on the spontaneous and impromptu interactions and conversations; and formal social interaction, which is more organized and pre-planned within the facility (Campbell, 2014). As revealed in the previous research, social spaces for formal social interaction (e.g., meeting rooms) draw more attention in the process of design and planning compared with informal and flexible social spaces despite the fact that the latter is in higher demand and lower supply (Percival, 2001).

The population of the elders is rising rapidly, and so are the challenges of aging at home for this population (Campbell, 2014). Many older adults move to Continuing Care Retirement Communities (CCRC), which are integrated communities that incorporate

various types of living and care services including independent living, skilled nursing care, and assisted living (“Continuing Care Retirement Communities | What is a CCRC?,” 2011) to ensure quality of life through the aging process (Shabnam *et al.*, 2016). CCRCs house individuals with a different belief, religion, social preference, age, gender, and experience, which all later contribute to the different level of social interaction among residents (Prieto-Flores, Fernandez-Mayoralas, Forjaz, Rojo-Perez, & Martinez-Martin, 2011). Studies have revealed that social, psychological, and behavioral factors, are essential factors that determine the health state of the elderly and their level of social interaction (Shiri *et al.*, 2014). Generally, among the older adults that are dwelling in the assisted living or nursing homes, the social participation is significantly decreasing as they are no longer able to proactively involve in activities which in turn reduce their social interaction even when confined and placed in aging communities (Shabnam *et al.*, 2016). In addition to genetic factors, physical activities, social engagement, and life attitude affect healthy aging (Shiri *et al.*, 2014). Elderly are particularly susceptible to loss of the social dimension and loneliness, which can lead to emotional and psychological separation and affect their social connectivity as a result (Madah, 2004). Hence, the improvement of aging life quality is related to enhanced social involvement (Prieto-Flores *et al.*, 2011).

As the impact of social interaction on the life quality and well-being of older adults has been operationally recognized, increasing attention has been paid on the environmental predictors that enhance social engagement in CCRCs (Cannuscio, 2003). In the Active Aging initiative, the World Health Organization (WHO, 2002) included the goal of “providing housing in communities that encourage daily social interaction” as a primary guideline for the senior community housing.

2.2 The Conceptual and Theoretical Framework of Social Spaces

This article reviewed several formulated models relevant to the environmental determinants in social interaction among older adults.

A conceptual framework developed by Moos and Igra (1980) on the relationship between environmental factors and the social environment in long term care settings suggests that “physical and architectural, policy and program, and resident and staff factors influence the type of social environment” (Moos & Igra, 1980). In a study of 90 congregate housing facilities for the elderly, interrelationships were found among the four domains mentioned above and the overall institutional social climate. However, in this study, the relationships among different factors and social environment are not clearly predicted (Moos & Igra, 1980).

Another relevant conceptual framework is from a study on the roles of the physical and social environments on informal social interaction among dementia care settings’ residents (Campo & Chaudhury, 2012). This framework stemmed from an integration of the Competence-Environmental Press model (Lawton, 1982), Social-Ecological Model of Health-related Behaviors (Moos, 1979) and the concept of ‘Affordance’ (Gibson, 1977). Holistically, this model illustrates that social interaction is buffered by the summative impact of components including physical environments, social environments, and individualized features such as past histories, situations, and functional as well as cognitive abilities (Figure 1).

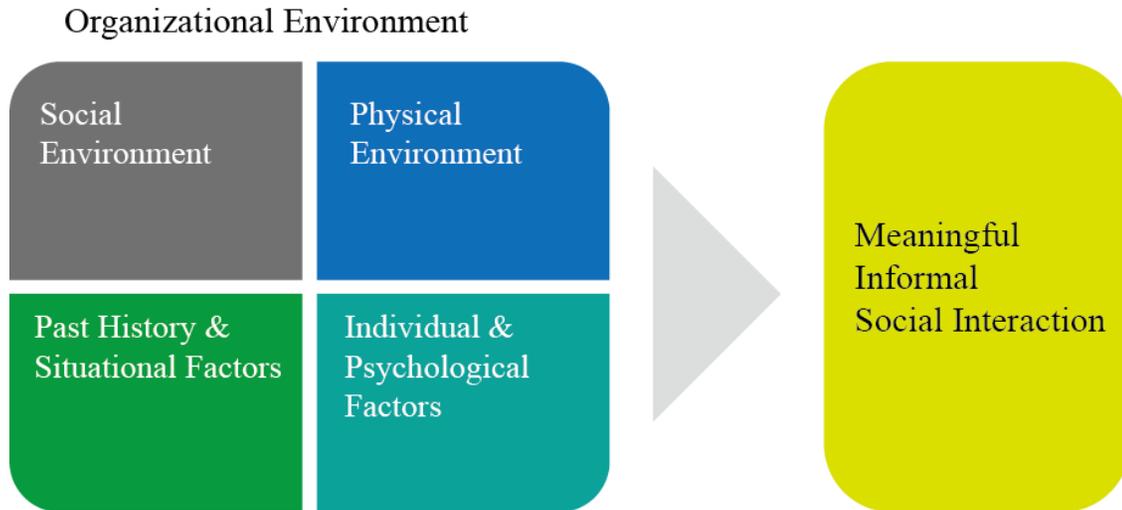


Figure 1. Reprinted from “Informal social interaction among residents with dementia in special care units: Exploring the role of the physical and social environments” by Campo, M., & Chaudhury, H. (2012). *Dementia*, 11(3), 401–423.

In the infertile context of social space design, the Successful Social Space Attribute Model (Campbell, 2014) was framed as the source of potential factors that have impacts on the socialization within CCRCs. The framework was displayed in the article to help systematically inform the discipline of environmental design for enhanced social interaction. This model contains four main categories, including: ‘factors unique to individual’, ‘communal environmental design factors’, ‘place culture’, and ‘programmatic factors’ (Figure 2). Based on the implications of this framework, a study was conducted to examine what factors influence informal social interaction in six selected CCRCs’ social spaces (Campbell, 2014). As the conclusion, ‘Negotiation & Comfort’, ‘Security & Views’, and ‘Context & Stimulation’ were the major predictors for usage and like of the social space, at the block scale. At a finer scale, privacy, active engagement opportunities, and

home range were the significant factors to trigger social interaction and increase usage of social spaces (Campbell, 2014).

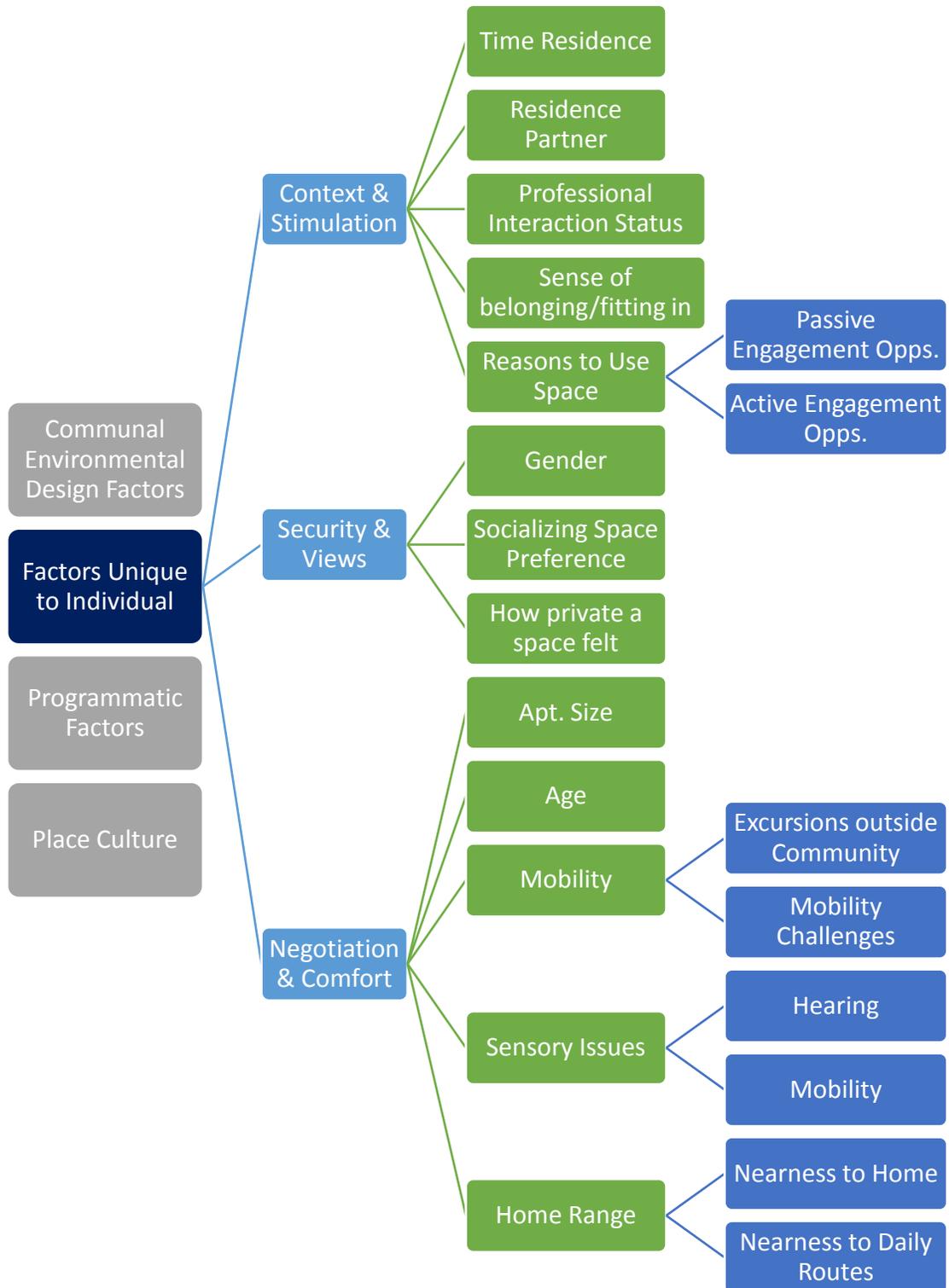


Figure 2. Reprinted from “Factors Predicting Retirement Community Social Space Success” by Campbell, N. M. (2014). *Housing and Society*, 41(1), 1–29.

Based on the aforementioned frameworks of social spaces, the following further describes the literature categories by the contributing factors.

2.3 Individual Factors

Investigations that quantified the levels of social interaction in CCRCs have shown that the development of social interaction is not only dependent on the space affordance offered by the facilities alone, but also is subject to some individual factors (Hubbard et al., 2003). These factors are considered as the confounding variables in the present studies that might cast undergoing influences. They include functional ability attributes of residents (Hubbard et al., 2003), duration/length of residence (Park, Zimmerman, Kinslow, Shin, & Roff, 2012; Weeks & Cuellar, 1983), personality or individual factors and personal satisfaction (Prieto-Flores et al., 2011). The following are various subcomponents of individual factors:

2.3.1 Functional ability attributes.

Older adults dwelling in CCRCs have different levels of cognitive and memory decline, and some have a suboptimal hearing, sight, speech and ambulating functionality (Bitzan & Kruzich, 1990; Kovach & Robinson, 1996). Speech and hearing impairments are found to be the main factors to reduce the occurrence and quality of social interaction (Hubbard et al., 2003). Functional states are also key predictors of the establishment of co-

residence relationship in the assisted living facilities (Bitzan & Kruzich, 1990; Kovach & Robinson, 1996).

2.3.2 Length of residence.

The duration of residence in the assisted living is also closely linked with social connectivity for older adults living in the retirement communities (Park et al., 2012; Weeks & Cuellar, 1983). Given that social interaction is featured with communicating and sharing, a longer duration of co-residence experience considerably facilitates the cohesion and integration within the community and brings more connectedness as well as empathy among older adults (Bitzan & Kruzich, 1990; Kovach & Robinson, 1996; Sandhu, Kemp, Ball, Burgess, & Perkins, 2013). On the other hand, ample amount of residence time allows residents to cultivate a sense of being home (Campbell, 2014). A sense of being home is regarded as a significant symbol of a successful care setting as it indicates a strong attachment, trust as well as safety that provided by the community, all of which are facilitators for increased engaged social participation (Prieto-Flores et al., 2011; Young, Russell, & Powers, 2004). Hence, the duration of the residence is found to be a relevant individual factor when it comes to social interaction.

2.3.3 Personality or individual factors.

Personal factors affect the level of social interaction in CCRCs with subcomponents, including age, responsiveness to others in social contexts, and ease to socialize with other people (Nolan, Grant & Nolan, 1995). Generally, peers of the same age or with similar social preferences socialize with each other easily (Prieto-Flores et al., 2011). Such factors also create division among the residents in a facility and impact the occurrence and quality of social interaction (Shabnam *et al.*, 2016).

2.3.4 Personal satisfaction.

Personal life satisfaction is an indicator of an individual's positive attitude toward the world around them (Prieto-Flores et al., 2011). Although the measure of self-philosophy is not viewed as a steady construct, in general, older adults find it difficult to achieve a high degree of satisfaction (Zarghami *et al.*, 2015). This may be due to the transition to a lowered functional ability as well as a decreased social presence. Lower personal satisfaction leads to relatively negative outlook toward social relationships (Zarghami *et al.*, 2015).

2.4 Physiological Factors

The living environments of older adults should be intentionally designed to support physiological changes of this population (Lichtenberg, MacNeill, & Mast, 2000; Trickey, Maltais, Gosselin, & Robitaille, 1994). For example, handrails and 'non-step' design are universally used to assist older adults in performing the Activities of Daily Living (ADLs), such as walking, bathing, toileting and so on (Iwarsson, 2009). However, few studies discuss design considerations to support social interaction for this population. The following provides a summary of the literature on environmental accommodations for the elderly's physiological needs:

2.4.1 Ambient environments.

According to previous research about environmental preferences (Brown, Kaplan, & Quaderer, 1999; Kaplan, Kaplan, & Brown, 1989), environmental satisfaction is increased when they meet users' physiological needs. Depending on the lighting, nature exposure, and acoustics, the ambient environment offers their occupants varying levels of

vision, auditory, and physical comfort (Campbell, 2015). Therefore, the ambient environment is likely to have an impact on social behaviors.

2.4.2 Proximity / Home range.

It is crucial to pay more attention to providing functional assistance by environmental design when users have decreased functional health status (Lichtenberg et al., 2000). When individuals are facing with increasing physical challenges, higher accessibility would be a central demand (Schmitt, Kruse, & Olbrich, 1994). Campbell (2014) came up with the concept of ‘home range’ – the proximity of the places, where social interaction would occur, to daily travel routes and apartment. The home range is ranked as a foundational factor to predict social interaction, according to the Successful Social Space Attribute Model, since the locations of social spaces are associated with residents’ motivation to get involved under the mobility limitations (Campbell, 2014).

2.5 Psychological Factors

2.5.1 Sense of belonging.

In the Successful Social Space Attribute Model, a sense of belonging is named as an influential factor to predict users’ engagement in the environment and interactions with others (Campbell, 2014). A sense of belonging to a community stems from a collective perception towards the objective qualities of the community, and the overall state of the resident (Gory et al., 1985). In a longitudinal study with a sample of 9445 women with ages between 73 to 78, it is concluded that an increased sense of belonging relates to a higher level of physical, mental well-being, improved social support and enhanced active physical functions (Young et al., 2004). In this study, the sense of belonging was measured

with a thirteen-question survey, which included questions that were associated with the feeling of safety, attachment, and attitude toward the community and social relationships (Young et al., 2004). Accordingly, a sense of belonging may be a facilitator of more involvement in social interaction.

2.5.2 Privacy.

Based on environmental psychology principles, privacy is defined as having control of access to the external stimuli – including physical and social stimuli (Altman, 1975). It is widely accepted that feeling safe and sheltered is a significant human need (Campbell, 2015). Altman (1975), in his book, addressed the necessity of an appropriate amount of privacy and territoriality that designers should provide even in the social spaces.

2.6 Physical and Resources Needs/Organizational Factors

2.6.1 Physical context factors.

The physical space factors include housing standards, floorplan, access to recreational facilities, living arrangement, and other interior environmental factors (Campbell, 2014, 2015; Campo & Chaudhury, 2012). Human behaviors are generally affected by various environmental factors, which in turn may affect the daily activities and psychological characteristics (Alipour, 2016).

2.6.2 Active engagement opportunities.

Active engagements include participating in planned activities within or out of the community context and interacting informally with other people (Campbell, 2015). The most efficient way to offer residents with opportunities for social interaction is having an activity hub, which could be either a community intervention, a social program, or a place

that integrate games, conversations, or other leisure activities (Zunzunegui et al., 2003). A study from Japan (Hikichi et al., 2015) examined how a community intervention program decreased the incidence of functional disability through the mediator of increased social interaction. From the baseline survey in July 2006 to the onset assessment in 2012 with a sample size of 2421, the noticeable effect was found, and it was significant even under adjustment of some confounding factors such as demographics, different levels of ADLs and depression (Hikichi et al., 2015).

In addition to the community-based programs, active engagement opportunities could be integrated into the elderly's daily living in multiple ways. For example, some environmental design features, such as providing circle tables and arranging chairs surrounding the table in a radial way are typical approaches to enhance social engagement (Campbell, 2015). Collectively, these approaches that relate to the concept of “affordance” – which addresses that the environmental features contribute to and guide the occurrence of behaviors by providing a proper context for the behavior (Gibson, 1977) are essential for creating active social engagement opportunities.

2.6.3 Policies and practices.

Policies practices, operation, and management in CCRCs can limit or support the potential of social interaction among residents or between residents and staff members (Prieto-Flores et al., 2011; Street et al., 2007). According to a study that examined the Quality of Life (QOL) in 55 assisted living facilities in California, policies, and practices such as assigned seating, identical daily routines and people, and constraints on flexible activities were reported to hinder meaningful social engagement (Mitchell & Kemp, 2000). Policies and practices can be designed to support social interaction. For example, meal

times could be the window for meaningful social interaction in the long term care settings since sitting together can provide opportunities for socialization (Park et al., 2012).

2.6.4 Social environment in the community.

The rotating pattern and locations of staff members in the CCRCs are potentially considerable factors that influence social interaction among residents since the staff members would be a large group in residents' social network (Campo & Chaudhury, 2012). Based on a qualitative study with 29 participants in four assisted living facilities (Park et al., 2012), residents were inclined to have meaningful social interaction and relationships with staff because they are considered as a part of residents' life beyond providing care, attention, and support.

According to Park et al. (2012), elderly residents showed desires to connect with outside the facility and develop external social networks. So, environmental factors that contribute to the connectedness between residents and networks outside of the community may have a decisive role in social interaction.

2.6.5 Technology.

Previous research has demonstrated technology – especially the online social network could advance social integration, but fewer studies have focused on the elderly population in comparison to other populations (Goswami, Köbler, Leimeister, & Kremer, n.d.). According to a focus group study, the use of online social networking facilitates social interaction among the elderly and provided accessible social support to them (Goswami et al., n.d.). However, another study questioned older adults' access and use of technology, because from an overall sample size of 1001 older adults (aged more than 60), only a few of participants were actively interacting with technology (Selwyn, Gorard,

Furlong, & Madden, 2003). In conclusion, technology is likely to be a predictor of promoted social interaction, but the generalizability of this factor is limited. Also, there are accessibility and usability issues with technological products for older adults, which usually results in a sense of frustration for them (Selwyn et al., 2003).

CHAPTER 3

METHODS

3.1 Methods

This study used a participatory methodology to research the facilitators and hindrances for social interaction of older adults dwelling in a CCRC. In this participatory approach, the Participant-Generated Image (PGI) Methods (Balomenou & Garrod, 2016), necessitate the involvement of participants to develop the subject of inquiry (Bergold & Thomas, 2012) and focuses on the visual presentation of the collected data. The PGI methods consist of two approaches that are separately deployed in the two phases of the study. Part I involves photovoice, an exploratory practice that asks participants to take photographs to provide content for interviews with researchers (Balomenou & Garrod, 2016). This method could significantly enhance the visual analysis of environmental facilitators and hindrances in social interaction (Bergold & Thomas, 2012). Part II involves an image-based interview, which is also known as a photo-elicitation interview (Epstein et al., 2006; Matteucci, 2013). This interview identifies the variables of the study and unfolds participants' perception of how environmental factors impact their social interaction based on photography. This chapter will describe the methods, data collection, and data analysis procedure of this project in detail.

3.1.1 Participants.

This study was conducted among residents dwelling in an assisted living center or nursing home in Kendal at Ithaca, which is located in Tompkins County, New York, United States. The participant group consisted of residents who were evaluated at the

“healthy” level of assisted living, which means that they need only personal care support services such as assistance with meals, medication management, and transportation.

Participants were identified as eligible to participate in the study if they experienced mild to moderate mobility loss, relatively declined memory and cognition, or physical functional impairment. However, all participants were confirmed by administrative staff members to be capable of finishing the research tasks and articulating their opinions.

3.1.2 Setting.

Kendal at Ithaca is a not-for-profit CCRC that opened in 1995, and which was expanded and enhanced in 2015. Currently, Kendal at Ithaca provides an array of living options that include independent living, enhanced assisted living, and skilled nursing care with the sum-up area of 105 acres (Kendal of Ithaca, n.d.).

The context of this study is the central construction of Kendal at Ithaca, including its community center, its 36-room enhanced assisted living residence (known as Cascadilla House), and its 48-room skilled nursing facility (known as the Taughannock House). The two sections of the residence are both located in a single-story construction that offers direct access to courtyards from each room. The residences are also connected to the community center, which encompasses a wide variety of activities, amenities, and healthcare services. The community center includes common areas that serve various functions, including activity rooms, an auditorium, a café, dining rooms, a salon and spa, a library, an arts and crafts room, and a fitness and physical therapy center with a pool. In addition, Kendal at Ithaca offers a childcare center that provides care to children from three months to three years old. Residents living in the enhanced living residence have private

rooms and baths. Residents' furniture, personal possessions, and personalized decorations are accepted in these personal spaces.

3.1.3 Study design.

In this study, the researchers used the photovoice approach (Balomenou & Garrod, 2016) combined with the photo-elicitation (Epstein et al., 2006; Matteucci, 2013) interview to seek participants' perception of the environmental factors that assist or hinder their social interaction.

The difficulty of data collection is well-recognized in extant qualitative research about older adults due to participants' limited memory and cognition, particularly in interviews (Kokkinakis, Lundholm Fors, Björkner, & Nordlund, 2017). Given the declined efficiency of articulation in the target population, mixed visual methods were deployed to facilitate data collection (Martin, 2015; Orr & Phoenix, 2015; Pilcher, Martin, & Williams, 2016). According to extant research that applies PGI methodology, photographs may be highly conducive to prompting in-depth interviews with participants, and combining photography with the interview approach could facilitate data collection (Balomenou & Garrod, 2016). This project draws upon the ongoing research of Klusmann (2018), which deploys the PGI Methods to investigate perceptions of aging. In this project, researchers decided to adopt the PGI Methods with dual processes, including the photovoice (Balomenou & Garrod, 2016) and the photo-elicitation interview (Epstein et al., 2006; Matteucci, 2013).

PGI Methods may be especially useful to measure social interaction, as social interaction is difficult to measure due to the lack of a clear behavioral model (Becker, 1974; Bode, Sutton, Lacey, Fennell, & Leonards, 2017).

3.1.4 Measurements.

a. Photovoice.

When applying the photovoice method (Balomenou & Garrod, 2016), participants were asked to use a disposable camera to take photos of places, scenes, or objects that they perceived to help or hinder their social interaction while walking around the facility with a research assistant. With the photovoice approach, environmental facilitators and hindrances to social interaction were recorded to visualize participants' perception and judgments.

Due to the limitations of the measurement validity of social interaction (Hewes, Planalp, & Streibel, 1980; Hubbard et al., 2003), we decided to measure participants' perception of social interaction rather than participant behaviors. The photovoice approach was adopted to consider the variables that affect participants' social interaction. For example, when asking participants to record environmental factors through photography, the research assistant used phrases such as "Take a photo of places, scenes, or objects that you think is helpful to your social interactions or that hinders your social interaction." In this way, the participant-generated visualized dataset would reflect the participants' perception. Additionally, this method expands the extent of recorded variables and facilitates interviews by repeating these scenarios through photos.

b. Photo-Elicitation Interview.

Following the collection of photos by study participants, the principal researcher developed the photos taken by each participant and conducted individual interviews. Conversations began with questions regarding participants' demographic and basic social profile, including their age, gender, marital status, the length of their residence in the assisted living facility, their social relationships outside the community, and their

communication with family and friends. (For a detailed description of these questions, see the Appendix A.) Next, the researcher reviewed the printed photos with each participant and recorded the descriptions, comments, and stories that the participant shared during the interview. This technique is traditionally identified as “photo-elicitation” and utilizes photos to navigate and empower the conversation between the researcher and participant (Matteucci, 2013). The photo-elicitation technique efficiently enriches researchers’ conversations and data.

3.2 Data Collection

Cornell University's Institutional Review Board for Human Participation approved the exemption application of this study before its initiation. This study also received the support and approval of the facility’s leadership, which enabled the successful completion of the study. The administrative staff of Kendal at Ithaca assisted the principal researcher through the recruitment and data collection processes. Since these staff members work closely with residents, they were the best judges of the ability of residents to participate in the study, and their cooperation ensured the feasibility and success of the study. These staff members worked as research assistants after a tutorial by the researcher.

3.2.1 Photovoice.

To facilitate a robust collection of data, a research assistant accompanied each participant on a walk around the facility to remind participants of the task at hand and to assist with the equipment to help participants take accurate photos of what they intended to capture. Participants and assistants used disposable cameras that were provided by the researcher. It was essential that participants be offered assistance with the cameras because

disposal cameras are more challenging to manage than digital cameras are. To guarantee the quality of the collected photo data, research assistants provide instructions to participants, focusing on the lighting condition control and view finding. The guidance offered to participants by research assistants was conveyed with several types of verbal expression, as some participants could only understand short sentences and colloquial phrases. Thus, research assistants varied their language as necessary to communicate with participants but ensured that this language remained consistent with the study's research questions and goals. Importantly, participants were not told how many photos to take but were limited by the 29-photo capacity of the disposable cameras.

3.2.2 Photo-elicitation interview.

Participant interviews began one week after the photovoice session due to the time necessary to complete the photo development process. As participants had varying levels of memory and functional ability decline, a range of strategies was applied to facilitate these interviews successfully. For instance, conversations with one participant with hearing impairment were facilitated by photos, lip-reading, and handwriting in notebooks. Another participant had limited vision but excellent cognition mapping ability. To retrieve the thoughts of the sight-impaired participant, the researcher walked with the impaired participant to find all the places, scenes, and objects that appeared in the photos and gathered the participants' descriptions, comments, and opinions about the environmental factors the participant identified. Furthermore, several participants requested that the researcher add photos of other places and objects that they did not recognize during the photovoice session. For example, one participant was inspired by one of the photographs during the interview and asked the researcher to add a photo of an emergency alert button,

as the participant perceived this as a crucial factor that encouraged the participant to explore the environment.

All information that participants shared with the researcher was noted and typed after the interviews. Interview notes have been stored in a digital format.

3.3 Data Analysis

The collected data is primarily qualitative in nature, and a content analysis method of naturalistic inquiry (Lincoln, 2007) was applied in the data analysis stage. Data analysis was performed iteratively during and after data collection. Participant data were interpreted from different perspectives, and visual data and interview notes were analyzed as complementary and mutually corroborated.

3.3.1 Photovoice.

First, incomplete data were eliminated. Photos that lacked an accompanying description were excluded from the analysis. Photos may have lacked annotation because the printed photo lacked quality and was not legible or recognizable; because the photo repeated a previously-photographed topic, factor, or feature; because the photo was high-quality and unique, but the participant did not recall why he or she had taken the picture; or because the photo description was not relevant to the research question proposed by this study.

Photos that were accompanied by descriptions were categorized by 1) the type of physical environment (such as dining room, hallway, or social corners) and the type of non-physical environmental resource (such as tools); and 2) the positive or negative association with the facilitation of social interaction as perceived and noted by the participant.

Extended analysis of the locations of photographed spaces and their polar evaluations (positive/negative) were graphically visualized.

Crucially, photographs empower and augment the contributions of participants during interviews and allow them to act as exploratory and in-process informants.

3.3.2 Photo-elicitation interviews.

The photo-elicitation interviews were analyzed using Excel with the content analysis method of naturalistic inquiry based on collected field notes and transcriptions (Lincoln, 2007). The textual description of each photo was read carefully and was labeled line-by-line with the themes that it contained. This line-by-line coding was undertaken by the researcher, who conducted all interviews and who has an accurate and in-depth understanding of the interview notes. This process was followed by a second coding procedure undertaken by another skilled researcher who did not participate in the interviews. This secondary researcher verified the clarity of the theme categorization, distilled core themes, reshaped the categorization structure, and re-iterated the data categorization system.

CHAPTER 4

RESULTS

4.1 Demographics

A total of 12 eligible residents of Kendal at Ithaca participated in this study. One participant dropped out of the study before continuing to the phase of photo-elicitation interviews, and a total of 11 completed the study. Demographic information is provided in Table 1.

Table 1

Characteristics of participants (n=11)

Age		
Mean (SD)	90 (4.9) years old	
Minimum - Maximum	82-97 years old	
Gender		
Male	4 (36%)	
Female	7 (64%)	
Marital Status		
Married	Spouse alive	3 (27%)
	Widowed	7 (64%)
Single	1 (9%)	
Residence Types & Independence Level		
Residence Type	Assisted living	Nursing home
	9 (82%)	2 (18%)
Independence Level	11 (100%)	0 (0%)

Table 2

Residence time in the assisted living center (years)

Residence duration ranges	<3	3-5	5-7	8-10
Numbers and Proportions	2 (18%)	3 (27%)	4 (36%)	1 (9%)

Note. One participant's residence time is unknown.

4.2 Main Results

First, in the report of photovoice findings, we provide a summary of spaces and objects photographed. Second, in the photo-elicitation interview findings, we provide a summary of the participants' responses on each photograph discussed.

4.2.1 Photovoice results.

Among all 254 photos submitted by participants and developed by the researcher, 149 (58.9%) photos with verbal explanations were analyzed. Photos, which were not accompanied with descriptions were eliminated from the dataset. On average, each participant took 14 (SD=3.7) photos with descriptions and opinions. The minimum and maximum sized from 8 to 19.

Table 3 shows the results of the photovoice contents by places and objects they focused on. The first column lists spaces within the facility or object types identified from photos. The second column shows the numbers and proportions of photos that were taken within these spaces or associated with these object types.

Table 3

Space and object types captured in the photovoice

	Numbers	Proportions
Spaces within a CCRC		
Hallways	21	14.0%

Lounges/Gather space	15	10.1%
Social Corners	11	7.4%
Café	11	7.4%
(Open to visitors and staff members)		
Lobby/Entrance/Reception	10	6.7%
Activities Room	9	6.0%
(E.g. arts/craft room, auditorium)		
Outside/Courtyard	8	5.4%
Library	6	4.0%
Dining Room	5	3.4%
(Only for residents dwelling in the nearby residence part)		
Gym/Swimming Pool	4	2.7%
Personal Care	3	2.0%
(E.g. Healthcare, Salon, Therapy)		
Mailbox	3	2.0%
Conference Room	2	1.3%
Bedroom	2	1.3%
Bathroom	1	0.7%
Nurse Station	1	0.7%
Objects		
Interactive items	13	8.7%
(E.g. Puzzles, games, and interactive decorations)		
Furniture	13	8.7%
(E.g. Chairs, clothes stand, tables)		
Communication Technologies	10	6.7%
(E.g. Cell phone, TV controller, alert button)		
Display	6	4.0%
(E.g. Showcases for residents' work and memorable items)		
Paper Media	4	2.7%

Artworks	4	2.7%
Plants	4	2.7%
Tools for Mobility (E.g. Scooter, elevator)	3	2.0%
Pets	3	2.0%
Events/Activity Boards	2	1.3%

Overall, 81.2% (n= 121) of the taken photos focused on displaying physical spaces that participants perceived as contextual factors to impact their social interaction. 41.6% (n=62) of photos included particular objects.

Surprisingly, hallways were the most frequently captured ones among all the spaces. Hallways were more frequently identified as an area for social interaction than lounges, cafés, and social corners, which are commonly defined as areas for social interaction. Moreover, compared to dining rooms, cafés were mentioned more often to provide opportunities for social interaction.

In terms of photographed objects, the most frequently included themes were interactive items, which refer to some manipulatable decorations, games, and playful items that used to support social behaviors and show their presence. Furniture was also mentioned a lot as it relates to providing physical environments for social interaction. In the following, communication technologies and displays were significantly included in the photos. Representative photos of each category are shared in Appendix B.

4.3 Interviews Results

Various environmental and non-environmental characteristics were perceived to influence social interaction by participants. Participants provided descriptions and opinions

from multiple perspectives about the content they photographed. Half of the photos contain more than one space or object factor. According to the content analysis of interview transcripts based on photos, Figure 3 and Table 4 reflect the results responding to the hypothesized questions.

Figure 3 shows the identified main demands of residents, which include both functional and psychological aspects, to successfully have social interaction with others in the CCRC. In the following paragraph, more detailed descriptions of themes and examples are provided as well. The generation of this framework is rooted from the expressed desire and demands of participants, and these subcomponents are achievable by efforts from multiple stakeholders in charge of design, policy, and programs in these facilities.



Figure 3. Main aspects of residents' demands.

4.3.1 Functional demands.

Access.

This topic was especially frequently mentioned in the interviews. Having access to spaces that are conducive to activity engagement as well as conversations, such as informal gathering places and outdoor spaces, is essential for participants to have social interaction. One participant stated the lack of adequate gathering spaces: “This is the best I can do, because we don’t have enough gathering place[s]. If we do, I am sure people will hang out [more often].” Regarding the available gathering spaces in the facility, the participant expressed the inconvenience to access gathering places: “Just try to reserve one! We need to do it in advance. We don’t have enough of them.”

Another factor mentioned was access to resources, which includes amenities, service, information, and even food. Photos of the Café and coffee counters were popularly commented among their Photography. Participants expressed that they are more likely to maintain presence and socialization in spaces that coffee, tea, and cookies are served.

Affordance.

This category addressed the way how the physical environment can support activities. Examples mentioned were environments that afford residents to move, to have actions, activities, and conversations. Most relevant interview responses in terms of the support to enable postures and moves were associated with the ‘right’ selection of furniture and finishing materials. For example, one participant stated that many of the chairs in the facility are poorly selected because the armrests are so slack that it’s hard for residents to

stand up from sitting (Figure 4). Thus, furniture selection is a crucial factor in creating environments that support social interaction.



Figure 4. An example photo of furniture with slack armrests.

Size and flexibility of the space to accommodate activities or conversations of various group sizes was another frequently stated factor. One participant exemplified with a space that lacks the flexibility to sit 7 in a table of 6: “...I keep beating that we could have all square tables with flaps [so] they can become round table then they are bigger than ours. We can have 8 or 9 [people to sit in] if they give us one of the tables. The reason they don’t want to do that [is] because that table will split out the traffic area and jam up the traffic. They could do a better job when a larger group want to gather informally.”

Mobility.

Participants noted the importance and their demands of mobility from several facets. A decreased level of mobility was regarded as one major part when participants referred to their physical health decline. For example, one participant explained: “I used to walk a lot. I walked surrounding the community at least 1 mile each day. I loved to go

outside, but I couldn't walk now." Participants expressed their high desires to be mobile. Being able to 'move easily' or 'be moved easily' was commonly stated, and it was mostly associated with environmental features such as materials of the floor. Referring to the flooring materials, one participant highlighted the importance of selecting finishes that facilitate ease of movement. One participant stated:

"...it's hard to get around. If you look at the texture, in the sunshine it's perfect, but it's hard to move walkers on this, it doesn't let go. It sticks on the straits. The more modern walker works a little better and wheelchair works okay. But it's hard to push. [This is why] people don't go anywhere."

Having adequate circulated traffics within the facility was also recognized as one incentive to have social interaction with other people. One participant stated how increased circulated traffic encouraged her to have more social interaction with others after she moved from an independent living apartment to the assisted living part. "It's easier to get out of my place and meet people here because the layout is in a circle shape." Participant commented.

Wayfinding.

This was found to be one of the most significant factors that participants recognized as the determinant of social interaction. More than half of the participants expressed frustrations they went through from the difficulties of wayfinding when they travel to friends' room or the activity locations. For example, one participant stated: "I find it challenging when I look at every single door. They look similar to me. I need to find the right door one by one so I can find my friends. There is less obvious signage except for the numbers next to the door." (Figure 5)



Figure 5. An example photo of the hallway in an independent living apartment with less obvious signage.

Good wayfinding in such facilities should not only include adequate directions and navigations for exploring the place and finding destinations but offer solutions and remedies when residents get lost in the facilities. One participant commented on a photo of an alert button and stated, "This [alarm system] belongs to [the community], and it's

connected to the staff. I take it with me all the time. When I get lost somewhere, I press the button; people will get to help me.” (Figure 6)



Figure 6. The photo of an alert button.

Assistance.

Participants expressed the needs for supportive environments and resources for conducting ADLs as well as communicating. Some examples of these supportive elements were transportation resources (e.g., wheelchairs, walkers, and scooters), non-barrier bathing appliance, and ambient environmental supports, which include adequate lighting and acoustics that enable visibility and hearing. Moreover, some expressed that technology tools, like a cellphone, played an essential role in helping them with tasks such as reading books, waking up, and looking up words.

4.3.2 Psychological demands.

Sense of Control.

Interview responses demonstrated that the feeling of having control of their own life was a factor for participants to enhance their ability to engage in social interaction. Participants' elaborated that some environmental factors could improve the possibility of social interaction if they support a sense of safety, owning privacy and territoriality, giving choices to select what they like, and a feeling of independence when performing daily activities.

Participants emphasized that the interior arrangements (e.g., locations of tables and chairs) must support their privacy and facilitate small group interaction and huddles. However, the balance between enough privacy in one's individual territoriality and connections with others was also valued by the participants as one explained: "[I like this place because] I can choose to be alone or with people here." (Figure 7)



Figure 7. An example photo that shows people can exercise various levels of privacy.

Besides, as cafés and dining rooms were both served in the facility, several participants expressed the preference to cafés instead of dining rooms with the reason that

“people enjoying going [the café] because the food is presented differently in a better way. There are more choices of food.”

Moreover, participants stated that elements such as slippery hardwood floor or bathtub with bubbles, which would pose a risk of losing their balance make them feel less safe and thus less sociable (Figure 8). Hard-metal armrests that hurt hands when standing up and pushing off the chair were addressed as well when they talked about the ‘less sociable factors’ because of a strong sense of unsafety.



Figure 8. An example photo that with slippery hardwood floor.

On the other hand, it was also frequently mentioned that being given the responsibility to ‘organize [an] event’ or to ‘take care of pets and plants’ was desirable because it brought a sense of independence.

Sense of connectedness & belonging.

Participants expressed the need to have a sense of belonging to the CCRC, and they also desired to be connected with the outside of the facility. In the interviews, participants described that being able to stay informed and aware of the outside world would support a

sense of social connectivity. Meeting new people and staying connected with the society outside of the community, for example, by receiving mail, were stated as essential for them to stay positive toward their social life.

Additionally, participants explained they felt alive and independent when they were involved in events, activities, and responsibility. The feeling of being one part of the community brought a sense of belonging.

4.3.3 Identified Influential Features and Factors

Table 4 shows the identified environmental design features, ambient environmental factors, and non-environmental features in terms of affecting social interaction based on both photo informants and the content analysis of interviews.

Table 4

Main factors perceived as affecting social interaction

Features/Factors	Explanations
Environmental Design Features	
Furniture comfort & safety	According to the interviews, furniture that didn't provide ergonomic safety and comfort was commented negatively to be socialization-friendly by participants. Also, the comfort of chairs and couches were stated by several times as a salient facilitator for social interaction.
Space quality	Multiple environmental attributes and subjective perception collectively contribute to the outcome of space quality. But overall, 'home-like' and 'comfortable' were mentioned by several participants when they were describing a desirable place for social interaction.

Personalization

Personalization consists of features including personalized room identifications and display of individual's memorable items according to the analysis of findings.

Participants emphasized the importance that personalized room identifications and display should be interactive.

For example, one participant commented on the photo of a porcelain cat in front of the participant's door

“Someone changes the hat [on this porcelain cat]. I don't know who did that, but the hat is changing. I love to see it because the hat is always creative. It's funny. It's communication.”

Spatial arrangement

Layouts of furniture, circulations, and the proximity of social spaces were all mentioned in the interviews as impactful factors to social interaction, which are summarized as spatial arrangement here. Participants noted that whether the chairs were huddling, whether the traffic space was circulated and whether the location of space is adjacent enough to their rooms or daily routines, were all relative to the occurrence of social interaction.

Room finishing & decorations

This category relates to the materials of floors and colors of walls, particularly. Room finishing and decorations that change styles of spaces were recognized as influential on social engagement. For example, one participant commented about the artworks in the hallways and expressed the inclination to more colors and decorations:

“It does encourage people to interact. And lend some color to the place. The beige is everywhere. We used to have colors on the wall, but now all is beige.”

Wayfinding	As one of the top two crucial attributes pointed by the participants, wayfinding indicates color coding within the building (use different thematic color to indicate different zones) and signage/navigation design. The importance of wayfinding was brought by comments on desired design features, including using color to distinguishing different zones and more visible signage or information posts according to the interview response.
Ambient Environmental Factors	
Thermal conditions	Temperature and HVAC were mentioned. ‘Warm’ was addressed several times in responses toward favorable social spaces.
Exposure/access to nature	In all the responses relative to nature access, participants showed a positive review of having exposure to nature.
Acoustics	Environments with proper acoustics were commented as positive because they support holding conversations, according to the responses of participants.
Daylight	Places with daylight were reported as being more favorable for residents to gather compared to artificially lighted spaces.
Non-environmental Features	
Volunteer responsibilities & Participation in activities	Although non-environmental factors were less recognized from photos, responsibilities, and participation were highly mentioned in the interviews as factors that conducive to social activeness. Participants discussed a lot about how responsibilities and activities made them engaged and involved.
Knowledge sharing & peer support among residents	The importance of this factor was reflected widely by the photos and comments about internal media (such as magazines and newspapers) and stories/skills sharing

activities. Participants hold positive reviews toward the internal communications among residents.

Amenity/Service support

Although not directly shown on photos, participant addressed the importance of amenity and service support frequently when they gave out comments on favorable social spaces. For example, from one participant's comment, amenity and service support played considerable roles in high-quality social space. "They have done it very well. It's warm with the fireplace. They have glass doors in front of the fireplace...People go there because of the nice sofa, [it is] very comfortable one. And books, coffee, and cookies are served from 2-4pm every day, except Sundays."

Staff support

Support from the staff was recognized by participants as a factor relative to their social well-being. One participant stated: "People there know everything. And they help with everything. There is once they call me because I put two checks in the envelope by accident. They told me I did that, so they help me remove one. They are great."

CHAPTER 5

DISCUSSION

5.1 Discussion of Integrated Results

In the following, this section covers the researchers' interpretations of integrated results and discuss the summarized primary attributes that affect social interaction among older adults in CCRCs. These include 1) Physical accessibility, locations and layouts of spaces; 2) Home-like and comfortable ambiance; 3) Mediums for interactions; 4) Privacy and security; 5) Variation of everyday life.

Physical accessibility, locations, and layouts of spaces.

Physical attributes of social spaces, including the accessibility, location, and layout emerge as one of the most critical environmental considerations related to the social interaction of older adults dwelling in the facility. There was an emphasis on the physical space, resources as well as accessibility in the findings.

Planners, designers, or managers may ask the following questions to evaluate these items in the design or renovation of future aging communities: "Do residents have access to use the spaces intended for social activities at any time when they need or want?" "Do these spaces support the variety of the needs that residents have, such as group huddles, games, or conversations?" "Can the designated spaces be reached by the residents who use walkers or wheelchairs to move around?"

Participants felt encouraged to have social interaction when the social spaces were properly designed for them. Barriers to use or access the space hindered their social engagement (examples of these barriers mentioned were: the spaces were not easy to

reserve, the spaces did not provide sufficient room for wheelchair circulation, or the furniture arrangement did not support flexibility). All these characteristics to support social spaces require both policy and planning provisions as well as environmental accommodations. As confirmed by previous research (Brown, Kaplan, & Quaderer, 1999; Kaplan, Kaplan, & Brown, 1989; Malmgren Fänge, 2004), accessibility is the key attribute of a successful aging space by meeting older adults' changing physiological needs.

In terms of layouts and locations to support proximity, designers, planners, and managers need to investigate the following questions: "Where social spaces should be located at?" "Does the location require the residents to allocate too much time or effort to reach?" "Are the spaces intended for social engagement close by and convenient to access for residents?" "Is that easy for residents to find the way in reaching these spaces?"

As indicated in the combined results of photovoice and interviews, hallways and social corners were the most mentioned spaces that recognized as facilitators to affect social interaction because these spaces are located at the nearest spots on residents' daily path and they lead the way to any destinations. Several participants expressed that spaces would be less visited when they are too far from residents' rooms. This finding is also supported by previous research. Range of travel or proximity of the social space is one of the critical determinants of social interaction (Campbell, 2015; Campbell, 2014) and as the effort for travel increases the possibility of visits decreases, especially for those with limited mobility.

Wayfinding has a role in residents' motivations to find others to interact with and get out of their rooms. Being able to find the way is related to the sense of safety and independence, which are linked to social interaction by evidence (Young, Russell, &

Powers, 2004). Thus, design strategies such as optimized navigation design, interior design, color coding of the building should be incorporated into the environmental design of the senior living facilities to help with smooth wayfinding and offer solutions for when participants get lost.

Home-like and comfortable ambiance.

This category contains multiple features that could collectively be characterized as a home-like and comfortable physical environment, which was highly valued by participants according to the integrated results. This finding corroborates the prior research (Campo & Chaudhury, 2012) that home-like and comfortable ambiance is a determinant of favorable social spaces. For example, one participant commented on a photo of the kitchen within a lounge as home-like because residents could make cookies here. It was found that smaller lounge rooms with bright windows, couches, artworks, and sight of nature/plants were favorable as they looked ‘like at home’ and ‘comfy’. Besides, it was highlighted that being able to decorate a space by residents themselves was recognized as an essential factor to make it be liked by participants as it helps generate a sense of belonging and feeling at home.

Mediums for interaction.

As concluded in studies about the content of social interaction (Becker, 1974; Hubbard, Tester, & Downs, 2003), social interaction yields expanded meanings beyond face-to-face conversations. Interpretations of others’ presence and communications through behaviors are also means of social interaction. Therefore, mediums for interactions that help residents show their presence are listed as one category, although this category is barely examined in the previous research as facilitators for social interaction. A number of

interactive items were recorded by photos and explained in the interviews including various formats such as interactive decorations or room identifications, communication technologies, display of individuals' memorable items or own work, and puzzle games.

According to the comments from participants, interactive decorations in the hallways were attractive to them, and residents could manipulate those items to display and convey simple messages to show their presence and activeness. For example, one photo focused on a porcelain cat with different hand-made hats that would be changed by the residents daily and participants expressed the joy and surprises this changing hat brought to them as a way of indirect communication. Likewise, one participant mentioned in his interview about how he placed a wooden manipulatable statue in front of his room, and other residents changed the posture of it every time when passing by. Interactive games and displays of personal stories were recognized as highly conducive to providing triggers for social engagement, in previous research as well (Campo & Chaudhury, 2012), because they have potentials to significantly facilitate informal social interaction by sharing the same goals in the game, and increase connectedness between residents by displaying memories and work.

Privacy and security.

It has been intensely discussed in the fundamental and further research (Altman, 1975; Courtney, 2008) that being able to regulate the perceived stimuli is significant as a universal human need. Moreover, in Marsden's (2015) guideline for assisted living facility design, it is stated that providing 'protective enclosure' – creating some level of privacy in the social spaces is favorable by residents. Unsurprisingly, the results of the present study showed resonance to the previous research. Participants expressed their preference to

smaller social spaces that made them feel more huddled and sheltered. The results also revealed an emphasis on the physical attributes that contribute to the safety of the environment. Elements such ‘slippery wood floor’, ‘soft coaches that hard to stand up from’, and ‘complicated floorplan that gets lost easily’ were all associated with a sense of insecurity. Hence, more considerations should be taken into the environmental design to improve the safety of the environment.

Variation in everyday life.

The significance of the demand to seek for variation in daily life, such as meeting different people, changing seats, changing daily routines, having contact with outside of the facility and ordering different food, were addressed considerably during the photo-elicitation interviews. These are both, directly and indirectly, related to the environment as well as non-environmental contributors. Similar to the findings of previous research, sameness (e.g., assigned seats) is perceived as the barrier for social engagement because it lacks the freshness and it turns out to bringing diminished positive attitude (Park et al., 2012). And it has been shown that some policies and practices that do not bring up freshness and diversity of daily life would deter social interaction and hinder the establishment of meaningful social relationship (Park et al., 2012; Mitchell & Kemp, 2000).

Findings informed that a child daycare center which is operated within the community as one of the sources to bring residents freshness, interaction, and joy. Following this idea, it might be beneficial for aging communities to offer opportunities for external communication, for example, by integrating cross-generational services and functions within the community to generate new stimulations and variation in daily life for

the residents. Developing social programs that involve outside communities is another useful approach to spark freshness and variation in residents' life. Besides, from the environmental design perspective, frequent changing of seats, decorations, layouts, and daily routines could be constructive to the sense of freshness, although this approach demands additional resources from the facility management. However, more research is needed to identify the most effective approaches to improve social interaction and quality of life by generating a variation in everyday life.

5.2 Methodological Reflections

This section outlines the lessons learned by the researcher throughout this study, which would benefit future research in this area.

The combined PGI methods were examined as an appropriate tool to facilitate data collection in terms of recording environmental factors for this population. Given the declined cognition and memory capacity of the participants, capturing the social interaction determinants with photos were proved to be highly useful to obtain informants in this study. Also, walking with an assistant who is a long-term staff member that works closely with the participants was recognized to be important as well. The following are additional critical reflections about the methods:

Since some participants had lower functional health statuses, and it was not easy for them to establish trust with strangers, it was beneficial to let them walk with the assistants whom participants had been very familiar with. Under thus relaxing context, participants were able to finish the tasks safely and enjoyably. However, having the staff members involved in the data collection might cast potential biases. Before the data collection

session, assistants were given a tutorial about how to state the research question clearly and how to respond to participants' questions to minimize any potential inconsistencies on communication. The way assistants understood and articulated the research would be a factor that might affect the perception of participants; therefore, would affect the outcomes of photovoice. According to the results, different participants understood the research questions and tasks in various ways. When the research question was communicated to participants, some of them perceived and interpreted it relatively more associated with the environmental design features; nevertheless, other participants may have an emphasis on the social or policy environment. Thus, it was a phenomenon that some participants' responses were more inclined to the physical environment, but some others addressed more on context factors (non-environmental factors). It was hard to avoid some stereotypical answers which were limited to the most common practices such as 'having activity rooms and events'. Therefore, it is recognized that having the research questions and tasks well-communicated prior to the study conduction is essential although it would demand more efforts and time from the researcher given the declined capacity of the population of interest.

The photos for interviews were developed by the researcher and brought back to participants for a follow-up interview one week after the photovoice. This one-week time gap resulted in some participants having difficulty with retrieving their memory on the reason behind taking the photo. This caused the elimination of some photos from the study due to incomplete responses. Hence, in future research, a short period of photo development is preferred if applicable. The choice of the type of camera is also essential in the successful completion of the study. Although many types of cameras are available in

the market for use, due to the limited agility of participants and resources for research use, fragile digital cameras with small buttons and high expenses were not applicable for this study. Consequently, the researcher selected disposable cameras as the equipment, but they brought the limitations that the photo quality was not high, and it consumed more time to develop and print. Several participants expressed that digital cameras would have been a better choice for them. Thus, for future research, careful choice of equipment based on budget and features that are needed and friendly to this target population is highly suggested. In conclusion, the proper method for such study should balance multiple constraints.

CHAPTER 6

CONCLUSION

6.1 Conclusions

This qualitative study explored the environmental factors that are associated with social interaction among older adults in the assisted living facility with PGI methods. A number of environmental and non-environmental factors are identified to contribute to social interaction, either facilitating or hindering, by meeting residents' needs for social interaction at different levels. The findings indicate both environmental design factors, and non-environmental factors (such as policy, operation practice, and service resources) have a role in enhancing social interaction for older adults. Therefore, the suggestions for optimized social spaces demand coordinated decisions on both environmental and non-environmental aspects.

In summary, the results indicate that hallways, lounges/gathering places, social corners, and cafés are the first places that are perceived as the context of social interaction. Interactive objects (e.g. puzzles, games, and interactive decorations), furniture (e.g. chairs, clothes stand, tables), communication technologies (e.g. Cell phone, TV controller, alert button) and displays (e.g. showcases for residents' work and memorable items) are the main objects that are recognized by participants as factors to contribute to social interaction.

The findings outline a broad array of residents' needs for developing successful social spaces, which include both functional demands and psychological demands. Seven key factors are identified to enable meeting these demands: sufficient access to social

spaces and resources, affordance to enable social behaviors, adequate accessibility support for mobility, smooth and unhindered wayfinding, assistance with daily activities and socialization or communication, enhanced sense of control and sense of belonging and connectedness. Design features specific to the environment distilled from the results are summarized as enhanced physical accessibility, proper layout, promoted home-like and comfortable ambiance, presence of mediums for interaction, enhanced privacy and security, and variation in everyday life.

Overall, the study informs stakeholders who involve in designing, planning, and operating aging communities on the ways to provide a supportive environment for social engagement of residents.

6.2 Limitations

There are limitations for the generalizability of this study. First, as participants' responses were based on the provided environmental resources, it became a threat to the generalizability when participants were from one facility. For instance, many participants included specific spaces, environmental features, policies, and practices in the photos and interviews that are provided by the selected facility. However, there are probably other approaches and features not explored and discussed because they are not available in the current context. On the other hand, since the participating facility is located in upstate, New York, the results may reflect on the cultural and geographic characteristics of this environment, which would reduce the generalizability. Moreover, our sample size was limited as conducting qualitative research with photo-elicitation method requires a substantive amount of time and in-depth work with each participant.

6.3 Future Research

Social interaction is a complicated concept that contains diverse forms of behaviors, and it is also subjective to many confounding factors (Altman, 1975; Becker, 1974; Hubbard et al., 2003). In this study, some individual factors were collected, including demographics, residence time, and a general categorization of ‘independence type’. However, further analysis was not pursued based on this data since the scope of this study is more focused on the exploration of outer determinants and the sample size does not support a robust statistical analysis of individual attributes. Future research is needed to investigate the role of individual factors in the perceived factors that contribute to social interaction. Also, as one of the important factors, engagement with social media should be taken into considerations as well in future research. Besides, cross-sectional research that examines both individual and environmental factors would benefit adaptive design for various conditions.

Furthermore, since assisted living residents are less independent and mobile than those who are dwelling in independent living, the assisted living residence is usually adjacent to the amenities and service of the community. However, as the most preferred living choices to age, ‘aging in place’ and independent living needs more information in terms of optimization for social interaction. Thus, further research is necessary for other living options to enhance social engagement for older adults.

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APPENDICES

Appendix A

Interview Protocol & Scripts

Role

As the Interviewer, the researcher will do the following

- a. Provide an overview and purpose of the interview for participants;
- b. Conduct interview and ask follow-up questions, whenever necessary;
- c. Provide a brief to the participant;
- d. Respond to participant's questions, if any

Introduction

Hello, thank you very much for collaborating with me in the past week by taking photos. I am back to meet you to discuss the photos you took. This meeting/interview will be approximately 30-60 minutes. As I explained I hope to apply the learning from this collaboration to design and plan better living communities for aging.

Would you give me permission to take notes of our conversation? No identification of you will be recorded or kept. This is just to help me better conserve the information.

YES NO

Interview questions

Part A: Participant demographics.

You could decide not to answer if you feel uncomfortable or concerned with the questions.

- 1- What is your age?
- 2- How long have been living in the assisted living facility?
- 3- Do you have any partners inside the community or nearby?
- 4- Are your family/relatives around? Do you meet them very often?
- 5- Are your friends/other social connections around? Do you meet them very often?
- 6- How do you meet and interact with them? (For example: In person, by phone, by email, video chat, online social media...)

Part B: Conversations about the photo collection.

- 7- Let's take a look at the first photo.
 - a. Can you tell me what this photo is about?
 - b. How it relates to social activity and interacting with others? Is it about helping or hindering social interaction?
 - c. Now let's move to the second photo...

(This will continue to the last photo.)

Any comments you want to share with me beyond the photos about how environment and resources around you can help you connect and interact with people socially are highly welcomed.

Part C: Wrap up

- 8- Do you have anything else you would like to add or any questions?

Appendix B

Representative photos of each category of spaces and objects.

Spaces within a CCRC	Representative photographs
Hallways	
Lounges/Gather space	

Social Corners



Café
(Open to visitors and staff members)



Lobby/Entrance/Reception



Activities Room
(E.g. arts/craft room,
auditorium)



Outside/Courtyard



Library



Dining Room
(Designed for residents
dwelling in the nearby
residence part)



Fitness Center/Swimming
Pool



Personal Care
(E.g. Healthcare, Salon,
Therapy)



Mailbox



Conference Room



Bedroom



<p>Bathroom</p> <p>(The example photo is the tub room)</p>	
<p>Nurse Station</p>	
<p>Objects</p>	<p>Representative photographs</p>

Interactive items
(E.g. Puzzles, games, and
interactive decorations)



Furniture
(E.g. Chairs, clothes stand,
tables)



Communication
Technologies
(E.g. Cell phone, TV
controller, alert button)

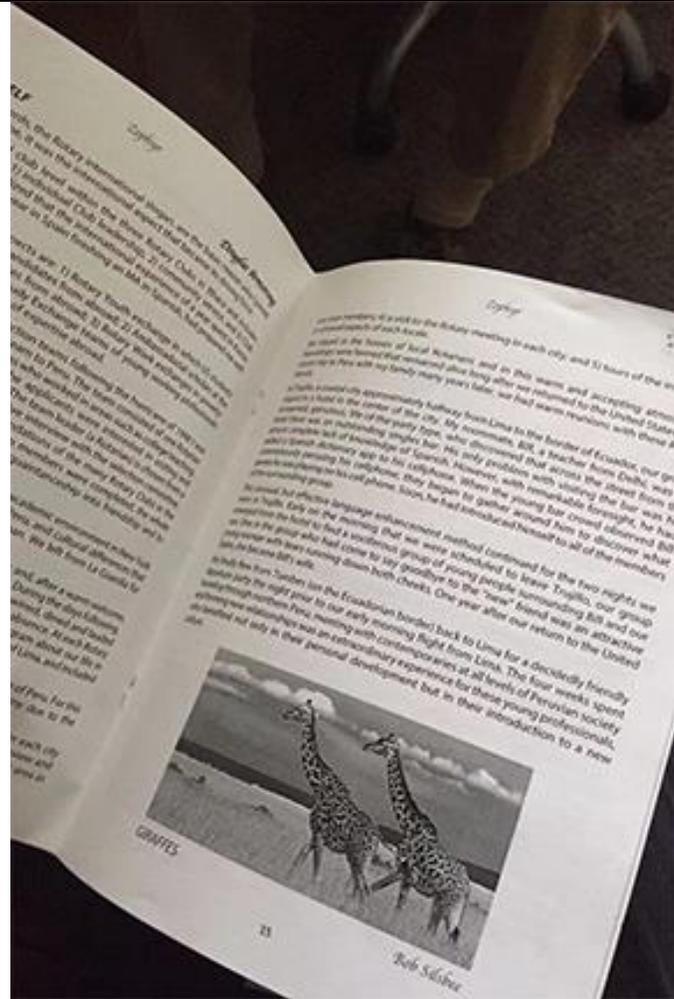


Display

(E.g. Showcases for residents' work and memorable items)



Paper Media



Artworks



Plants



Tools for Mobility
(E.g. Scooter, elevator)



Pets



Events/Activity Boards

