ABSTRACT

KIM, HYUN JEE. Researching Indoor Public Space Attributes: Enhancing the Interaction between Older Adults and Children. (Under the direction of Dr. Sharon Melissa Joines.)

The purpose of this research was to investigate the attributes of indoor public spaces (IPS) with an eye toward enhancing interactions for intergenerational groups for their quality of life. The goal of this research was to develop an effective framework for designing IPS for intergenerational groups. The hypotheses of this research were first, the two age groups will prefer similar types of spaces that have mutually preferred features, attributes, and qualities, and secondly, they will want indoor public spaces where they can visit easily with intergenerational friends.

The first study used the survey as the primary form of data collection. Through the survey, the researcher sought to understand the differences and similarities in perceptions and preferences between older adults and children for current indoor public spaces. The researcher sought collect opinions of older adults and children regarding how they use IPS, and why they come to indoor public spaces, to discover the importance of each component of five conditional affordances. The second study used the participatory design to understand people's thoughts about future indoor public spaces by allowing them to express their preferences by creating collages. A final study using observation was conducted to understand what pairs of individuals do in a real indoor public space and reconciles the findings between their opinions (expressed in the survey and while making collages) and real behaviors. Thus, Study 3 was designed to compare social interactions between intragenerational pairs and intergenerational pairs. Based on the results of the three types of methods, it was found that:

- The intergenerational groups preferred the indoor public spaces that are in balance the importance of the five conditional affordances: safety/security, sense of belonging, multiple activities, differing physical abilities, and intergenerational engagement.
- The intergenerational groups equally preferred the two types of current indoor public spaces – Museums and Malls/Shopping Center.
• When individuals from different generations meet, their interactions are more frequent and more active than those of individuals from the same generation.

• The concept that people in natural settings (especially water fountain), within indoor public space, could experience improved quality of life.

• Based upon subjective responses from the two methods (survey & participatory design), the intergenerational groups preferred 23 space characteristics that are included in the three perceptional modes (perceptible, functional, and affective).

• The 8 space characteristics, which were overlapped with the five affordances and the three perceptual modes, were Watching, Café, Food/Eating, Talking, Sitting/Resting, Not Crowded, Having Fun, and Protective. When designing indoor public spaces for intergenerational groups, these 8 characteristics are the minimum or most basic to be included.
Researching Indoor Public Space Attributes: Enhancing the Interaction between Older Adults and Children

by
Hyun Jee Kim

A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Design

Raleigh, North Carolina

2012

APPROVED BY:

__________________________________________________________
Dr. Sharon Melissa Joines                                         Prof. Meredith Davis
Chair of Advisory Committee

__________________________________________________________
Prof. Haig Khachatooarian                                         Dr. Anne Collins McLaughlin
DEDICATION

To
Soonhee Park, my beloved mother,
Who has nurtured and encouraged me with her prayer and love

To
Hyounil Yoon, my beloved husband,
Who encourages and supports me with his endless love,

And To
Juha M. Yoon, my adorable son,
Who has given me overflowing joy every day
BIOGRAPHY

Hyun Jee Kim was born on June 21 in 1980 in South Korea. She received a Bachelor of Science in the Housing and Interior Design in 2004 and a Master of Science in the Housing of Interior Design in 2006, both degrees from Kyunghee University in Seoul, South Korea. Hyun Jee's interest in universal design started during her Master’s period. Her concentration was on house design for older adults, and her Master’s thesis title was, “Planning on Kitchens and Bathrooms for the Elderly”. Hyun Jee was accepted to the Ph.D. program in the College of Design at North Carolina State University in Raleigh in 2007. She served as a research assistant for three years.

In June 2009, Hyun Jee married to Hyounil Yoon who also came to the U.S. in pursuit of his Ph.D. degree in the College of Textiles at North Carolina State University. They met each other in the Young-Adult Group at DuRaleigh Presbyterian Church in Raleigh. Now Hyun Jee and Hyounil have a son, Juha Matthew Yoon, who was born in September 2010. Upon graduation, Hyun Jee plans to continue her academic and professional activities to help elderly people by improving the quality of life through design.
Finally..., I have arrived at the end of this long tunnel! It has taken longer than I expected. Whenever I wanted to give up my Ph.D. program, I remembered these words from the Bible.

“In his heart a man plans his course, but the Lord determines his steps.”

(Proverbs 16:9, New International Version)

With this thought in mind, I was able to persevere for this exciting moment!!

Sometimes I could not understand why these things happened to me, but now I believe the Lord has a purpose for my life even though I may not yet understand it. I am sure God has been working with me in ways that I cannot see. Anyway, thanks God!!

First of all, I would like to express my sincere appreciation to the chairman of my Advisory Committee, Dr. Sharon Joines, for her support during my Ph.D. program. I especially recognize Dr. Joines as a woman of encouragement. She has endured with me my emotional and intellectual trials during my days in Raleigh. Without her unfailing faith in me, this dissertation would have been impossible to start, let alone to finish.

I further wish to express my deep gratitude to my committee members, Prof. Haig Khachatoorian, Prof. Meredith Davis, and Dr. Anne McLaughlin for enduring the long wait until the completion of my dissertation. They provided me with questions, useful resources, and insightful opinions enabling me to think about my research from different perspectives.

I would like to express my appreciation to Prof. Art Rice, the director of the Ph.D. Program at the College of Design, for giving me the opportunity to obtain a scholarship that allowed me to continue my study.

There are other important people to whom I like to express my gratitude. I want to thank Sae A Yoon, my sister in law, for proofreading my papers. I thank John Sobrero for reviewing my
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1. INTRODUCTION AND DESCRIPTION OF PROBLEM AREA

The absolute and relative number of the elderly population is growing. This rate of increase in the older population is advancing considerably faster than that of the world’s total population. In absolute terms, the number of older people has tripled during the last 50 years and will more than triple again over the next 50 years (Population & Development, 2002). In relative terms, the percentage of older adults is projected to more than double worldwide over the next half century. The challenge for the future is “to ensure that people everywhere will be enabled to age with freedom, security, and dignity and continue to participate in their societies as citizens with full rights” (Population & Development, 2002). One question that needs to be addressed is the definition of “older adult”. The birth date appears useless, outside of a pension plan perspective. There is a tendency to understand “old” as synonymous with “disabled”. An older adult is a person, who is over the age of 65 and retired, and is now spending their time with hobbies and/or friends and relatives (Wanner, Sauvain-Dugerdil, Guilley, & Hussy, 2005).

A new viewpoint must be developed, in which older adults can be seen as playing an active role in urban spaces, rather than as a source of social problems (Martinoni & Sartoris, 2009). Quality of life is also an important consideration for older adults, when evaluating composite satisfaction including physical, emotional, social, and environmental conditions in all public areas, not only residential care facilities. At the same time, “the rights of older people should be compatible with those of the younger generations, and the reciprocal relationships between the generations must be nurtured and encouraged” (Population & Development, 2002).

While data for residential care for older adults (Baggett, 1989; Garibaldi, 1999; Yates, Fentunan, & Dewar, 1995; Zimmerman & Sloane, 2001), such as assisted living, independent living, home care, and nursing home, have been accumulated over a hundred years (Andrews & Phillips, 2000), the investigation of indoor public spaces (libraries, museums, and restaurants) for older adults is rarely found. Even though there are common areas in many residential care facilities, in which older adults can participate in various activities such as, reading books, enjoying games, talking with others and
sharing coffee, these places are limited to facility occupants and older adults’ guests. The public is excluded from these common areas. In addition, according to the National Organization for Victim Assistance (NOVA), the environment at many residential care facilities across the country is ripe for abuse. Older adults who live in a separate space specially designed for them suffer abstract loss, including loss of role, lifestyle, freedom, autonomy, and privacy (Brubaker, 1996; Fiveash, 1998; Learman, Avorn, Everitt, & Rosenthal, 1990; Nay, 1995; Pearson, Hocking, Mott, & Riggs, 1993; Wilson, 1997).

Interestingly, older adults do not want things (places or objects) especially designed for them. Joseph Coughlin, a founder of the AgeLab at MIT said, “If you design for the old, the young won’t use it and the old will run away.” Considering this attitude and the growth of the elderly population, incorporating considerations of older adults’ physical limitations in the design of public spaces and products would be a better approach.

One report from the United Nations (Population & Development, 2002) notes that two generations, older adults and children, should be nurtured and encouraged together. In addition to the increase in the number of older adults, there is the increasing percentage of grandparents who raise their grandchildren. More than 60 percent of families with children had both parents employed outside the home in 2005-2006, according to the Bureau of Labor Statistics (Population & Development, 2002). The dramatic increase in the number of children who are nurtured and cared for by their grandparents during the last several decades poses a significant challenge for older adults today (Backhouse, 2009). According to the 2000 Census, 5.8 million grandparents live with their grandchildren, and 42% of these grandparents have the primary responsibility in caring for their grandchildren (Simmons, Dye, & Bureau, 2003). This social phenomenon indicates that the relationship between older adults and children is more closely connected than in recent times. Thus, meeting the needs of both older adults and children has become an important issue, which while not well known to contemporary society, must be included in the study of society at-large.

In practice, there are various exchanges and programs designed to support older adults and children’s interactions. These programs include non-familial social support programs, employment
training, religious instruction, counseling, apprenticeships, in-school curriculum-based programs, after-school child-care programs, and mentoring (e.g., the Foster Grandparent program) (Layne, 2009). Other programs include children visiting nursing homes to perform plays or give out gifts during holiday seasons and visiting regularly to read books and chat with older adults (McCrea & Smith, 1997). Through these programs older adults teach the values and skills required to support a society to children (Williams & Nussbaum, 2001) and children give energy, creativity, and companionship to older adults (Layne, 2009). Similar to the benefits documented in non-familial intergenerational programming, older adults as grandparents and children as grandchildren play an important role in supporting emotional attachments (Kornhaber & Woodward, 1981).

Arthur Kornhaber (1981), a child and family psychiatrist, documented the emotional attachment of older adults to a child. Kornhaber (1981) suggested that emotional attachment of children to their grandparents is unique and different from the emotional relationship between children and parents. Children do not have many of the typical parental conflicts with their grandparents. Kornhaber also noted that “No matter what they were like as parents, grandparents are exempt from the emotional intensity that characterizes parent-child relationships” (p. xxi). He pointed out that “Grandparents and grandchildren are naturally at ease with each other, while both have intense emotional relationships with the middle generation. In short, grandparents and grandchildren do not have to do anything to make each other happy. “Their happiness comes from being together” (p. xiii).

Even though there are many programs to support both generations, most studies are focused on the effects of a program and not on the ability of a physical environment to meet the needs of each generation. Researchers focused on programs rather than on physical environments. However, all social activities, all human behavior take place in a physical space (R.B. Bechtel, 2000). Considering the increase in the number of older adults, both generations serving each other, and the percentage of the grandparents who deal with their grandchildren for a longer time than their parents on a daily basis, it makes sense to design a space, where both generations can stay in comfort and free of difficulty. This has long been studied for urban public spaces (Carr, Francis, Rivlin, & Stone, 1992; Carson, 1970; Goodsell, 2003; Scruton, 1984; Stine, 1997) to satisfy each individual’s needs while
Layne (2009) studied supporting intergenerational interaction in urban public space (outdoor) for leisure activities and social exchange between older adults and youth.

Until now, most studies related to people’s leisure or quality of life have been focused on environmental planning or design guidelines of outdoor public space, while indoor public space was seen only as a small part of the entire public space. Studying indoor public space is as essential as studying outdoor space. Both the indoor and outdoor physical environments foster optimal growth and development by providing opportunities for individuals to learn (Children, 1997). When it is raining, snowing, or just simply too cold or too hot to go outside, older adults and children may prefer indoor public spaces. This dissertation, therefore, investigated the attributes of indoor public spaces with an eye toward enhancing interactions for intergenerational groups (see Figure 1.1).
Social Phenomena

- Increasing the number of older adults
- Increasing older adults who raise their grandchildren

Existing Research

- Investigation of residential care for older adults
- Special design studies considering older adults
- Various programs two generations serve each other

Problems

- Age-separated research
  - Older adults and children dislike things only for them
- Limited research of space for two generations

Need the attributes of indoor public spaces with an eye toward enhancing interactions for intergenerational groups

Figure 1. Social Phenomena and Solutions Regarding the Relationship between Older Adults and Children
2. LITERATURE REVIEW

2.1 Studies about Older Adults and Children

In a review of previous publications and books in this area, there were few precedents that investigated the interaction between older adults and children in indoor public spaces. First of all, the researcher needed to investigate the satisfaction and dissatisfaction between older adults as grandparents and children as grandchildren, in order to understand each generation’s position. Then, the researcher reviewed environment and behavior studies for both groups, focusing on the needs of older adults in order to understand their characteristics.

2.1.1 Older Adults as Grandparents - Satisfaction and Dissatisfaction

Grandparent satisfaction has been identified as the primary positive outcome of being a grandparent (Hurme, 1991) and represents grandparents’ overall evaluation of their grandparenting experiences (Szinovácz, 1998). An individual will feel “satisfied,” if their experiences in a role meets or exceeds their expectations and “dissatisfied” if they do not (Sabatelli & Shehan, 1993). Thus, grandparents with similar experiences, but different expectations, or grandparents with similar expectations, but differing experiences, can vary considerably in their degree of role satisfaction (Szinovácz, 1998).

Generally, grandparents have been reported to experience high levels of enjoyment, comfort, and satisfaction with their roles (e.g, Neugarten & Weinstein, 1964; Robertson, 1977, Agresti & Finaly, 1997; Thomas, 1990; Peterson, 1999; Reitzes & Mutran, 2004). Approximately 37% of grandmothers in a study (Robertson, 1977) of role conceptions preferred being a grandparent to being a parent, while another 25% enjoyed both roles equally. Furthermore, grandparents typically indicate relatively high levels of satisfaction with their life as grandparents. For example, Peterson (1999) pointed out that a mean satisfaction rating of 6.02 on a 7-point scale, where 1 indicated “neither satisfied nor dissatisfied” and 7 indicated “extremely satisfied.” Consistent with this, Peterson (1999) found that 89% of grandparents were satisfied, while 3% were indifferent and only 8% were
dissatisfied. In addition, grandparents enjoy high levels of interaction with their grandchildren (e.g., Albrecht, 1954; Robertson, 1977). Reitzes and Mutran (2004) found that frequency of contact—categorized as being, “more than once a week,” “once a week,” “once a month,” and “every few months”—was a significant, positive, individual predictor of grandparent satisfaction.

Although grandparents have been satisfied with grandchildren as shown from many empirical studies, there are also negative aspects with roles as grandparents. Neugarten and Weinstein (1964) studied grandparent’s relationships to grandchildren, degree of comfort in the grandparent role, significance of the role, and style with which the role is enacted. In this study, almost one-third of grandparents expressed difficulty and discomfort with their role because of strain in thinking of oneself as a grandparent, conflict with the parents regarding grandchildren, or difficulties to caretaking. Likewise, Robertson (1977) studied the significance of being a grandmother in a sample of 125 females. Almost 20% of grandmothers indicated indifference, unhappiness, or mixed emotions, because they have more time to spend with and enjoy grandchildren than when their children were young.

Unfortunately, previous research into grandparent satisfaction has relied on limited measures. Typically, early studies adopted interpretive approaches, through which interviewers classified and described grandparents’ responses as indicating enjoyment and comfort (Neugarten & Weinstein, 1964; Robertson, 1977). While valuable in providing insight into how grandparents feel about their experiences, it is difficult to generalize from this research. Recent investigations (Reitzes & Mutran, 2004; Thiele & Whelan, 2008) into grandparent satisfaction have relied on single-item measures reported by grandparents; hence, the reliability of their reported levels of satisfaction is uncertain. It is critical that future studies employ more a reliable mix of quantitative and qualitative scales to enable a comprehensive examination of the construct.

It has been argued by Albrecht (1954) that grandparents enjoy being able to indulge and idealize their grandchildren, but their enjoyment is lessened, if they must endure the irritations and difficulties associated with having daily responsibility for them. Consistent with this argument, having custodial responsibility for grandchildren has been reported to adversely affect grandparent
satisfaction (Hayslip, Shore, Henderson, & Lambert, 1998). For non-custodial grandparents, however, the relationship is less clear. In contrast to the above argument, (Thomas, 1990) found that non-custodial grandparents expressed positive attitudes to having childcare contact with grandchildren: increasing levels of this perceived responsibility was found to predict increasing satisfaction.

Bowers and Myers (1999) investigated the consequences for grandmothers of providing care for their grandchildren. They anticipated that grandmothers providing full-time care for grandchildren would have more negative outcomes (i.e., greater levels of stress and burden associated with parenting the grandchild) than grandmothers providing part-time care or those providing no regular care. As anticipated, Bowers and Myers (1999) found that the greatest satisfaction was reported by non-custodial grandmothers who provided part-time childcare for their grandchildren. They were more satisfied than either the non-care-giving or full-time custodial grandmothers. It was argued that providing full-time care was excessively burdensome and stressful for grandmothers, and was an unwelcome, non-normative responsibility late in life. In contrast, for non-custodial grandmothers, a moderate amount of childcare contact with grandchildren was more satisfying than having none. That is, for these grandmothers the burden of such responsibility is far outweighed by the enjoyment of these additional interactions with their grandchildren.

Fortunately, a recent review of research on grandparent and grandchildren reported that grandparents enjoy playing with grandchildren in a specific relationship. Aguiar and Hurst (2006) conducted empirical studies over the last 40 years, focusing on measuring trends in leisure of older people. Among the trend elements they reviewed 'Child Care', which was divided into 4 categories: primary, educational, recreational, and total child care. Interestingly, only recreational child care increased between 1965 and 2003. Recreational child care was defined as: playing games with children; playing outdoors with children; attending a child's sporting event; and taking walks with children. These results indicate that older adults, like grandparents, like to play, and not to take care of them. Thus, it is important to study a place where older adults and grandchildren can interact with one another.
2.1.2 Studies about the Relationship between Physical Environment and Older Adults

Publications, looking at how older adults interact with public spaces and the relevance that their behaviors may have on design, are related to the relationships between older adults and physical environments. Especially, most research studies are related to retirement facilities, where older adults live and interact with people. Texts focusing on the interaction between older adults and indoor public spaces are hard to find. In his dissertation (2006), *Effect of Space on Health and Well-being*, that Orcun Kepez reviewed retirement community floor plans with different spatial configurations that lead to differences in the use of spaces and the social interaction between residents that may affect well-being. He chose nine cases from four different sites and used a survey and observations to assess his hypothesis that there were at least two plan types with significantly different outcomes (survey outcomes, use, and social interaction) at p<0.05 level. His dissertation considered the distances between each resident's bedroom and the common spaces and syntax variables (e.g.: distance, social interaction, and depression levels). An interesting result was that a shorter walking distance was found to be an indicator of an increase in the number of conversation groups in the common spaces. The numbers of spaces that residents needed to walk through to reach any of the common areas were also found to be a factor for social interaction. These findings support the concept that older adults and children meet where they can have a variety of experiences, their chances of having social interaction would increase.

Documenting similar community planning issues facing older adults, *Community Planning for an Aging Society* (M.P. Lawton, Newcomer, & Byerts, 1976) was organized into three parts that focused on the designing of older adult services and facilities. This collection of papers provided: (1) facts about aging – urban life-styles and life-cycle factors (Carp, 1976); (2) through case study examples, principles relating to societal responsibilities associated with alternative housing and services; and (3) planning community services – facilities (Kahana, Felton, & Fairchild, 1976), transportation (Golant, 1984), and urban parks (Byerts, 1876). What all publications support was noted by Carp that “the urban environment [as it exists] is especially difficult, [psychologists agree] that individual differences increase with age [and thus there is a need to] design and create the wide range of
environments necessary to support the rich variety of life-styles that are appropriate among older people (F. M. Carp, 1976, p. 19)."

Through an ecological approach to understanding the spatial needs of older adults: Spatial Behavior of Older People (Pastalan & Carson, 1970), the researchers collected studies related to social and spatial environmental planning (De Long, 1970); effects of space and physical objects on behavior (M. P. Lawton, 1970); and the meaning of natural landscapes (Carson, 1970). They tried to probe critical human behavior areas, in some cases in rather academically unconventional ways. Even though the patterns of other animals so clearly reflect the features of their natural environments, the behaviors of humans are difficult to imagine that the characteristics of environments do not affect. By focusing on architectural and personal space, various researchers in each chapter of the book showed a new approach that an older adult can be creative, as well as productive.

Alton DeLong (1970) described the use of Hall’s proxemic notion of physical distance between individuals in a study of a group of the aged. He pointed out that misinterpretations of the use of interaction distance could occur between patients and staff, who are in different age groups. This may lead to varying degrees of alienation. For example, some older adults depend more on tactual interaction in social-casual contacts and may be misinterpreted by non-aged, who treat such behavior as intimate-personal contact. The older adults’ need for such contact may originate in their deteriorating sensory systems. His study implies older adults not only have difficulty communicating interpersonally, but that they are also being alienated from their physical environment by being placed in surroundings, which they are unable to decode. DeLong’s study gave knowledge about the micro-spatial structure of older adults.

M. Powell Lawton (1970) discussed what he termed the “environmental docility hypothesis,” which states that the lower the competence of the organism, the greater will be the dependence on environmental factors. A large proportion of the variation in behavior environment, personal environment of “significant others” and the social environment contrasted with the individual as the independent variable when dealing with older people. Physical and psychological competence is lower in older people and Lawton advanced the hypothesis that under conditions of maximally free
choice, older adults tend to choose and organize environmental resources, which match their individual competences. His idea is significant in solving all problems of older adults by using an ecological approach.

Dan Carson (1970) exposed some alternative definitions of the natural environment given by other authors in connection with his discussion of natural environment as meaningful space. He arrived at a tentative distinction of some use in separating the natural from man-made environments. He mentioned the natural environment is a good place to develop recreational uses for older adults. It was pointed out that although there seems to be some decline in outdoor recreation in general and among older adults in particular, newly instituted conservation education programs may change some limitations.

Marcus and Francis (1997) suggested guidelines for older adult uses of public outdoor spaces in *People Places*. This book consists of seven chapters written by different authors. The bulk of one chapter is devoted to design guidelines, followed by several short case studies. Each case study is accompanied by a site plan, a brief description of the site’s use, and a summary of successful and less successful aspects of the site plan. These case studies present actual settings and real examples of varying success, rather than best-case examples of the most up-to-date design responses.

Most of all, Chapter 5, Outdoor Spaces in Housing for the Elderly, defines a “prosthetic environment” as an environment that provides support to older adults when they need it. However, it allows them to have independence to challenge and to learn in the environment. Moreover, Carstens (1990) mentioned creating a subspace for meeting others was important, since meeting and talking with others and feeling part of the activity are very important to older adults. In general, smaller spaces make it easier for an older person to meet and talk with others, because smaller spaces reduce the number of distractions that may contribute to the loss of a train of thought or confusion over who is speaking. In design recommendations, Carstens suggested locating outdoor socializing areas near indoor activity sites, such as building entries, lounges, or game rooms and providing enough space to accommodate the functional activities of the area and people passing by, as well as space for sitting, watching, and talking. The public space activities and environmental attributes people of all
ages enjoy their leisure and happiness. (Marcus & Francis, 1997). This book contributes to the discussion of older adults’ issues and definition of guidelines for creating supportive older adult spaces within neighborhood parks. Though this book is focused on public outdoor spaces, the guidelines for older adults and definition of older adults’ issues may provide sources as the foundation for creating new concepts about indoor public spaces.

2.1.3 Studies about the Relationship between Physical Environment and Children

Many researchers who study about children and their environments are focused on assessing relationships between their behavior and outdoor environments, and how to develop these relationships. Al-Khalaileh (2004)’s dissertation, *Understanding Children’s Environments*, examined children’s experiences, while growing up in urban environments. Al-Khalaiieh used several data collection methods, such as informal observations (field notes and photographs), interviews (with participating children, schools and public officials), children's drawings (cognitive maps), and photographs taken by children. The methods proved useful in determining a wide variety of issues the children considered important (identified through their views, opinions, and perceptions). In this study, Al-Khalaiieh found that the children did not satisfy with viable exploratory opportunities in their outdoor physical environments. When the researcher asked the children about their desires for the outdoors, 46 percent of the children answered *adjustment to existing resources* such as cleaning the area, reducing the traffic and noise, pollution, and crime, and widening streets. 28 percent of the children wanted *new fixed resources* such as adding sport fields and playgrounds, providing benches and sidewalks, and supporting various public spaces. Few children (13 percent) proposed *natural resources* such as adding natural garden, open space, trees, flowers, and grass. As a result, children expressed a variety of desires regarding the characteristics of public spaces.

*In Play for All Guidelines*, Moore, Goltsman, and Iacofano (1997) of MIG Communications provide environmental designers with guidelines and suggested approaches to the design of outdoor spaces that would address the needs of children. This book includes child development objectives, site analysis procedures, and site design criteria. The authors also define and illustrate specific site design and management considerations including - entrances, pathways, signage, play equipment,
game settings, surface treatments, stage settings, and gathering places. Though these guidelines were focused on outdoor spaces, using and revising these guidelines may be applied to indoor space design for children, as well.

Sharon Stine's (1997) *Landscapes for Learning* provides insights into the use of these important environments for children. The author defines nine reciprocal pairs of environmental affordances that must be met in creating public schools: (1) accessible/inaccessible, (2) active/passive, (3) challenge-risk/repetition security, (4) hard/soft, (5) natural/people built, (6) open/closed, (7) permanence/change, (8) private/public, and (9) simple/complex. Through a discussion of eleven case studies of quality outdoor school environments, Stine includes not only the environmental affordance as a design concept, but the participatory process employed in their creation.

Celen Pasalar (2003) has also studied learning environments. In her dissertation, *The Effect of Spatial Layouts on Students' Interactions in Middle Schools*, she selected four schools and analyzed their spatial organization, social organization, and the interactive interfaces for social and educational activities. Using the space syntax technique, Pasalar used the spatial data, which provided information on the spatial layout attributes, and behavioral mapping to identify students' activity and movement patterns with respect to the syntactic attributes of spatial layouts. The students' behavior and the spatial layouts were related to students' perceptions about the social organization of their school communities and the role of the spatial characteristics. She suggested spatial layout, when designing school buildings is an essential component of both formal and incidental interactions among students.

In Kristin Thorleifsdottir's (2008) dissertation, *Neighborhood Design*, she documented the association between environmental mechanisms and the development of sedentary behavior by examining the relationship between suburban neighborhood morphology and children's outdoor (out-of-school) physical activities. Thorleifsdottir was interested in the health problems of children associated with reduced physical activity, increased sedentary activity and increased consumption of high fat, fast food and snacks. She focused on the interaction between physical design and sedentary lifestyles on children's health. It was used for a quantitative-qualitative and multi-method
approach with a multiple case study field research strategy. For the criteria in the selection of neighborhoods, she chose profiling the variability of physical attributes in two steps: the selection of different philosophical design orientations and the selection of best-fit of suburban neighborhoods. Thorleifsdottir's main finding was that well-designed neighborhood design supports children's healthy development. The study also pointed out well-designed neighborhood design serves as a catalyst for children’s outdoor physical activities with implications. She found a design process that can contribute to health-promoting outdoor pursuits and make a significant difference in children’s lives. Even though this study focuses on children’s outdoor and out-of-school activities, the methods may be appropriate for this dissertation.

In the book, Methods in Environment and Behavior Research, the chapter on “Children and the Built Environment”, Ziegler and Anderson (1987) summarized measurement techniques for environmental research suitable for working with infants, preschoolers, school children and adolescents. The overlapping self-report technique for use with children and youth included survey attitude instruments, such as cognitive mapping, diaries, activity logs, photographic simulations, games, scale models, and various interview techniques.

2.1.4 Intergenerational Environment Studies

Since the purpose of this study is to investigate the function of an indoor public space and whether it could be a positive role model for interacting with the two age groups, reviewing intergenerational research literature is critical. Though there are many published design guidelines for community facilities about programming social connections 'between older adults' or 'children', only a few sources particularly deal with spaces where older adults and children can have interactions. Moreover, much of the current research related to intergenerational interaction is dealing with topics regarding children’s activities (Bembry, 1993; Reese, 1997). Intergenerational programs, which schools and church communities conduct are beneficial for both generations, considering programs and spaces simultaneously could be a beneficial and practical solutions for both generations.
There are two dissertations dealing with the importance of a physical environment in supporting intergenerational activities. *Physical Planning for Increased Cross-Generational Contact* by Edward Steinfeld (1972) and *An Intergenerational Approach to Community Education and Action* by Matthew Kaplan (1991) suggest that programming and the physical environment are interconnected and inseparable in terms of intergenerational contact (Steinfeld, 1972).

Participants, programming, and environments are important ingredients in a successful intergenerational exchange. A greater understanding of the physical community environments, where the participants live, may create better intergenerational programs. In addition to providing insights into intergenerational community support and development opportunities for older adults (Steinfeld, 1972) and children (Kaplan, 1991), researchers use somewhat unique tools by defining perceptions and preferences of the study groups toward environmental issues. Steinfeld (1972) employs alternative visualization models to assist Foster Grandparent volunteers in defining their disposition toward proximity and privacy with very young children; while Kaplan, after interviews with community leaders, employs a special event approach to conduct an intergenerational community participatory design exercise with school age children and older adult volunteers.

Further investigation noted that the intergenerational study seemed to be an argument for the need for intergenerational programs to deal with family programs that are affecting the well-being of older adults and children (McCrea & Smith, 1997) and another study outlined the types of intergenerational programs. McCrea & Smith (1997) employed to help support the social family programs or to assist communities in supporting older adults and children.

In Stephen Golant’s chapter, *Location and Environment of Elderly Population*, James Bohland and Lexa Davis (1979) described their study designed to determine any difference between the satisfaction of older adults and other age groups living in urban environments. Contrary to a number of current publications on designing urban or school environments (Marcus & Francis, 1997; Stine, 1997), where they emphasized different environmental needs for different age groups, the results showed no significant difference in satisfaction between older adults and children.
Since populations of cities constitute the mixing of all age groups, any study related to the urban context should incorporate the whole spectrum of age, from children to adolescents and middle age to older adults (Layne, 2009). Given the fact that older adults and children, located at both ends of the age spectrum, use public space more frequently than other groups (Layne 2009; Marcus & Francis, 1997), the selected data collection methods should be appropriate for studying these two specific groups.

2.2 Public Space, Social Interaction, and Quality of Life

2.2.1 Concept of Public Space

The term public space is frequently used in academic writing, but authors in different disciplines employ the term quite differently (Goodsell, 2003). The complexity of public spaces as an objective investigation results in a single rarely available organized concept. Because there are so many different expressions of public space, it is hard to find and unify one concept. The term 'public' has many meanings, from a strictly political definition of collective citizenry to the more popular usage of designating everyone and anyone (Carr et al., 1992). In each example of use, accent is inevitably placed on one particular meaning such as a political definition, but the other meanings are nevertheless necessarily commutated (Carr et al., 1992).

The meaning of 'space' may seem clearer-cut: it refers to the physical dimensions of a particular location. Yet, it turns out to be conceptually complex (Anderson & Studies, 1978) like the term ‘public’. Canter (1977), an environmental psychologist, drew together a number of psychological studies on the interactions between people and buildings, publishing and providing consultancy on the designs of offices, schools, housing, and other building forms, as well as exploring how people made sense of the large-scale environment, cities. “Space” can be described as an experiential entity referring to specific physical settings and having three main components: “activities, evaluative conceptualizations and physical properties” (Canter, 1986). Based on Canter’s work, Groat (1984) studying about environmental meanings and the experience of place, pointed out that the concept of space may serve to integrate both the phenomenological and empirical approaches
in environmental psychology. Both Canter and Groat pointed out that its economic dimensions involve not only issues of ownership, but also questions of access and location within a building, which in turn give rise to the political and social conceptual issues. Thus, a wide-range of meanings and conceptual issues are likely to emerge from juxtaposing the two terms 'public' and 'space'.

Roger Scruton (1984), an architectural historian and critic, reflects on the concept of ‘public space’ in a series of essays. In each instance, the term 'public space' is used to designate a location which is (1) designed, however minimally, such that (2) everyone has the right of access, (3) encounters in it between individual users are unplanned and unexceptional, and (4) their behavior towards each other are subject to rules of common norms of social civility. These defining conceptual elements can be combined with particular features and functions of different locations to give rise to many concrete manifestations of public spaces.

Carr et al., (1992) pointed out that adopting an encompassing meaning of public space and all its concrete manifestations means that such investigations require an interdisciplinary approach. They suggested two possibilities: one is to have an interdisciplinary team investigate different aspects of a particular public space, for example the economics, politics, sociology, architecture, geography and history of the atrium space in modern shopping complexes. A possible example of this is found in the collection entitled On Streets (Anderson, 1978). The other possibility would be for a single analyst to discuss a particular public space from an appropriate discipline and subsequently, produce a collection of essays that is interdisciplinary in its collective sense. Carr et al.,(1992) also mentioned that each approach, of course, has its own advantages and disadvantages; the first produces depth in a very specific category of public space, the latter results in expansive knowledge of various types of public spaces and collectively a wider knowledge of public space as a category of collective phenomenon.

Goodsell (2003), who proposed a unified concept of public space, has drawn from the literature of political philosophy, urban planning, and architectural interpretation. His definition is a space-time continuum for political discourse. With this phase, he emphasizes that people can communicate with a connected and interactive human process. He highlighted that all participants together unite
mutual presence in the space to do this purpose. The aforementioned researchers each analyzed concrete instances of a ‘public space,’ giving emphasis to one of its defining elements.

2.2.2 Social Interaction in Public Space

Behavior comes in many forms — eating, reading, sleeping, dancing, and playing. What then distinguishes social behavior? In The Conflict Helix: Principles and Practices of Interpersonal, Social, and International Conflict and Cooperation (1991), Rummel mentioned that social interactions are the acts, actions, or practices of two or more people mutually oriented towards each other's selves, that is, any behavior that tries to affect or take account of each other's subjective experiences or intentions. This means that those engaged in social interaction must be aware of each other. Such behavior considers the intentional or rational meaning of the other’s field of expression and involves expectations about the other’s acts and actions. He noted that social interaction is not defined by type of physical relationships or behavior, or by physical distance. It is a matter of a mutual subjective orientation towards each other. Thus even when no physical behavior is involved, as with two people deliberately ignoring each other's work, there is social interaction.

According to Rummel (1991), “social interactions are complex in their manifestations and interrelationships. These interactions can involve smiling, talking, or winking; threatening, fighting, or debating; and negotiating, or discussing. The interactions can be overt or covert, active or passive, brief or long-lived. They can be organized, unorganized, direct or indirect, shallow or intense, narrow or universal, and so on. There is clearly a diversity of characterizations, processes, forms, types, and the like” (p.110).

"The relationship of behavior to space and the objects in space is a system of causes, effects, interactions, and feedback, so that the ultimate effects of a change in any component of the system may become evident only after a chain of interactive cause-and-effect cycles (Lawton, 1970, p.42)."

Based upon socially constructed factors such as culture, socialization experience, and relationships, environment may play an important and decisive role in social exchange. These factors within a given physical setting could influence the choices made by the group members, when looking for a
space to socialize. In his doctoral dissertation in Design, Layne (2009) pointed out that “the human spatial relationships become the basis for deciding which spaces are most appropriate for positive social interaction. The perception of an environment's ability to meet these personal space needs is reflected in the preference for one space over another. Obviously, it would be somewhat impossible for the respondents to be aware of every nuance of their personally constructed cultural background or socialization experiences” (p. 53). However, when the behavior of a number of individuals results in a personal dyadic environment (Layton, 1970), the specific relationship influences the ability of the social interaction to achieve the desired results.

In discussing the spatial needs of older adults, Spatial Behavior of Older People (Pastalan & Carson, 1970), Robert Sommer (1970) collected studies related to both public and private use of spaces within institutional settings. He said it is necessary to teach people how to use an environment effectively and to develop institutional arrangements and rules, regarding space usage that are in keeping with the goals of the organization. Sommer summarized a number of experiments and studies which illustrate how space is organized or reorganized in a formal way to the detriment of social behavior. He introduced the term “space managers” to describe those persons who initiate organization of space from above without consulting users or lower staff members. He pointed out “the residents adapt themselves to the arrangements by reducing their level of social intercourse” (p. 38), but older adults are ascribed to this description, because they are so active and emotionally alive.

Alain Legendre (1999) conducted an observational study with 45 toddlers in social relationships in a day care center. He highlighted three factors on which the quality of dyadic interaction was dependent: the nature of the inter-individual relationship, the distance between child and adult care-givers, and the visual connection between the pair of children within the play space.

In A Pattern Language (1977), Christopher Alexander explains a great understanding of the relationship between the physical attributes of a space and the relationships and situations that take place within it. He suggests that certain spaces cultivate individual development (a place of one’s own), while other spaces are intended to be employed by married people in order to cultivate the
relationship as a couple. As perceived by each individual or collectively by the two participants, the physical attributes of an environment and the relationship that exists between them either supports or does not support their needs. It was critical to look beyond an acceptance of the physical environment as an influence on human behavior and social exchange. Depending upon the physical attributes of an environment, older adults and children could either interact or not interact with each other.

“Evidence from research into the relationship between human behavior and the physical environment indicates that physical features [and their spatial relationships] can have an important influence on where and when social contact will take place and the effectiveness of social interaction when it does take place” (Steinfeld 1972, p.4). Thus, it is important to provide physical spaces where the best possible interactions can take place, where both programmed and casual interactions are not only possible, but likely to occur. Society is about groups of people interacting collectively to create stories that are mutually shared, mutually understood, and mutually transferred to future generations (Layne, 2009).

2.2.3 Quality of Life in Public Space

A variety of definitions and measurements of quality of life exist, and the struggle with the definition and measurement of this construct continues (B. Moore, Newsome, Payne, & Tiansawad, 1993). Quality of life can be defined as the sense of satisfaction and well-being that an individual feels about life, encompassing the degree to which one successfully accomplishes one's desires (Gerson, 1976). Another definition reflects the degree that a person's hopes are matched and fulfilled by a particular experience (Calman, 1984). Often, the description of the quality of life experience includes both objective conditions and subjective evaluation of these conditions (Kennedy, Northcott, & Kinzel, 1978). For older adults, the quality of life construct suggests that there is more to life than simply survival (Clark, 1991). However, quality of life may be seen as something to be pursued as a matter of public policy, through public means (Eckersley, 1999). The provision of leisure (e.g., facilities and programs) has been a significant element of public policy throughout the western world since the nineteenth century (Coalter, Long, & Duffield, 1988) and has been seen as a service
of governments in a number of ways. Much of this effort has been focused on providing leisure-oriented facilities or public spaces (e.g., sport and cultural facilities, city squares and urban parks) (Logan & Molotch, 2007).

Studies of quality of life have generated information regarding quality of life as one ages. Flanagan (1978) did a research study which has several steps for improving the quality of life for Americans. To accomplish the empirical definitions of a person’s quality of life, he collected more than 6,500 critical incidents from almost 3000 Americans of all regions of the U.S. and supplemented 2000 additional critical incidents from a 11-year follow-up survey. He formulated a set of 15 components under five categories of quality of life by sorting these critical incidents. (These 15 components were: Material well-being and financial security; health and personal safety; Relations with spouse; Having and raising children; Relations with parents; Siblings, or other relatives; Relations with friends; Activities related to helping or encouraging other people; Activities relating to local and national governments; Intellectual development; Personal understanding and planning; Occupational role; Creativity and personal expression; Socializing; Passive and observational recreational activities; and Active and participatory recreational activities).

For the next step, Flanagan surveyed varied age groups (30s, 50s, and 70s) to know their importance and assessment about the 15 components (with 5 categories) defining the quality of life. The findings from the group of 70-year olds were that Health and personal safety rated the most highly, Material comforts second, and Close relationship with a husband/with a person of the opposite sex (for 70s Male), and Having and raising children (for 70s Female) third. Flanagan (1978) found three components relevant to the quality of life for older adults: (a) health and personal safety; (b) material comforts; and (c) intimacy including children and socialization opportunities.

Fitzpatrick & La Gory (2000) pointed out that “All human action takes place in space, but this space is more than a physical container, it is also a social and cultural phenomenon” (p. 16). For example, the public library has always been a place for people to read books, to exchange information and a place where important events are staged. The public libraries have also been a communication place where various books and events are offered, people can meet each other, and share their opinions.
Thus, planners and designers, who are involved in the provision of leisure-oriented spaces, should seek to understand not only how planning initiatives change the physical nature of space, but how leisure influences the quality of life for people; how people feel about and experience their leisure, and the settings in which leisure occurs (Rice, Frone, & McFarlin, 1992).

Objective and subjective measures of the quality of life contribute independently useful estimates like each character is important to physical space. “While objective and subjective indicators in quality of life are generally fairly independent, their degree of dependency increases when the objective conditions of living are very poor.” (Cummins, 2000, p. 68). Thus, in order to measure quality of life that is integrated into objective and subjective conditions, it is essential to reflect a wide-range of life domains, through an individual ranking of the relative importance from children to older adults. Even though it may be different to weight certain life conditions as less important than others according to each individual, “the objective measurement of life conditions is still a part of the overall measurement and may be compared to those typically experienced” (Felce & Perry, 1995, p. 70).

Since the 1960s, researchers and urban policy analysts have focused on the “factors which predict residential satisfaction and ... could decrease movement away from planned communities, housing projects, and declining cities” (Baldassare, 1986, p.139). For example, quality of life in Australia was defined by the Economic Planning Advisory Council (Social Planning Working Group, 1993), in terms of objective indicators of economic performance, health, crime, and other social indicators. Thus researchers and urban policy analysts offered a “partial interpretation of any meaningful and effective definition of quality of life” (SPWG, 1993). In terms of their efforts, they influenced people’s patterns of use in public spaces and contributed to promoting new cultural services and facilities such as museums, libraries, cultural centers and performing arts venues (SPWG, 1993).

Furthermore, effective design of public spaces is an important issue for supporting quality of life. In order to have effective design of public spaces for older adults or children, it is essential to understand the role that those places play in older adults' or children's lives, and why spaces are used or ignored. In other words, the human perspective has been neglected in a public space design
(Carr et al., 1992). Carr et al. (1992) mentioned that “Places are proposed, built, and assessed with assumptions about what should be done in them. These assumptions are based on the goals of space designers, their clients, and space managers and do not address older adults' needs or the ways that public places can function to serve these needs” (p. 87).

Most people go to public space for specific reasons. Some involve immediate needs - to eat lunch in a good restaurant, to shop, or to rest. Others have long-range purpose and may be less obvious, for example, the need for a change or the opportunity to enrich quality of life. Regardless of immediate or long-range purposes, people are influenced to various purposes related to the qualities of public spaces. For example, plazas often are designed for commercial reasons, to act as corporate emblems, or making statements about the city rather than its citizens. An understanding of the purposes of public places and its use by people is essential to any speculation about the quality of space.
3. CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS

The main purpose of this chapter is to construct a conceptual framework to expand environmental preferences based upon affordance and perception of a space. After providing the theoretical background providing perspective to this study, a conceptual framework discussion will be introduced. The factors within the conceptual framework that are proposed as influencing affordance and perception modes for quality of life will used to pose a set of research questions.

3.1 Theoretical Background Supporting This Research

This study is based on an ecological perspective, which assumes that environment influences human behavior. The term ecology comes from the ancient Greek words *oikos* and *logos* and means "science of the habitat" (Haeckel, 1866). The word ecology denotes a science dealing with the interrelationships between organisms and their surroundings (Lawrence, 2003). Hence, human ecology deals with the relationship between people and environments (Lawrence, 2003). Human ecology provides a conceptual framework for academics and practitioners from the perspective of both the natural sciences (e.g., biology, chemistry, and geology) and the human sciences (e.g., anthropology, epidemiology, and psychology). This approach allows us to accept divergent disciplinary concepts in order to develop an integrated approach. That is, an ecological perspective can be used in the design process to consider the environment from a psychological and relational point of view (Heft, 2001).

An ecological approach is exemplified by the concept of affordance. James Gibson (1979) presented the concept of affordance, as the characteristics of configuration of a physical object or setting enabling it to be used in particular way. That is, whenever someone looks at a scene, preference for that scene is often a reflection of not only its aesthetic qualities, but its potential to support behavior (Hartig & Staats, 2005). This affordance is associated with an expected outcome or the ability of the space to provide for a specific need. Thus, the affordances of an environment can limit or extend the behavioral choices a person makes based on its configuration. According to Gibson’s ecological perspective, a physical system lies in a static condition. That means Gibson’s natural world
always exists and only human behavior reveals its functional uses. In addition, the construction of an ecological perspective is defined as a reciprocal relationship between human perception (and behavior) and physical world (Heft, 2001). Thus Gibson’s theory of affordance shows a truly ‘interdependent’ relationship between a person and their environment.

As Gibson mentioned, perception and action are interconnected in a direct way and reflect the specific requirements the individual has for environment in order for it to meet his/her needs (Heft, 1997). According to Gibson’s book (1986), *Ecological Approach to Visual Perception*, this detection of stimulus information, is what is perceived as environmental affordances (Gibson, 1986; Heft, 1997).

“The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill (Gibson, 1986, p.127).”

Since social interactions between older adults and children require activity in a physical environment, the perceived ability of that environment to meet the interactive needs is considered critical to selection of the best possible space.

This theoretical view implies a parallel set of personal needs and environmental affordances that result in behavioral outcomes, i.e. physical activity, and subjective states that may be evaluated in terms of quality of life for older people. According to Carp (1987), an appropriately designed setting increases an older adult’s confidence in their ability to successfully participate in a specific activity. Older adults with particular needs and who actively use affordances available in environmental settings are more likely to experience positive results in improving their quality of life.

Yet these affordances, are also functionally significant for each person individually (Heft, 2001). For example, a child may find that a small chair (low to the ground) in an indoor public space affords the perfect opportunity to sit. On the other hand, the same seat would not provide the same level of comfort to an older adult. The older adult would require a seat with a higher seat pan or a more comfortable seat, such as a couch with an armrest and backrest to afford an opportunity to sit. What affords the child’s seating does not necessarily afford the older adult’s. Thus, even though the
features present in one space may be the same as in another, the affordance of a particular space may be different based on the age group using the space.

In addition, according to Zimiring et al. (2005), physical environmental factors can be considered at four nested levels of spatial scale: urban design, site selection and design, building design, and building element design. Most of all, the scale of 'building element design', including stairs, chairs, and tables, is an important opportunity to design for both older adults and children. Well-designed building elements may afford both older and young age groups convenience, safety, and comfort by either promoting or deterring activities by virtue of the features of their individual design (Zimiring et al., 2005). Finally, well designed building elements can influence the quality of life of all people at-large. “Barriers such as door locks, grade changes, non-ergonomic design, and poor placement of building elements can not only deter physical activity, but potentially can neutralize other features designed to promote physical activity (Leibrock, 2000, p. 190).” In addition to the possible differences in required physical space needs, everyone’s choice of a supportive environment and his or her ability to define that space may also be influenced by a variety of personal tastes in leisure activities. Thus, affordances within a space should be chosen to support the different experiences of quality of life for both older adults and children.

Although each person may perceive a physical environment somewhat differently, the environmental affordance of a selected space to meet mutual goals of older adults and children groups is important. Selecting an indoor public space for social interaction, the ability of that physical space to support the cognitive needs of both the older adult and children is critical. Thus, developing a set of intergenerational affordances, so that both the older adults and children can view an environment and determine its suitability for intergenerational social interaction would contribute to the design and local communities.

“Individual differences increase with age” (Carp 1976, 19): a person becomes more unique as he/she ages. Extending the average lifespan of individuals and life experiences contributes to distinctive lifestyles and the associated living environments required supporting those lifestyles. Thus, environmental perception is based upon everyday experience and focuses on the factors influencing
the impressions that observers form about settings and places. Just as there is no one best lifestyle in meeting older adult needs and children’s needs, there can be no one best environment for meeting their needs. Rather, when designing spaces within which older adults and children co-exist, it is necessary to study several existing spaces, where people of different ages meet and interact to support the richness of overlapping unique lifestyles.

Whether physically or psychologically, both older adults and children highlight challenges associated with conducting a comparative study involving two disparate age groups having different physical traits, as well as different world experiences. Even though both groups having different physical traits, which may be important when determining the specific choices made by older adults or children, the selection of indoor public spaces to meet the intergenerational intervention goal for both age groups requires a similar outlook, such that both groups experience positive or improved quality of life in the same space.

3.2 The Conceptual Framework

The main purpose of this dissertation is to investigate the function of an indoor public space and whether it could play a positive role for supporting quality of life for older adults and children. The proposed study promotes the improvements in quality of life as an outcome of an interaction between complex resources in the environment and human needs. To understand this process it is essential to investigate the availability of resources in the environment and the human needs that should be met. It is evident that human needs are covered by the environment; the environment can contribute to quality of life for them.

The general conceptual framework of this dissertation is based upon the "Theory of Affordances" that human beings prefer environments to which they are best adapted, environmental affordances are what the physical environment contributes to the needs of people. Some of the studies reviewed one or more of the affordances as variables that were compared to preference or well-being, while others simply employed the affordance as the theory of a conceptual framework in their studies.
In *Urban Design: The Urban Experience*, Lang (1994) employed the five basic human affordance needs to define the ability of the urban environment to support human use and interaction. He modified Maslow's model of basic human needs to effectively present the five conditional affordances that people employ to make decisions on how they act within the urban landscape (Lang, 1994). The five conditional affordances are: (S) Safety/Security - encourages a feeling of personal safety; (B) Sense of Belonging - welcoming messages, a connection to the space; (M) Multiple Activities - flexible/accommodates lots of different uses; (A) Differing Physical Abilities - supports mobility/people of all ages can get around; and (E) Interpersonal Engagement - provides for connecting/communicating with a friend. Lang (1994) noted that the five conditional affordances could influence the quality of intergenerational social exchange outcomes between older adults and children and within in their physical outdoor environment.

Layne (2009) studied urban public open space (e.g. outdoor) for supporting an intergenerational perspective. He also represented his best guess of the most important measures for a social exchange for both youth and older adults and identified supportive conditional affordances to the survey and compared the environmental perceptions and preferences between both groups.

Like Layne, this dissertation also employed the five conditional affordances to support human needs in public spaces and the following describes the five conditional affordances:

- **Safety/Security** is related to the surrounding physical elements such as handrails, stairs, and pathway within the indoor public spaces.

- **Sense of Belonging** is a connection between people and the indoor space. It may give people sense of values as individuals with individual needs and allow them to form supportive relationships (such as older adults and children) in indoor public spaces. Moreover, when individuals enter the indoor space, the space may give welcoming, comfortable, and attractive messages like the familiarity of neighborhood to people.

- **Multiple Activities** are accommodating lots of different uses and different physical activities.
• **Differing Physical Abilities** are supporting mobility characteristics of both generations, so that they can move easily.

• **Intergenerational Engagement** has various types of characteristics about indoor public spaces and provides for connecting/communicating with one another.

This dissertation also focuses on the physical environmental settings where people connect with a variety of public spaces. Even though environmental settings can be explained in terms of human values, beliefs, attitudes, intended purpose, and perceived meaning (Bechtel, 1997), a number of theories exist in the environment and behavior studies field that suggest that preference for the physical environment can be classified within various three types of modes of perception (R. G. Barker & Wright, 1978; Bronfenbrenner, 1979; M.P. Lawton & Nahemow, 1973; Layne, 2009; Lewin, 1935; Mesch & Manor, 1998; R. C. Moore, 1978; Pennartz & Elsinga, 1990).

Lawton and Nahemow (1973) who developed the Ecological Model pointed out that “behaviors are a function of the interaction of personal factors with the physical, psychological, and social dimensions of the environment.” By defining people’s behavior they suggested a good theoretical basis for assessing the value of physical environments. Moore (1978) utilized a three-part value system of operational value, conceived value, and object value (Peterson, 1976) as a descriptive tool for assessing the results of a variety of methods employed to study children’s use of a naturalized schoolyard. Based on responses to interviews on the urban environment with adults, adolescents, and architects, Pennartz and Elsinga (1990) also organized factors into three categories: physical (elements), visual (spatial attributes), and meaning (social situations). Layne’s (2009) work was also based upon the three perception modes (responsive, operational, and inferential) and classified 96 categories based upon the open-ended survey answers of all participants.

“**It is important to understand the classification scheme that people comprehend the environment and the meaning they are likely to draw from those classifications (Sanoff, 1991, p. 16)**” if the analysis and interpretation of the results are to be meaningful.
Aggregating the descriptions of the aforementioned investigations into the tripartite classification system of modes of perception that were used in this study are perceptible, functional, and affective and were used to develop the framework for collecting and analyzing data from older adults and children. This study not only focused on addressing the perceptual, but also the preferential aspects of determining the quality of an environment for the two age groups. The analytical structure for conducting this study was designed to reveal and articulate the connections between human beliefs, actions, and feelings and indoor space characteristics.

The following describes the three perception modes as categories:

- **Perceptible**: Environmental attributes that are measurable and represent human thought or understanding
- **Functional**: Environmental features that support human behavior or action
- **Affective**: Environmental qualities that are less definable, but reflect human feelings and meaning

The conceptual framework of the proposed study can be diagrammed as shown in Figure 3.1.
3.3 Research Questions and Research Methodology

The main research question of this dissertation is: “Is it possible for an indoor public space to play a positive role in supporting quality of life issues for older adults and children?”

The goal of this dissertation is to develop an effective framework for designing indoor public spaces to support quality of life for intergenerational groups.
Sub-Questions

1. Which components of the five affordances (safety, sense of belonging, multiple activities, differing physical abilities, and intergenerational engagement) are important to older adults and children in order to enjoy spending time together?

2. How do older adults and children describe their vision of an ideal indoor public space?

3. What types of indoor public spaces and the associated characteristics do older adults and children prefer for social interaction?

4. What are the characteristics of spatial properties among the three perceptional modes (perceptible, functional, and affective) that lead older adults and children to an increase in social interaction in an indoor public space?

5. What types of interactions are demonstrated by pairs of individuals socializing in an indoor public space? How are the demonstrated types of behavior affected by the inter- or intra-generational relationship between the pair?

The purpose of this chapter is to define the methods employed to collect, analyze, and define the preferences (age group specific and collectively) for supporting quality of life for inter-generational groups for indoor public spaces. In order to design indoor public spaces for inter-generational groups, three different methods were used to form three sequential studies in completing this dissertation.

Adapting Elizabeth Sander’s model of say/do/make as a design mindset (Sanders & Stappers, 2008), the researcher used three types of mixed methods, summarized the data collection methods, and matched them to the five main research questions presented in Section 3.3. (see Figure 3.2 and Table 3.1).

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1 Note: intra-generational relationship refers to within the same generation or pair of older adults while the inter-generational relationship refers to between generations or pair of child and older adult
The first study used the survey as the primary form of data collection. Through the survey, the researcher sought to understand the differences and similarities in perceptions and preferences between older adults and children for current indoor public spaces. The researcher sought to collect opinions of older adults and children regarding how they use indoor public spaces, and why they come to indoor spaces, to discover the importance of each component of five conditional affordances. The second study used the participatory design method to understand people's thoughts about future indoor public spaces by allowing them to express their preferences by creating collages. Finally, the study used observation as the method for documenting the differences of social interactions between older adults and children in which the researcher recorded people's behaviors using observation and real-time coding in an indoor public space.
<table>
<thead>
<tr>
<th>Study</th>
<th>Research Methods</th>
<th>Participant Number</th>
<th>Research Questions</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Survey</td>
<td>Older participant: 82 Children participant: 75</td>
<td>1. Which components of the five conditional affordances are important to older adults and children in order to enjoy spending time together? 2. How do older adults and children describe their vision of an ideal indoor public space? 3. What types of indoor public spaces and the associated characteristics do older adults and children prefer for social interaction? 4. What are the characteristics of spatial properties among the three perceptional modes that lead older adults and children to an increase in social interaction in an indoor public space?</td>
<td>• Rating the level of the importance using Likert Scales • Multiple free-sort task • Open-ended questions</td>
</tr>
<tr>
<td>2</td>
<td>Participatory Design</td>
<td>Older participant: 6 Children participant: 6</td>
<td>Question 2, 3, &amp; 4</td>
<td>• Filling in a workbook • Making a collage • Group discussion</td>
</tr>
<tr>
<td>3</td>
<td>Observation</td>
<td>Older group: 12 (24 people) Intergenerational group: 12 (24 people)</td>
<td>Question 4 &amp; 5 5. What types of interactions are demonstrated by pairs of individuals socializing in an indoor public space? How are the demonstrated types of behavior affected by the inter- or intra-generational relationship between the pair?</td>
<td>• Behavior mapping approach • Time-based observation</td>
</tr>
</tbody>
</table>

\[2\] Note: intra-generational relationship refers to within the same generation or pair of older adults, while the inter-generational relationship refers to between generations or pair of child and older adult
4. STUDY 1: SURVEY

4.1 Questionnaire Development

The survey consisted of four sections. In the first section, participants in both groups were asked to rate the importance of space features or characteristics for indoor public spaces that well supported spending time with intergenerational friends. This section of the survey was based on Layne’s (2009) study of urban open space for supporting an intergenerational perspective, suggested three perception modes, and classified 96 categories based upon the open-ended survey answers from all participants. Out of his 96 categories, 53 categories were not included in this survey, because they are related to outdoor spaces or had too specific a meaning to be applied in this survey. 44 categories, which are related to the five conditional affordances, were selected and classified.

The 44 components (or categories) that were included in the survey were classified according to the five affordances:

- **Safety/Security (SS) - 9 components:**
  Not crowded, Wheelchair/Stroller, Privately owned, Handrails, Wide path/Walk, Barrier free, Distinctive colors (used mark locations), Stairs (handrails, no high steps), and Security guard

- **Sense of Belonging (SB) – 10 components:**
  Natural, Designed space, Colorful furniture, Open space, Music, Cozy feeling, Beautiful/Attractive, Peace/Quiet, General lighting and Plants/Trees

- **Multiple Activities (MA) – 10 components:**
  Watching, Sports/Games, Gardening, Talking, Using internet, Stores/Shopping, Food/Eating, Meeting place, Café, Reading books

- **Differing Physical Abilities (DPA) – 9 components:**
  Playing, Sitting/Resting, Tables, Different ages, Child-centered interior, Adult-centered interior, Elevator, Signage-good contrast, and Signage-large font size

- **Intergenerational Engagement (IE) – 6 components:**
Inviting/Familiar, Protective, Supports having fun, Engaging, Vibrant/Festive, Programs for two people

Each of the 44 components were rated using a 5-point Likert scale (where 1=least necessary and 5=most necessary) to indicate how important each component was when visiting an indoor public space with intergenerational friends.

The second section of the questionnaire sought to gather specific information that could be used to refine the observational research in the third method of this study. Specifically, each participant was asked to provide the name and description of an indoor public space he/she personally enjoyed while visiting in with his/her intergenerational friends. The results for this section provided a clear way to identify preferred intergenerational indoor spaces for the third method of observation. Each person was also asked to describe the reasons for selecting a particular place as his/her preferred indoor public space. The format of the questions was open-ended.

The third section provided an opportunity for the older adults and children participants to describe their image of a future indoor public space experience. They were asked to list three words that described their ‘vision of a future indoor public space experience.’ The format of the question was open-ended allowing participants to freely describe their idealized space. In the final section of the survey, simple demographic data, such as age, gender, and ethnicity, were collected.

Copies of the older adults’ and children’s surveys, the associated informed consent forms, and an IRB application were sent to the Institutional Review Board (IRB) at North Carolina State University for their approval before beginning the field work. After receiving the IRB’s approval, older adults’ and children’s survey packages were prepared. Each survey package contained three letter-size blank surveys, a consent form and a sheet that describing the purpose of the survey and the procedure. These packages were given to all survey participants in both of the two age-group sessions.
4.2 Population Sampling and Site Selection

Since the purpose of survey was to assess the preferences for older adults and children, who have the ability to visit indoor public spaces with intergenerational friends, the sampling process included a multistage approach. Although it was not possible to collect a simple random sample from the whole population because of the age-comparative nature of the study, both stratified and clustered sample collection approaches were employed to reduce sampling bias. The target survey population was set to include between 150 and 180 total participants, which was intended to be composed of 75-90 older adults and 75-90 children. The ‘older’ people were selected as individuals who appear over 65 years old, and the ‘children’ were selected as those who appear in the age between 7 and 14 years old (which is approximately analogous to anticipate ages for students in grades 3 – 8). In the survey, a total of 157 participants, 82 older adults and 75 children, were recruited through public facilities and programs in the Triangle Area.

4.3 Data Collection Method

For the recruitment of older adult participants, the researcher identified individuals from local churches and public spaces such as libraries, shopping malls and museums in the greater Raleigh area and asked them to participate in the survey. Since one of the focuses of this study includes the interaction between older adults and children, children who were out with their grandparents were ideal participants. The researcher recruited children that were with adults (which included parents, guardians, and grandparents) and asked the adult for permission to include the child in the survey. Once the adult agreed, the researcher also asked permission from the child to participate in the survey. The child participant remained with the accompanying adult (parent or grandparent) while

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Note: The average of the age of the children in the survey was 11.6 years old. The children had no problem to answer the survey. Barbara Byrne (1996) stated in Measuring Self-Concept Across the Life Span, that children at this stage of the life cycle (grades 3 – 8), “no matter their ethnic, gender,…. or socio-economic status, can describe their own behavior in relationship to others to a much greater level than can younger children… Children have an ability to define themselves as being smart, popular, helpful, as well as other self-descriptions” (p. 84). Since the children who participated in the survey were with their guardians, the children could ask me or their guardians when having some questions.
the child completed the survey. Since this survey was conducted after school hours or on weekends, it did not affect children’s typical school day and disturbed the welfare of the children.

Survey data was collected over a 3 month period from 82 older adults and 75 children. Individuals who agree to participate received a copy of the informed consent form, were provided with a brief overview of the study and informed of the exclusion criteria, relating to age ranges. After participants questions were answered and consent for was signed, completing the survey took 15 – 25 minutes depending upon the participant.

4.4 Response Processing and Statistical Analysis

The main purpose of documenting and coding all the collected data, including the open-ended data (written reasons for selecting a space and three words that each participant chose), was “to produce systematic, quantitative summaries of the responses (Brenner, Brown, & Canter, 1985).” Although the questions included a variety of data types, every answer was coded (Zeisel, 1981) and recorded in an Excel spreadsheet. A comparative analysis of the answers from both older adults and children groups was conducted using SAS (version 9.1).

4.4.1 Demographic Comparison: Testing Homogeneity

The purpose of conducting demographic comparison was to determine whether the responses from the two age groups could be considered to be equivalent. Demographic data were analyzed to find out whether statistically the two sample populations of older adults and children represent the larger population in terms of gender and ethnicity, and to ascertain whether the two age-groups were statistically homogeneous. The first step was to collect the demographic frequency distribution data (age, gender, and ethnicity), and then calculate the percentage of total responses for each of the two age groups. The results are presented in the Participant Group Demographics in Section 4.4.1.
4.4.2 Rating Important Components of Each of Five Affordances

In order to understand the important components of the five conditional affordances, two main objectives were addressed, using EXCEL and SAS analysis procedures. The first objective was to determine whether the groups differ from each other on each component of the five affordances on a scale from 1 to 5 (1 = least necessary and 5 = most necessary). After calculating the mean and frequency distributions of the responses, Wilcoxon signed-rank sum test was used. The second objective was to determine whether there were any significant differences in the mean responses between older adults and children in the rating of each component of the five affordances. The results were defined as significant when p<0.05, and highly significant when p<0.01.

4.4.3 Personally-Preferred Indoor Public Space and Future Image of Indoor Public Space

The open-ended responses from the two age groups were coded in order to determine what type of indoor public spaces and what associated characteristics that each group preferred to visit with their intergenerational friends. The responses were categorized into the similarities of the words that they used, identified as an interpretation of one or a number of thoughts, and translated into single words or short-word phrases. More detailed descriptions are presented in Section 4.5.4.

4.5 Results

4.5.1 Participant Group Demographics

4.5.1.1 Older Adult Group

The survey responses older adults (N=82) between the age of 65 and 84 (20 year span) were analyzed. Of the total older adult participants, thirty (37%) were male and fifty-two (63%) were female (see Figure 4.1) which included twelve (15%) of Asian, sixty-five (79%) Caucasian, two (2%) Latino, and three (4%) other races (see Figure 4.2).
4.5.1.2 Children Group

The survey responses of seventy five (N=75) between the age of 6 and 14 years old were analyzed. Of the total children participants, thirty-four (37%) were male and forty-one (63%) were female (see Figure 4.3). which included twenty-one (28%) were of Asian descent and fifty-four (72%) were Caucasian (see Figure 4.4).
4.5.1.3 Comparison of Group Homogeneity: Older Adults to Children

Frequency data was reviewed to determine if there were any significant differences in the gender and ethnic composition of the two age groups. Since the two age groups were numerically different in both the gender and ethnicity categories, a Chi-Square test of independence was used to determine, if the differences were significant enough to impact the results of this comparative study.

The null hypothesis was that the frequency of participants by gender or ethnicity and the age of those participants are independent. In other words, there were no differences between the number of participants in either the gender or ethnicity categories and age group.

Based on Chi-Square tests, Chi-squared test statistics were used to assess the significance of the relationships and the null hypothesis that the proportion of the older adult participants and that of the children participants are the same by gender. The Chi-Square value equaled 1.2414 with 1 degree of freedom. The $p$-value of .2652 supported the null hypothesis, indicating that no relationship exists between the two age group variables. These results indicate that statistically there was no difference between the males and females in number by age (see Table 4.1).
The result of the Chi-Square assessment for differences based on ethnicity (see Table 4.2) rejected the null hypothesis, indicating that a significant relationship does exist between the two age group variables. These results indicate that the four ethnic categories are statistically different in number by group.

Table 4. 1 The Result of Chi-Square Tests of Older Adults and Children Group by Gender

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Older adults</td>
<td>30 (19.11)</td>
<td>52 (33.12)</td>
<td>82 (52.23)</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>34 (21.66)</td>
<td>41 (26.11)</td>
<td>75 (47.77)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>64 (41.76)</td>
<td>93 (59.24)</td>
<td>157 (100)</td>
</tr>
<tr>
<td>Statistic</td>
<td>DF</td>
<td>Value</td>
<td>Probability</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>1</td>
<td>1.2414</td>
<td>0.2652</td>
<td></td>
</tr>
</tbody>
</table>

Although the results of the two groups by ethnicity were statistically different in number by group, the number of Latino (=2) and Other group (=3) was so small that it is hard to conclude that there is significantly different in number by ethnicity. The results of group by Asian and Caucasian indicated that there was no statistically significant relationship between the groups for the two ethnic
categories-Asian and Caucasian (Chi-Square with one degree of freedom=3.4456, p=.0634) (see Table 4.3).

Table 4.3 The Result of Two Ethnic Categories between Asian and Caucasian

<table>
<thead>
<tr>
<th>Group</th>
<th>Ethnicity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asian</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>Older adults</td>
<td>12 (7.89)</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>21 (13.82)</td>
</tr>
<tr>
<td>Total</td>
<td>64 (41.76)</td>
<td>93 (59.24)</td>
</tr>
<tr>
<td>Statistic</td>
<td>DF</td>
<td>Value</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>1</td>
<td>3.4456</td>
</tr>
</tbody>
</table>

4.5.2 Rating Important Components of Each of Five Affordances

To compare the responses of the two age groups for the five affordances rating, the Wilcoxon test was used to identify differences in the mean responses between older and children groups. The null hypothesis was that there was no difference between the mean responses of older adults and those of children participants in the value that each group holds for each component of the five conditional affordances. Of 82 older adults and 75 children who took the survey, all participants (N=157) in both two groups participated in the rating the importance of the five affordances (data was analyzed using SAS v 9.1).

4.5.2.1 Rating Safety/Security Components Comparisons between Older Adults and Children

Safety/Security had nine components rated by the participants for level of importance (see Appendix A-3); the mean responses for each of the nine components were calculated for all participants (total group), participants in the older group and participants in the younger group. The results were compared between the total group and both the older adult and child groups. The older group’s mean values were higher than the total group’s mean for the components of Wheelchair/Stroller, Handrails, Barrier free, Distinctive colors, and Stairs. The children’s group mean
values were higher than the total group’s mean for the components of Not crowd, Privately owned, Wide path/Walk, and Security guard (see below Table 4.4).

The Wilcoxon – nonparametric statistic was used to identify differences in the mean responses between older adults and children groups. For 5 of 9 components of Safety/Security, this assessment rejected the null hypothesis that says there is no significant difference between the mean responses of the two groups. The five components with a significant difference were Privately owned, Barrier free, Distinctive colors, Stairs, and Security guard (labeled in Table 4.4 as # 3, 6, 7, 8, and 9). In other words, 5 of 9 components produced significant differences between older adults and children groups’ responses (see below Figure 4.5).

Of the 5, the differences for three components (# 3, 6, and 9) were highly significantly different. In contrast, there were no significant differences for four components (Now crowd, Wheelchair/Stroller, Handrails, and Wide path/Walk), which were strongly rated by both groups indicating that they are important issues for both groups.
Table 4. The Result of Mean and Stat Comparison of Components of Safety/Security

<table>
<thead>
<tr>
<th>Component</th>
<th>Total mean</th>
<th>Stat Comparison</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Older adults</td>
<td>Children</td>
<td>P-value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety/Security (SS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Not crowded</td>
<td>3.66</td>
<td>3.57¹ (1.03²)</td>
<td>3.76 (0.93)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>2 Wheelchair/Stroller</td>
<td>3.32</td>
<td>3.49 (1.33)</td>
<td>3.13 (1.32)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>3 Privately owned</td>
<td>2.26</td>
<td>1.74 (1.04)</td>
<td>2.83 (1.19)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>4 Handrails</td>
<td>3.71</td>
<td>3.73 (1.27)</td>
<td>3.68 (0.95)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>5 Wide path/Walk</td>
<td>3.99</td>
<td>3.87 (1.11)</td>
<td>4.12 (0.77)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>6 Barrier free</td>
<td>3.59</td>
<td>3.84 (1.20)</td>
<td>3.32 (1.03)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>7 Distinctive colors (used mark locations)</td>
<td>3.23</td>
<td>3.41 (1.13)</td>
<td>3.03 (1.07)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>8 Stairs (handrails, no high-steps)</td>
<td>2.52</td>
<td>2.87 (1.65)</td>
<td>2.13 (0.99)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>9 Security guard</td>
<td>3.61</td>
<td>3.43 (1.23)</td>
<td>3.81 (1.23)</td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

¹ Average Value ² Standard Deviation

** P < .01 highly significant * p < .05 significant NS: not significant

Figure 4. The Result of the Two Groups' Mean of Each Component about Safety and Significant Difference
4.5.2.2 Rating Sense of Belonging Components Comparisons between Older Adults and Children

_Sense of Belonging_ had ten components rated by the participants for level of importance (see Appendix A-3); the mean responses for each of the ten components were calculated for all participants (total group), participants in the older group and participants in the younger group. The results were compared between the total group and both the older adult and child groups.

When each component’s total mean was compared to the each age group’s mean for that component, the older group put higher importance in _Natural, General lighting, _and _Plants/Trees;_ the children showed higher interest in _Designed Space, Colorful furniture, Open space, Music, Cozy feeling, Beautiful/Attractive, _and _Peace/Quiet_ (see Table 4.5).

Using the Wilcoxon test, the mean of each age group’s response was significantly different for 8 of 10 Sense of Belonging components. The eight components with significant differences were _Natural, Designed space, Colorful furniture, Open space, Music, Cozy feeling, General lighting, _and _Plants/Trees_ (see Figure 4.6). The only two components that the two groups rated similarly were that of _Beautiful/Attractive_ and _Peace/Quiet_ both of which were rated high or as being important.
Table 4.5 The Result of Mean and Stat Comparison of Components of Sense of Belonging

<table>
<thead>
<tr>
<th>Sense of Belonging (SB)</th>
<th>Component</th>
<th>Total mean</th>
<th>Stat Comparison</th>
<th>Older adults</th>
<th>Children</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Natural</td>
<td>3.60</td>
<td>4.07¹ (0.99²)</td>
<td>3.08 (1.11)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Designed space</td>
<td>3.73</td>
<td>3.52 (1.08)</td>
<td>3.96 (1.05)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Colorful furniture</td>
<td>3.39</td>
<td>3.04 (1.01)</td>
<td>3.79 (1.19)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Open space</td>
<td>4.05</td>
<td>3.88 (0.95)</td>
<td>4.24 (0.75)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Music</td>
<td>3.48</td>
<td>3.22 (1.04)</td>
<td>3.76 (0.96)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Cozy feeling</td>
<td>3.96</td>
<td>3.59 (1.03)</td>
<td>4.36 (0.73)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Beautiful/Attractive</td>
<td>4.34</td>
<td>4.21 (0.80)</td>
<td>4.48 (0.58)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 Peace/quiet</td>
<td>4.10</td>
<td>4.07 (0.86)</td>
<td>4.12 (0.87)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 General lighting</td>
<td>3.78</td>
<td>4.07 (0.86)</td>
<td>3.47 (1.04)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 Plants/Trees</td>
<td>3.69</td>
<td>4.13 (0.89)</td>
<td>3.20 (1.15)</td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

¹ Average Value ² Standard Deviation  ** P < .01 highly significant  * p < .05 significant  NS: not significant

Figure 4.6 The Result of the Two Groups’ Mean of Each Component about Sense of Belonging and Significant Difference
4.5.2.3 Rating Multiple Activities Components Comparisons between Older Adults and Children

*Multiple Activities* affordance consisted of ten components. When the mean responses between the total group and two age groups were compared, the older group rated the following components higher than the total group mean: the components of *Watching, Gardening, Meeting place, Café,* and *Reading books.* The children group’s means that were higher than the total group means for the components of *Sports/Games, Talking, Using internet, Stores/shopping,* and *Food/Eating* (see Table 4.6).

Using the Wilcoxon test, the mean of each age group’s response was significantly different for 6 of 10 *Multiple Activities.* The six components with significant differences were the components of *Sports/Games, Gardening, Using internet, Stores/Shopping, Meeting place,* and *Reading books.* In order words, 6 of 10 components produced responses with significant differences between older adults and children groups (see Figure 4.7). These results indicate that the two age groups rated six components (labeled in Table 4.6 as # 2, 3, 5, 6, 8, and 10) differently. The four components that the two groups rated similarly were that of *Watching, Talking, Food/Eating,* and *Café* each of which were rated high or as being important.
Table 4.6 The Result of Mean and Stat Comparison of Components of Multiple Activities

<table>
<thead>
<tr>
<th>Component</th>
<th>Total Mean</th>
<th>Stat Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Older Adults</td>
<td>Children</td>
</tr>
<tr>
<td><strong>Multiple Activities (MA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Watching</td>
<td>3.41</td>
<td>3.51¹ (1.02²)</td>
</tr>
<tr>
<td>2 Sports/Games</td>
<td>3.50</td>
<td>3.24 (1.10)</td>
</tr>
<tr>
<td>3 Gardening</td>
<td>2.67</td>
<td>2.79 (1.25)</td>
</tr>
<tr>
<td>4 Talking</td>
<td>3.99</td>
<td>3.93 (1.03)</td>
</tr>
<tr>
<td>5 Using internet</td>
<td>3.29</td>
<td>2.56 (1.12)</td>
</tr>
<tr>
<td>6 Stores/Shopping</td>
<td>3.03</td>
<td>2.85 (1.10)</td>
</tr>
<tr>
<td>7 Food/Eating</td>
<td>3.90</td>
<td>3.85 (1.04)</td>
</tr>
<tr>
<td>8 Meeting place</td>
<td>3.53</td>
<td>3.79 (1.00)</td>
</tr>
<tr>
<td>9 Café</td>
<td>3.71</td>
<td>3.77 (0.96)</td>
</tr>
<tr>
<td>10 Reading books</td>
<td>3.45</td>
<td>3.63 (1.08)</td>
</tr>
</tbody>
</table>

** P < .01 highly significant ¹ Average Value ² Standard Deviation  * p < .05 significant NS: not significant

Figure 4.7 The Result of the Two Groups’ Mean of Each Component about Multiple Activities and Significant Difference
4.5.2.4 Rating Differing Physical Abilities Components Comparisons between Older Adults and Children

*Differing Physical Abilities* had ten components rated by the participants for level of importance (see Appendix A-3); the mean responses for each of the ten components were calculated for all participants (total group), participants in the older group and participants in the younger group. The results were compared between the total group and both the older adult and child groups. When each component’s total mean was compared to the each age group’s mean for that component, the older group put higher importance on *Playing, Sitting/Resting, Tables, Different ages, Child-centered interior, Signage-good contrast,* and *Signage-large font size*; the children rated *Adult-centered interior,* and *Elevator* higher (see Table 4.7).

For 4 of 9 components of *Differing Physical Abilities* the null hypothesis, that there is no difference between age groups, was rejected using the Wilcoxon test. The four components (labeled in Table 4.7 as # 3, 4, 8, and 9) with a significant difference between age groups were the components of *Tables, Different ages, Signage-good contrast,* and *Signage-large font size* (see Figure 4.8). The two age groups rated five components at about a similar level of importance - *Playing, Sitting/Resting, Child-centered interior, Adult-centered interior,* and *Elevator.*
Table 4: The Result of Mean and Stat Comparison of Components of Differing Physical Abilities

<table>
<thead>
<tr>
<th>Component</th>
<th>Total Mean</th>
<th>Stat Comparison</th>
<th>Older Adults</th>
<th>Children</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Playing</td>
<td>3.87</td>
<td>3.96¹ (0.94²)</td>
<td>3.77 (1.07)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>2 Sitting/Resting</td>
<td>4.19</td>
<td>4.23 (0.88)</td>
<td>4.15 (0.78)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>3 Tables</td>
<td>3.70</td>
<td>3.90 (0.92)</td>
<td>3.48 (1.06)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>4 Different ages</td>
<td>3.54</td>
<td>3.83 (1.06)</td>
<td>3.23 (1.18)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>5 Child-centered interior</td>
<td>3.25</td>
<td>3.70 (0.99)</td>
<td>2.76 (1.13)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>6 Adult-centered interior</td>
<td>3.34</td>
<td>3.21 (1.04)</td>
<td>3.48 (1.06)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>7 Elevator</td>
<td>4.22</td>
<td>4.11 (1.14)</td>
<td>4.33 (0.92)</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>8 Signage-good contrast</td>
<td>3.48</td>
<td>3.93 (1.05)</td>
<td>3.00 (1.19)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>9 Signage–large font size</td>
<td>3.47</td>
<td>3.91 (1.06)</td>
<td>2.99 (1.35)</td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

¹ Average Value ² Standard Deviation

** P < .01 highly significant  * p < .05 significant  NS: not significant

Figure 4: The Result of the Two Groups’ Mean of Each Component about Differing Physical Abilities and Significant Difference
4.5.2.5 Rating Intergenerational Engagement Components Comparisons between Older Adults and Children

Intergenerational Engagement had six components rated by the participants for level of importance (see Appendix); the mean responses for each of the ten components were calculated for all participants (total group), participants in the older group and participants in the younger group. The results were compared between the total group and both the older adult and child groups. When the mean responses between older adults and children were compared, the older adult group rated the following components higher than the total group mean: the components of Inviting/Familiar, Engaging, Vibrant/Festive, and Programs for two people. The children group’ means that were higher than the total group mean of each component were the components of Protective, and Supports having fun (see below Table 4.8).

Using the Wilcoxon test, 3 of 6 components of Intergenerational Engagement rejected the null hypothesis that there is no difference between the mean responses of the two groups. The three components (# 1, 5, and 6) with a significant difference were the components of Inviting/Familiar, Vibrant/Festive, and Programs for two people (see Figure 4.9).

Both groups only rated three components, Protective, Supporting for fun and Engaging, at about a similar importance.
### Table 4.8 The Result of Mean and Stat Comparison of Components of Intergenerational Engagement

<table>
<thead>
<tr>
<th>Component</th>
<th>Total Mean</th>
<th>Stat Comparison</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Older Adults</td>
<td>Children</td>
</tr>
<tr>
<td>Intergenerational Engagement (IE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Inviting/Familiar</td>
<td>4.08</td>
<td>4.21¹ (0.87²)</td>
<td>3.95 (0.87)</td>
</tr>
<tr>
<td>2 Protective</td>
<td>3.96</td>
<td>3.95 (1.10)</td>
<td>3.96 (1.06)</td>
</tr>
<tr>
<td>3 Supports having fun</td>
<td>4.43</td>
<td>4.34 (0.83)</td>
<td>4.53 (0.81)</td>
</tr>
<tr>
<td>4 Engaging</td>
<td>4.01</td>
<td>4.05 (0.94)</td>
<td>3.96 (1.14)</td>
</tr>
<tr>
<td>5 Vibrant/Festive</td>
<td>3.49</td>
<td>3.73 (1.05)</td>
<td>3.23 (1.21)</td>
</tr>
<tr>
<td>6 Programs for two people</td>
<td>3.20</td>
<td>3.48 (1.17)</td>
<td>2.91 (1.04)</td>
</tr>
</tbody>
</table>

¹ Average Value
² Standard Deviation

** P < .01 highly significant  
* p < .05 significant  
NS: not significant

---

**Figure 4.9** The Result of the Two Groups’ Mean of Each Component about Intergenerational Engagement and Significant Difference
4.5.3 Identification of Preferred Public Places

When participants were asked to provide the specific name and location of a favorite public space, the response data was open ended. After the data was coded, the responses were sorted and grouped with like settings. This grouping produced 11 setting types.

4.5.3.1 Indoor Public Space Setting Types

The 11 indoor public space setting types, where both groups would enjoy visiting with his/her intergenerational friends, are presented in Table 4.9. The types of indoor public space setting types were the Museum, Mall/Shopping Center, Restaurant/Café, Public/Private Center, Bookstore, Park, Library, Community Center, Church, Amusement Park, and Movie Theater.

Table 4.9 The Result of Several Indoor Public Space Setting Types Where the Two Groups would Enjoy Being Together

<table>
<thead>
<tr>
<th>List of Indoor Public Space</th>
<th>Type</th>
<th>Specific Place Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum</td>
<td>7</td>
<td>Marble Museum in Raleigh, Children’s Museum in FLA, NC Museum of Art, NC Museum of Natural Sciences, NC Museum of History, NC Aquarium, Smithsonian Museum in Wash. DC</td>
</tr>
<tr>
<td>Mall/Shopping Center</td>
<td>6</td>
<td>Crabtree Valley Mall, Triangle Town Center, Cary Town Center, South Point Mall, Stonewood Shopping Center, North Hills</td>
</tr>
<tr>
<td>Restaurant/Café</td>
<td>5</td>
<td>Twisted Fork, Panera Bread, Neomode Café, Caribou Coffee, Starbucks Coffee</td>
</tr>
<tr>
<td>Public/Private Center</td>
<td>7</td>
<td>Trump Tower in NY, Memorial Auditorium, Progress Energy Center, Meymandi Concert Hall, Durham Performing Arts Center, RBC Center, McKimmon Center</td>
</tr>
<tr>
<td>Bookstore</td>
<td>2</td>
<td>Borders, Barnes and Noble</td>
</tr>
<tr>
<td>Park</td>
<td>1</td>
<td>Pullen Park, Sertoma Park</td>
</tr>
<tr>
<td>Library</td>
<td>1</td>
<td>Wake County Public Library</td>
</tr>
<tr>
<td>Church</td>
<td>1</td>
<td>Church</td>
</tr>
<tr>
<td>Movie Theater</td>
<td>1</td>
<td>Movie theater</td>
</tr>
<tr>
<td>Community Center</td>
<td>1</td>
<td>Community center</td>
</tr>
<tr>
<td>Amusement Park</td>
<td>1</td>
<td>Lotte World</td>
</tr>
</tbody>
</table>
4.5.3.2 Older Adult Group - Indoor Public Space Setting Types

Of 82 older adults who participated in the survey, 73 older adults completed this section. A summary of the specific indoor public space types preferred by older adults based upon the places listed in the survey is presented in Table 4.10, including the preference percentages for each indoor public space.

For older adults, ten personal space types were defined: with Museum being the most preferred (36%) type of place they liked to visit with friends. Mall/Shopping Center was second with 16%, followed by Restaurant with 13%. In the order of value, the remaining indoor public space setting types included: public/private center with 11%, community center with 3%, library/church/park/bookstore with 3% each and 9 people did not answer. Museum and shopping malls were the primary types listed; the percentage older adults listing these two indoor public spaces as a preferred location was over 50 percent (52%).

<table>
<thead>
<tr>
<th>Primary (&gt; 15%)</th>
<th>Older Adults</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum</td>
<td>29 (36%)</td>
<td></td>
</tr>
<tr>
<td>Mall/Shopping Ctr.</td>
<td>13 (16%)</td>
<td></td>
</tr>
<tr>
<td>Secondary (10-15%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restaurant/Café</td>
<td>10 (13%)</td>
<td></td>
</tr>
<tr>
<td>Public/Private Center</td>
<td>9 (11%)</td>
<td></td>
</tr>
<tr>
<td>Tertiary (&lt; 10%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Center</td>
<td>3 (4%)</td>
<td></td>
</tr>
<tr>
<td>Library/Bookstore</td>
<td>3 (3%)</td>
<td></td>
</tr>
<tr>
<td>Church</td>
<td>3 (3%)</td>
<td></td>
</tr>
<tr>
<td>Park</td>
<td>3 (3%)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>9 (11%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>82 (100%)</td>
<td></td>
</tr>
</tbody>
</table>
4.5.3.3 Children Group - Indoor Public Space Setting Types

Of 75 children who participated in the survey, 60 children completed this section. A summary of the specific indoor public space types preferred by children based upon the places listed in the survey is presented in Table 4.11, including the preference percentages for each indoor public space.

For children, seven personal space types were defined: with Museum being the most preferred (25%) type of place they liked to visit with friends. Mall/Shopping Center was second with 18%, followed by Library with 11%. In the order of value, the remaining indoor public space setting types included: restaurant/café with 11%; church with 8%, movie theater with 6% and amusement park with 2% each and 13 children did not answer. Museum and shopping malls were the primary types listed; the percentage children listing these two indoor public spaces as a preferred location was almost 50 percent (43%).

<table>
<thead>
<tr>
<th>Children</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary (&gt; 15%)</td>
<td></td>
</tr>
<tr>
<td>Museum</td>
<td>18 (25%)</td>
</tr>
<tr>
<td>Mall/Shopping Ctr.</td>
<td>14 (18%)</td>
</tr>
<tr>
<td>Secondary (10-15%)</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Restaurant/Café</td>
<td>8 (11%)</td>
</tr>
<tr>
<td>Tertiary (&lt; 10%)</td>
<td></td>
</tr>
<tr>
<td>Church</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Movie Theater</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>Amusement Park</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>None</td>
<td>13 (17%)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100%)</td>
</tr>
</tbody>
</table>

4.5.4 Text Response Data - Older Adult and Children Groups

Both groups’ participants expressed their reasons for selecting specific indoor public spaces by responding to open-ended questions. Specific categories were not defined prior to the start of the
coding procedures. The open-ended responses were analyzed in order to be categorized into two levels of information: category label (perceived space characteristic) and the descriptors that would define them (Gabr, 1993). There were many factors associated with how a physical environment influences a person’s decision about the appropriateness of a space to meet his/her social interaction needs. These factors were related to the way a person perceives or views the physical space.

4.5.4.1 Text Response Data – Coding Process

To reiterate the coding process, the handwritten responses of each participant were read and transcribed into a typed form. Each text response was then identified as an interpretation of one or a number of thoughts or concepts and translated into single words or short-word phrases. The resulting coding and classification is summarized below. Three clusters were created for the three perceptional modes (perceptible, functional, and affective) as described previously in the conceptual framework. The letter R (representing text response) accompanied with a number code was assigned within the cluster (Byrne, 1996). Numbers were assigned to create meaningful groupings of like descriptions provided by the participants – the number itself was meaningless and only represented an additional like grouping. This process continued until all the responses were reviewed and assigned to a group; this assignment and grouping process produced individual R-factors numbered from 1 to 67. Even though the categorized numbers were a little large, “the items [were] grouped in conceptually linked topics, and the list [was] highly comprehensive (Kane, Kane, & Eells, 2000).” The individual descriptor (R-factors) were grouped into one of three perception modes: perceptible, functional, and affective (Olver & Hornsby, 1966; Sanoff, 1991).

4.5.4.2 Classification of Coded Text Response Data into Three Perception Modes

Having assigned the contents of text responses of participants to individual R-factor numbers, R-factor numbers were classified into one of the three perception modes (or categories):

- **Perceptible Mode:** attributes that are measurable and represent human thought or understanding
- **Functional Mode:** features which encourage specific action or use
• **Affective Mode**: qualities reflective of meaning or feeling

1. Perceptible Mode: Space Factors, Features, and Quality

   The perceptible mode is physical qualities of the environment. These factors can be described in physical terms, counted, and identified by everyone as being the same; they are factual or often seen as archetypes (Brower, 1988). Of the 157 participants who completed the survey, 117 participants completed the open-ended questions. The coded data, individual R-factors, from these participants associated with the perceptible mode were:

   • **R1 – Accessible**: close to house, not too isolated, nearby or close, easy place to meet
   • **R2 – Open Space**: lots of space, plenty of space, open, spacious, enough space
   • **R3 – Diversity**: diverse areas, lots of places to be, different places
   • **R4 – Water**: waterfall wall, water feature
   • **R5 – Plants/Trees**: plants, flowers
   • **R6 – View**: visual aspects
   • **R7 – Wheelchair/Stroller Present**: wheelchair, wheelchair accessible
   • **R8 – Nature**: natural, environmentally friendly
   • **R9 – People Present**: lots of people, group, friends, family, people around, friendly people
   • **R10 – Manicured**: clean, well kept
   • **R11 – Different Ages Present**: Older adults around, various ages, kids also, children around
   • **R12 – Not Crowded**: less populated
   • **R13 – Security Guard**: staff, people to help, monitored space
   • **R14 - Railings**: roped-off area, can’t get hurt or fall, barriers
   • **R15 – Crowded**: many people around, crowded streets
   • **R16 – Designed Space**: modern, professional design
   • **R17 – Restrooms**: clean restrooms
   • **R18 – Privately Owned**: private use, home environment, private dwelling
   • **R29 – General Lighting**: adequate lighting, bright
   • **R20 – Colorful Furniture**: colorful environment, variety of colorful furniture
• R21 – *Climate-Controlled*: having heating and cooling
• R22 – *Distinctive Colors*: distinctive marked location
• R23 – *Signage-large Contrast*: easy to see
• R24 – *Signage-large Font Size*: easy to see, large font size books

2. Functional Mode: Space Features/Elements or Activities

The functional mode is associated with the use of a space. How a person can interact with or within a particular space is significant. This mode is associated with the ability of the environment to allow or encourage a given behavior and action required to complete a desired task or purpose. These categories include a physical feature or element that supports a particular activity. The coded data, individual R-factors, associated with the functional mode were:

• R25 – *Food/Eating*: many menu, beverage, many restaurants, eating a meal
• R26 – *Stores/Shopping*: places to shop a, stores, gift shops
• R27 – *Playing*: play place, play tools, play equipment, playground
• R28 – *Activities*: experience, multiple activities, multiple activities or uses,
  lots of interesting things to do
• R29 – *Seat/Resting*: rest-in, sitting, place to sit, sit down, chairs, benches
• R30 – *Talking*: conversations, share, shared experiences, shared interest,
  common interests
• R31 – *Watching*: viewing, observation, looking at people, movie, watching activities,
  exhibitions
• R32 – *Stairs*: steps, stairs, escalator, ramp
• R33 – *Learn*: imagine, interests, discovery, accomplishment, find information, studying,
  homework
• R34 – *Handrails*: railings, handrails
• R35 – *Wide Path/Walk*: wide isles, large isles, space to pass, pass way, not narrow, room to move
• R36 – **Barrier Free**: no obstructions, no barriers, no steps, easy to get to, no stairs, easy escape

• R37 – **Using Internet**: web searching

• R38 – **Parking Area**: ease of parking, convenient parking

• R39 – **Café**: coffee, beverages

• R40 – **Meeting Place**: group meeting place, being together, place for people to gather

• R41 – **Exploring**: watching exhibitions, imaginations

• R42 – **Walking/Moving**: walkers, movement, go

• R43 – **Gardening**: doing gardening

• R44 – **Child-Centered Interior**: child-centered space, purpose-built for children, children, kids

• R45 – **Tables**: for studying, for reading, for talking

• R46 – **Adult-Centered Interior**: older adults, adults, parents

• R47 – **Sports/Games**: sports activities, structured activities, physical activity, recreation, chess, exercise, playing ball, checkers, cards, games

• R48 – **Music**: Listen to music, harpist, concerts, street entertaining, public event

• R49 – **Programs for Two People**: common interests, mutual experiences, special interest

• R50 – **Hanging-out**: lingering, standing around, waiting

• R51 – **Documenting**: taking photos, sketching

• R52 – **Reading Books**: reading books, magazines, newspapers

• R53 – **Elevator**: taking an elevator

3. Affective Mode: Space Qualities

The affective mode is indicative of the symbolic or meaning associated with a specific physical environment and reflects the value it imparts. How a person feels, rather than what he/she sees or experiences, is important. The coded data, individual R-factors, associated with the affective mode were:

• R54 – **Privacy/Personal**: individual space, personal space, alone, private
• R55 – **Peace**: easy feeling, serene, quiet, psychological comfort
• R56 – **Quiet**: not very noisy, quiet
• R57 – **Restful**: help relaxing, calming, unhurried, easy, leisure, soothing, relaxing atmosphere
• R58 – **Engaging**: interesting space, exciting space, cheerful, over stimulating, stimulating, entertaining, adventure place, different, amazing, challenging, complex
• R59 – **Vibrant/Festive**: atmosphere place, community run, busy & active, hustle & bustle, party atmosphere, vibrant community life
• R60 – **Contemplative**: meditative, reflective, introspective, remember other times
• R61 – **Beautiful/Attractive**: beauty, handsome, pretty, lovely, aesthetic, appealing, wonderful, adorable, beautiful surroundings
• R62 – **Protective**: safe, secure, not dangerous, trouble-free, cannot be harmed
• R63 – **Inviting/Familiar**: warm earthy feeling, warm feeling, pleasant, becoming, good, nice, like, very cool, pleasure, charm, welcoming, it charms me to, sense of belonging, home of favorite team
• R64 – **Having Fun**: enjoy, playful, pleasure
• R65 – **Cozy**: intimate, close
• R66 – **Not Expensive**: free, reasonable
• R67 – **Comfortable**: comfortable, comfortable chairs, comfy

### 4.5.5 Vision of a Future Indoor Public Space Experience

#### 4.5.5.1 Vision of a Future Indoor Public Space Experience of Older Adult’s Group

The last question in this survey asked all participants “*What are three words that describe your vision of a future indoor public space experience?*” The total number of unique words older adults used when answering was 81.

A complete list of the unique words and associated frequency of used is presented in Table 4.12. Among the 81 unique words, the most frequently used word by older adults was *safety*, the second was *comfortable*, the third was *quiet* and the fourth was *accessible*. In decreasing order of its
frequency, the remaining words included: interesting, open, seating, pleasant, attractive, clean, inviting, lighting, etc.

Table 4. 12 Total Words of Expectations that Older Adults Answered about a Vision of a Future Indoor Public Space Experience

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Word</th>
<th>Frequency</th>
<th>Ranking</th>
<th>Word</th>
<th>Frequency</th>
<th>Other Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>safety</td>
<td>24</td>
<td>13</td>
<td>food</td>
<td>5</td>
<td>Good parking area, vibrant, warm, entertaining space, lively, learning, green (environmentally-friendly)</td>
</tr>
<tr>
<td>2</td>
<td>comfortable</td>
<td>20</td>
<td>15</td>
<td>security</td>
<td>4</td>
<td>Enclosed, familiarity, soothing, walkable, area to congregate, groupings, proximity, flexibility, nearby, happy, enjoy, potential for quiet area, restrooms, various, amusement, old people, stimulating, alive, culture, professional design, educational, air, healthcare, waterfall, landscaping</td>
</tr>
<tr>
<td>3</td>
<td>quiet</td>
<td>13</td>
<td></td>
<td>welcoming</td>
<td>4</td>
<td>Engaging, activities, diverse</td>
</tr>
<tr>
<td>4</td>
<td>accessible</td>
<td>11</td>
<td></td>
<td>fun</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>interesting</td>
<td>8</td>
<td></td>
<td>peaceful</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>8</td>
<td></td>
<td>spacious</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>seating</td>
<td>7</td>
<td></td>
<td>friendly</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pleasant</td>
<td>7</td>
<td></td>
<td>cozy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>attractive</td>
<td>7</td>
<td></td>
<td>activities</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>inviting</td>
<td>6</td>
<td></td>
<td>diverse</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lighting</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Participants were asked to list three unique words that imagining a future indoor public space experience. The frequency indicates how many participants responded with the same word. Unique words were rated based on the number of people who answered with the same words.

4.5.5.2 Vision of a Future Indoor Public Space Experience of Children’s Group

Children also answered total words in the order of frequency of the words (see Table 4.13). The result shows that among 49 unique words, the most frequently used word by children to describe their vision of a future indoor public space experience was fun, the second was comfortable the
third was *interesting* and the fourth was *freedom*. In decreasing order of its frequency, the remaining words included: *good, nice, relaxing, accessible, inexpensive, free, lively, big, cozy, etc.*

**Table 4. 13 Total Words of Expectations that Children Answered about a Vision of a Future Indoor Public Space Experience**

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Word</th>
<th>Frequency</th>
<th>Ranking</th>
<th>Word</th>
<th>Frequency</th>
<th>Other Words</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>fun</td>
<td>22</td>
<td>13</td>
<td>peaceful</td>
<td>5</td>
<td>Spacious, beautiful, connection, colorful,</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>comfortable</td>
<td>17</td>
<td></td>
<td>attractive</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>interesting</td>
<td>9</td>
<td></td>
<td>professional design</td>
<td>5</td>
<td>Seating, potential for quiet area, warm</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>freedom</td>
<td>8</td>
<td>16</td>
<td>safety</td>
<td>4</td>
<td>Restful, functional, open, food, unprogrammed,</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>good, nice</td>
<td>8</td>
<td></td>
<td>quiet</td>
<td>4</td>
<td>inclusive, diverse, entertaining space, enchanting, cool, engaging, intellectual, challenging, inspiring, studying, interactive, lighting, wise, natural</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>relaxing</td>
<td>7</td>
<td></td>
<td>happy</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>accessible</td>
<td>6</td>
<td></td>
<td>various</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>inexpensive</td>
<td>6</td>
<td></td>
<td>activities</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>free</td>
<td>6</td>
<td></td>
<td>clean</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>lively</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>big</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cozy</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*note: participants were asked to list three unique words that imaging a future indoor public space experience. The frequency indicates how many participants answered same words. Unique words were rated based on the number of people who answered same words.*

**4.6 Discussion**

**4.6.1 Demographic Comparison**

Reflective of current trends in our society, the survey’s the demographic data by gender shows that for more females participated in the survey (see Figure 4.10). Typically, the life expectancy of women is longer than that of men (Puglisi & Rickards, 1989). Thus a larger segment of the older
population was women. Also more girls participate in after school programs than boys and more girls were willing to participate in the survey. For the two groups, these ethnicities, Caucasian population and Asian descent, composed 96 and 100 % of older adult participants and children participants respectively. The percentages of Caucasian population are 79 and 72 % for older adults and children respectively (see Figure 4.11).

Moreover, a review of the results of the tests for the Chi-Square independence analysis, conducted to determine the homogeneity of the two age groups, established that both older adult and children samples to be considered statistically similar. The Chi-Square test by ethnicity, proved the homogeneity between the responses of Asian Descent and Caucasian population except Latino and Other (see Section 4.5.1.3 for details).
4.6.2 Comparison of Rating Important Components of Each Five Affordance

The main focus of this section of the survey was to rate the importance of space features or characteristics for indoor public spaces that well supported spending time with intergenerational friends. For the Safety/Security affordance, the components that the two age groups similarly rated (average ratings > 3) were: Not crowded Wheelchair/Stroller, Handrails, and Wide path/Walk (see Figure 4.12). While the Barrier free and Distinctive colors components were important for both groups, they were more important to the older adults than to children. On the other hand the Security guard component was important for both groups but was more important to the children. This indicates that the two age groups seem to have different thoughts on safety. While both groups highlight the importance of a space that practically assists physical weakness, the older adults placed more importance on this than did the children.

![Figure 4.12 Comparison of Rating Important Components of Safety/Security Affordance](image)

While all components were rated as important (average ratings > 3) by the both groups, the two age groups rated the strength of the importance differently for the Sense of Belonging (see Figure 4.13)
affordance. Among the ten components, only two components were similarly rated by the older adults and the children which were Beautiful/Attractive and Peace/Quiet. Children group’s mean values for seven of the ten components were higher than those of the older adult group; thus the Sense of Belonging affordance was more important (perhaps conveying a sense of belonging) to the children than the older adults. The components such as Designed space and Colorful furniture seem to reflect children’s tendency to place more importance on attractive decorations and interior designs. The children also seem to consider Open space factor necessary even though they are in an indoor space. Additionally they are likely to seek an indoor place where they feel an atmosphere of psychologically comfortable and calm on the other hand. Older adults, based upon their higher ratings in the components of Natural and Plants/Trees, seem to like a nature-friendly space in which they can feel connected to or be at one with nature. Older adults also rated General lighting more highly than children; this result may come from age-related eye problems such as yellowing of the eyes which reduces the amount of light passing through the eye.

Figure 4. 13 Comparison of Rating Important Components of Sense of Belonging Affordance
Four components in the *Multiple Activities* affordance (see Figure 4.14), *Watching*, *Talking*, *Food/Eating*, and *Café*, were similarly important (average ratings > 3) factors for the both groups. The older adult group’s mean ratings on *Meeting place*, and *Reading books* were higher than those of children group. While *Meeting place*, *Café*, and *Reading books* were important for both groups, they were more important to the older adults than to the children. On the other hand the *Sports/Games* and the *Using Internet* were important for both groups but was more important to the children. Only the children rated the *Store/Shopping* component more than the older adults. While the two age groups highlight the importance of a space where they experience a variety of activities, the children place more dynamic activities on this than did the older adults.

For the *Differing Physical Abilities* affordance, the components that the two age groups similarly rated (average ratings >3) by both groups were: *Playing*, *Sitting/Resting*, *Adult-centered interior*, and *Elevator* (see Figure 4.15). Only for the *Child-centered interior* did the older adults rate a component important while the children rated it <3 and therefore less necessary. While *Tables*, *Different ages*, *Signage-good contrast*, and *Signage-large font size* were important for both groups,
they were significantly more important to the older adults than to children. This indicates that the two age groups consider space components that can support physical differences important.

For the Intergenerational Engagement affordance (Figure 4.16), three components were similarly rated (average ratings >3) by the older adults and the children, which were Protective, Supporting, having fun, and Engaging. While Inviting/Familiar and Vibrant/Festive were important for both groups, they were more important to the older adults than to children. Only for the Programs for two people did the older adults rate a component important while the children rated it <3 and therefore less necessary. This indicates that the two groups seem to want to have a variety of experiences in the same indoor public spaces.
The result of the importance of each component (average ratings >3) by two age groups according to the five conditional affordances is presented in Figure 4.17. The two age groups had the same ratings of importance for 8 of 9 components in Safety/Security, all ten components in Sense of Belonging, 8 of 10 components in Multiple Activities, 9 of 10 components in Differing Physical Abilities, and 5 of 6 components in Intergenerational Engagement. This indicates that intergenerational groups preferred an indoor public space that exhibits all of the five conditional affordances. The two age groups rated 18 components among the total 44 components similarly. (These 18 components were: Not crowded; Wheelchair/Stroller; Handrails; Wide path/Walk; Beautiful/Attractive; Peace/ Quiet; Watching; Talking; Food/Eating; Café; Playing; Sitting/Resting; Child-centered interior; Adult-centered interior; Elevator; Protective; Supports having fun; and Engaging).
4.6.3 Indoor Public Space Setting Types

The main focus of this section was to provide specific name and description of favorite public indoor spaces to visit with intergenerational friends. The result of this section was that the two age groups chose the 11 indoor public space setting types (Museum, Mall/shopping Center, Restaurant/Café, Public/Private Center, Bookstore, Park, Library, Community Center, Church, Amusement Park, and Movie Theater) and the two age groups had similar preferences about the first and the second preferred types of indoor public spaces.

The two age groups seem to equally prefer the two types of indoor public space – Museums and Malls/Shopping Center - with an intergenerational friend (see Figure 4.18). Even though the older
adults preferred more types of indoor public space than children, the two groups had similar types of the preferences in selecting indoor spaces for social exchange. As indicated in the pie chart percentages, the two primary indoor spaces, Museum and Mall/shopping Center accounted for over 50 percent what the two age groups answered. The results for this section provided a clear way to identify preferred intergenerational indoor spaces for the third method of observation.

The results of the three perception modes (perceptible, functional, and affective) for the two age groups had similar patterns in the reasons for selecting an indoor public space for social exchanges with intergenerational friends (see Figure 4.19). Pennartz and Elsinga (1990) who studied age and urban environments pointed out that older adults tend to perceive the environment through the inferential (perceptible) mode and children perceive the environment through the responsive (functional) mode. In this study, the two age groups described their preference for environments using the perception mode descriptors. While older adults described their preferred environments
equally using the affective mode and the perceptible mode descriptors, children more frequently used the affective mode descriptors of the environment than the perceptible mode (see Figure 4.19).

4.6.4.1 Space Perception: Perceptible Mode

For the perceptible mode (which can be subdivided into design, people, and natural attributes), the two age groups most frequently used the design attributes to describe their favorite space for meeting with intergenerational friends. They mentioned the people attributes second, and the natural attributes last (see Figure 4.20). While the proportion of the perceptible mode attributes are similar for both groups (see Figure 4.20), the specific factors within the three perceptible mode attributes were somewhat different for the two age groups (see below as Figure 4.21 - design attributes, 4.22 – people attributes, and 4.23 – natural attributes).
Well-designed places were more attractive to the two age groups in selecting a space for visiting with a friend (Figure 4.21). Older adults preferred the accessible factor for visiting indoor public space. They liked places that were easy to visit and near their home. This result seems to relate to older people’s preference for staying at home because of their physical fatigue and safety issues (Milan & Peters, 2003). Both groups were in agreement that the open space and the view are important features; the results indicate that people seem to look for spaces that feel spacious and have a variety of views (such as views to the outdoors).

In comparison to children’s responses of the design attributes (see Figure 4.12), older adults’ preferences for the manicured, restrooms, and general lighting factors are representative of basic design features. Children often mentioned visual design characteristics indicative of unique techniques incorporate by architect when describing their favorite places. The meaning of the designed space factor was defined by abstract images such as special, beautiful, cool, fancy, sophisticated, and great. When describing their favorite places, children more frequently identified security guard factor and climate-controlled factors than older adults. The inclusion of the security guard factor by the children has a direct relationship with the need for safety (Carmona, Heath, Oc, & Tiesdell, 2003). Even though the climate-controlled factor does not seem to be directly related to
the safe issue, the environment’s climate change is likely impact the health of both two groups (Shea, 1997). Since the well *climate-controlled* indoor environment is not restricted by the local environment’s climate changes or seasonal factors, an indirect connection between safety and *climate-controlled* attributes can be made.

![Image](image.png)

Figure 4. 21 Comparative Bar Charts by Percentage of Design Orientated Perceptible Mode Preferred by Older Adults and Children in Survey

For natural attributes in the *perceptual* mode (see Figure 4.22), older adults selected *water, plants/trees, and nature* factors with similar frequency when describing their favorite places. The only natural attribute children mentioned was water when describing their current favorite environments. According to Hartig, Mang, and Evans (1991) who studied health resource values of natural environments, experiences in natural setting have restorative outcomes for mental fatigue associated with noise, crowding, and other environmental demands (Cohen, 1980; Evans & Cohen, 1987). This result supports the concept that people in natural settings, within indoor public spaces, could experience improved quality of life.
In the *people* attributes in the *perceptual* mode (see Figure 4.23), the older adults more frequently mentioned *people present* and *different ages present* factors compared to the children. For example, older adults descriptions of their favorite place having lots of people, friendly people, people around, older adults around, and varied age were categorized as either *people present* and *different ages present* factors. When children’s descriptions of their favorite place including ‘a variety in the space’, ‘lot of places’, and ‘different places’ these comments were categorized in the *diversity factor*. Children mentioned the *diversity* factor more frequently than the older adults did. Thus the two age groups had quite different tendencies when they described *people* attributes in the *perceptual* mode. Reflecting to the construct theory of polar opposites (Kelly, 1955), one interesting finding of this result was that the two age groups picked and were similarly divided in their preference for *not crowded* and *crowded* factors. Older adults preferred the *not crowded* factor rather than the *crowded* factor and children preferred the *crowded* factor rather than the *not crowded* factor.

![Figure 4.22 Comparative Bar Charts by Percentage of Natural Oriented Perceptible Mode Preferred by Older Adults and Children in Survey](image)

In the *people* attributes in the *perceptual* mode (see Figure 4.23), the older adults more frequently mentioned *people present* and *different ages present* factors compared to the children. For example, older adults descriptions of their favorite place having lots of people, friendly people, people around, older adults around, and varied age were categorized as either *people present* and *different ages present* factors. When children’s descriptions of their favorite place including ‘a variety in the space’, ‘lot of places’, and ‘different places’ these comments were categorized in the *diversity factor*. Children mentioned the *diversity* factor more frequently than the older adults did. Thus the two age groups had quite different tendencies when they described *people* attributes in the *perceptual* mode. Reflecting to the construct theory of polar opposites (Kelly, 1955), one interesting finding of this result was that the two age groups picked and were similarly divided in their preference for *not crowded* and *crowded* factors. Older adults preferred the *not crowded* factor rather than the *crowded* factor and children preferred the *crowded* factor rather than the *not crowded* factor.

![Figure 4.22 Comparative Bar Charts by Percentage of Natural Oriented Perceptible Mode Preferred by Older Adults and Children in Survey](image)
Figure 4.23 Comparative Bar Charts by Percentage of People Oriented Perceptible Mode Preferred by Older Adults and Children in Survey

4.6.4.2 Space Perception: Functional Mode

For the rankings of the *functional* attribute clusters of the two age groups (Figure 4.24) (which can be subdivided into *active recreation*, *passive recreation*, *social*, and *safety issue*), the older adults describing their current favorite indoor spaces using *social* attributes (39%) most frequently, *passive recreation* attributes (33%) second, *active recreation* attributes (21%) third, and *safe issue* attributes (7%) last. The children, on the other hand, described their preference in the functional attributes in following order: *passive recreation* attribute (38%), *social* attribute (32%), and *active recreation* attribute (30%). The older adults selected the *social* attribute rather than other attributes while the children surprisingly selected the *passive recreation* attributes over other attributes.
In the *active recreation* attribute (Figure 4.25), the children (20%) more frequently mentioned the *activities* factor than older adults (14%), but older adults and children seem to place equal value on the rest of the *active recreation* factors with between 1% and 5%. Thus, the ability to support active recreations for children is an important issue when designing the contents for the indoor public spaces.
The two age groups showed strong interest in the passive recreation attribute in the functional mode, especially seat/resting, talking, and watching factors (see Figure 4.26). The older adults more frequently comments on seat/resting and talking factors when describing their favorite places compared to the children. However, the children more frequently mentioned an interest in watching than did the older adults. The other factors mentioned by the children when describing their favorite places were hanging out and reading books. The top three passive recreation attributes seems to match the result of a study conducted with adults who work in outdoor spaces within day-care, elementary and high school, and children’s museum settings (Stine, 1997). Similar to Stine’s findings, their results of this study indicated that regardless of the work settings people tend to value most those spaces where they could socialize (talking), relax (seat/resting), and observe (watching).
Kweon et al. (1998), who studied the relationship between the physical environment and social integration, note that the physical characteristics of public outdoor spaces can play an important role in the formation and maintenance of social ties among older adults as well as children. These characteristics are also applied to the characteristics of indoor public spaces, as presented in Figure 4.27. Three factors (food/eating, stores/shopping, and café) in the total functional perception mode were mentioned by older adults (29%) and children (25%) with similar frequency when describing their favorite place. These three factors are strongly associated with the socio-cultural public realm and factors of public spaces that support social interaction (Carmona et al., 2003). Thus, the two age groups would consider elements such as eating, resting, and talking when selecting an indoor public space. Even though children made comments associated with learning more than older adults did, the frequency comments associated with programs for two people by children was low (1%). Therefore, there does not seem to be a direct relationship between the learning and programs for two people factors.
Only older adults mentioned the *safe issue* attributes for selecting an indoor public space (see Figure 4.28). The older adults seem to consider the *parking area* highly; this factor is related to the *accessible* (13%) factor in the *perceptional* mode. It seems that older adults appreciate physical aspects where they can easily access the place they are visiting. Children, on the other hand, did not need to think of and therefore did not mention the *parking area* since they come to indoor public spaces with their guardians. Since the survey was based upon the current indoor public spaces, the children seem to be not concerned about the *safe issue* attributes when visiting their favorite places.
4.6.4.3 Space Perception: Affective Mode

The result of comments attributed to the affective mode when describing favorite places was somewhat different between the two age groups (see Figure 4.29). For older adults, the top three factors mentioned were comfortable (24%), beautiful/attractive (20%), and quiet (16%). They also described images of the protective factor (14%). The top three factors in the affective mode mentioned by children were not expensive (24%), having fun (15%), comfortable (13%) and protective (13%). The outstanding difference between older adults and children was that the older adults seemed to appreciate a psychologically comfortable environment, while children seemed to appreciate psychological happiness and low economic burden.
4.6.5 Image of a Future Indoor Public Space Experience

The unique words older adults and children provided when asked to describe their vision of a future indoor public space experience were categorized into seven space quality clusters (protective, functional, supportive, activities, energizing, good, and calming) (see Figure 4.30). The relationship between each unique word and the seven space clusters is presented in Table 4.14. Older adults most frequently described using supportive (23%) words, while children used energizing (24%) words most often. What distinguishes between the two groups is what categories they reported most frequently and therefore may be interpreted as most important in their desires for future spaces. The older adults considered supportive (23%), functional (20%), protective (17%), and calming (16%) attributes most important. The children group considered energizing (24%), supportive (23%), and calming (21%) attributes important. Contrary to the variety of unique words attributed to most of the space attributes (see Section 4.5.5.1. in Table 4.12), protective attribute had only three unique words. This clarity of description is underscored by the number of individuals, both older adults and children, who choose this as one of three words to describe their ideal space. Older adults selected the protective words in 17% of their descriptions; the most frequently used
word by older adults was ‘safety’ This result indicates that older adults consider the **protective** (17%), the **functional** (20%) that influences their physical activities and practical uses in an indoor public space, and preferred the **supportive** (23%) attributes important.

![Figure 4. 30 Comparative Pie Charts by Percentage of Seven Space Quality Clusters Preferred by Older Adults and Children in Survey](image)

Children, on the other hand, seem to be in balance the importance of three space attributes: **energetic, supportive, and calming**. As mentioned in Section 4.5.5.2 and summarized in Table 4.13 when describing their ideal space, children selected ‘fun’ as the most frequently used word and the **energetic** attribute among other space attributes. Interestingly their top priorities also included opposite characteristics: **calming** opposite **energetic**. Children seem to want to have a variety of experiences in the same indoor public spaces.
Table 4. 14 The Unique Word Related to Each Space Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Words</th>
<th>Older Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective</td>
<td>security, safety, enclosed</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>Functional</td>
<td>walk able, spacious, area to congregate,</td>
<td>40</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>groupings, proximity, accessible, good parking space, flexibility,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>nearby, functional, seating, lighting, more professional design,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>environmentally designed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supportive</td>
<td>comfortable, familiarity, inexpensive, free,</td>
<td>46</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>welcoming, open, friendly, inviting, restrooms,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>food, learning, educational, studying, warm, waterfall, colorful,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>health care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>inclusive, various, activities, diverse, amusement,</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>entertaining space, old people, interactive,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energizing</td>
<td>pleasant, interesting, joy, happy, vibrant, fun,</td>
<td>26</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>enjoy, engaging, intellectual, challenging,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>inspiring, stimulating, lively, alive, culture,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>big, good, nice, enchanting, attractive, beautiful,</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>cool, adorable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calming</td>
<td>peaceful, soothing, restful, freedom, quiet,</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>potential for quiet area, cozy, relaxing, un-programmed, landscaping,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>green, natural, clean, fresh, air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. STUDY 2: PARTICIPATORY DESIGN

In the first study, the researcher used a survey to collect opinions of older adults and children, regarding how they use indoor public spaces and why they come to specific indoor spaces and to determine the importance of each component of the five conditional affordances. However, even the explicit knowledge of what people say is not enough to understand people’s experiences (Sanders & Stappers, 2008). Since the survey focused on the participants’ description of their experiences in current indoor public spaces, the researcher used the participatory design method in a second study to document their preferences (their ‘dream’) in an ideal indoor public space for intergenerational groups.

5.1 Overview of Participatory Design

Participatory design is a method that allows various stakeholders (e.g. customers or end users) to participate in the design process. The people who take part in participatory design can convey their needs to designers or researchers by making their own solution (Sanders, 2002). Participatory design originated in Europe, during the Scandinavian workplace democracy movement and was considered to be “a set of theories, practices, and studies related to end users as full participants in activities” (Muller & Kuhn, 1993). American design researcher and consultant Dr. Elizabeth Sanders (2002) described the participatory methodology as “a belief that all people have something to contribute to the design process and that they can be both articulate and creative, when given appropriate tools with which to express themselves”.

Participatory design is normally used as the format of events to help users and other stakeholders communicate and share their ideas, goals and outcomes (Baek & Lee, 2008). Participatory design uses the collective generativity\(^5\) of stakeholders rather than the individual creativity of designers (Sanders, 1999). Researchers can find out that what problems participants want to improve during

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\(^5\) According to Elizabeth Sanders, collective generativity is defined as stakeholders’ collective ability to generate or create what they think or imagine.
workshops and discussing these issues with users and other stakeholders (Baek & Lee, 2008). In such a workshop, researchers use a generative toolkit to connect the ideas of people from different perspectives. Participants in the workshops use toolkits to visualize their thoughts in a design process; researchers then analyze the results in order to elicit the needs of participants (Sung, Shin, & Kang, 2003).

Several studies have applied the participatory design method developing new designs with children. Adapted Contextual Inquiry techniques, Technology Immersion, and Participatory Design techniques to generate new ideas, Druin et al. (1998) included participatory design, while identifying the development of new technologies for children. They recognized children as their design partners and emphasized the importance of collaboration between children and adults. Baek and Lee (2008) introduced two participatory design toolkits: Info Block and Info Tree. They used these toolkits to evaluate the usability of the Yahoo Kids (Korea) directory by building information architecture (IA). They found that children’s information architecture is different from that of adults’ in terms of depth, breadth, and clarity of contents. While developing software for children with severe illnesses, Ruland et al. (2008) also used participatory design in the development of a clinical support tool, and helped children’s cognitive and emotional developmental stage.

In this study, collage creation was used as an application of participatory design. This included recording the descriptions of the participants (children and older adults) while they explained (their motivations, desires and preferences through) their collages. The two age groups were able to easily express their thoughts by creating collages to produce prototypes that contained abundant data containing cognitive characteristics. The researcher analyzed their collages and comments to understand their preferences for indoor public spaces.

5.2 Data Collection Method

Participants were recruited from public and private groups or organizations. Examples of those organizations include the Boys and Girls Club and churches where older adults and children can participate easily. The researcher sent e-mails or directly contacted older adults and parents of
children (asking them to allow their children) to participate in the workshop activities for this study. All workshop activities were scheduled at the convenience of individuals. Children participated in the workshop activities with their parents and all activities were performed in the same place at the same time.

Workshops for both groups, older adults and children, were conducted during the summer, 2011. Participants in the workshop activities included 6 older adults and 6 children. After an overview of the study, review of exclusion criteria relating to age ranges, and answering questions, participants signed an informed consent form and provided general demographic information about their age, gender, and ethnicity before starting the workshop activities.

5.3 Workshop Activities

The workshop activities consisted of two components: creating a workbook and creating a collage. Both the workbook and collages were created individually using materials provided to the participants when they arrived. After creating a collage, participants shared their creation with a presentation to the group. These presentations led to open discussions between group participants on their opinions about indoor public spaces.

5.3.1 Individual Activities – Completing a Workbook

Each group of participants (who gathered in the same place) received a small workbook with different types of questions asking about the memories the participants had in public places. This workbook was not analyzed as a part of discussion; the purpose of the workbook was to assist participants in recalling their experiences and feelings in order to prompt their ideas about ideal indoor public spaces. Workshops were conducted separately for children and older adults to allow focus in tone and discussions.

During individual activities, the participants were asked to describe themselves in the workbook by responding to questions and inquiring statements such as: “What is your typical weekday afternoon like?”; “What is your typical weekend afternoon like?”; “Where do you spend your time when you meet with your friend(s)/grandparents/grandchildren?”; “Where is your favorite public indoor space
to visit with your grandparent/grandchildren/friends?"; "Please tell us about the best indoor public space you have been to with your grandparents/grandchildren."; and "Please tell us about the worst indoor public space you have been to with your grandparents/grandchildren." This part of the study took 10–20 minutes for the participants to complete.

5.3.2 Individual Activities – Making Collages

After completing the workbook, participants received 100 images and 100 printed words. These images and words, called triggers, were given to them on 7 sheets of letter-size paper. The images included photos of real indoor spaces, various activities, images of nature such as seasons, the sea, and the sky, abstract concepts and ideals, etc. that individuals might associate with interacting with their grandchildren or grandparents, respectively. The 100 images included 38 environment centered, 31 people centered, and 31 behavior centered images (see more detailed in Section 5.4.2.1).

The words included descriptors of feelings, indoor public spaces, experiences, and interactions. Among the 100 words, 60 words were from feelings (positive, neutral, and negative). The percentage of positive to negative/neutral feeling words was 63 % to 37% which mirrors the 60/40 proportion when measuring desirability in a Microsoft usability lab test (Benedek & Miner, 2002). Of the remaining 40 words presented to the participants, 18 words were descriptions of indoor public spaces selected from public space literature (Carr, Francis, Rivlin, & Stone, 1992) while the remaining 22 words were descriptions of affordances of indoor public spaces and interaction between people. The 100 pictures and 100 words are shown in Figure 5.1.
Participants were asked to choose the images and words, which they felt the best in describing their thoughts and feelings to answer specific questions, then cut them out, place and glue them on the provided white paper. They were informed that they could use as many images and words as they would like, but did not have to use all of them (see Figure 5.1). Participants were also asked to write explanatory comments on the white paper. This part of the study took between 30–40 minutes for the participants to complete. Participants were asked to make their collages (see Figure 5.2) according to the following prompt:

*What do you plan to do in your spare time in the next 5 years? OR What will you do when you visit your grandparents/grandchildren while playing in the future?*
5.3.3 Individual Activities – Groups Discussion

After participants completed creating their collages, they were asked to join in a group discussion. The group discussion took about 20-30 minutes. Each participant shared their collage results with other participants in his/her group and explained why he/she selected each image. Older participants and children were separated into different groups during discussion. The purpose of having group discussions was to generate ideas on how to improve indoor public spaces where participants think people would like to visit. Furthermore, in addition to describing their ideas developed during the collage session, participants could embellish upon others ideas after listening to other participants. During the group discussions, participant’s presentations were recorded using an audio recorder. At the end of the group discussion and data collection session, all crafts including workbooks were collected by the researcher (not returned to the participants).

5.4 Results

5.4.1 Results from Individual Activities — Completing a Workbook

Twelve individuals participated in this activity, half were older adults over the age of 65 and the rest were children who were between 7 and 14 years old. The workbook activity took 10-20 minutes to complete. The workbook was used as a tool to help participants recall their experiences and feelings about their time spent with intergenerational friends in order to generate ideas when making
collages. Because all participants’ answers were similar, reporting results of all 12 participants is uninformative. So only four participants’ (two older adults and two children) answers are summarized below (these 4 were randomly selected):

**Participant 1 (female older adult)**

She is 78 years old and Caucasian. She uses a computer in order to check e-mail or search the Internet. Typically, she takes a nap during weekday afternoons. On a typical weekend afternoon, she engages in recreational reading, watches a movie, or goes shopping with her friends. Two or three times a week, she and her friends meet in their houses, at a mall, at a park, or in restaurants in order to play card games, talk, or dine. When she meets her grandchildren, they spend time at their homes, go to church, or go to shopping centers. They go out to eat, talk, and shop; on special holidays they watch sports on TV at home. She likes to dine out and is especially fond of fancy restaurants. Her favorite indoor public space is the museum of natural science in Raleigh since there are many interesting scientific exhibitions — she and her grandchildren like them all. Her least favorite indoor public space was the Marble’s Kids museum in downtown Raleigh because it held nothing of interest for her.

**Participant 2 (female older adult)**

She is 79 years old and Caucasian. During her typical weekday afternoon, she reads books, talks with friends on the telephone and naps. She does housework, reads, and takes a nap on typical weekend afternoons. She enjoys eating at a restaurant, going to a movie, and attending church with her friends. Once or twice a week, she meets her friends for conversation, dining out and shopping. When she sees her grandchildren, they spend time at her home, the grandchildren’s home or in a restaurant. During her time with her grandchildren, she shares a meal, attends school activities, talks, and plays with them. Every Sunday, she has a dinner with her grandchildren. Her favorite indoor public space to visit with her grandchildren is a museum, especially The Natural Science Museum in Raleigh. She also enjoys going to an indoor playground, because it has many different attractions including, sliding boards and tunnels for her grandkids to enjoy. All her grandchildren enjoy visiting the museum with her, and she can also watch her grandchildren playing. The least
favorite indoor public space for her was ‘Cleveland County Fair’ because of the disorganization and lack of cleanliness.

**Participant 3 (boy)**

He is 10 years old and Asian-American. He plays soccer and games with his friends or reads books during his usual weekday afternoon. On a typical weekend afternoon, he often watches TV or uses the Wii console with his younger brother. When he plays with his friends, he spends time at his house or at his friends’ house. They usually talk or play sports together about one to six times a week. Even though he does not often meet with his grandparents when he does, they talk and play a game with him at his house. When they do meet, they often like to go to a fancy restaurant to have a dinner. His favorite indoor public space with his grandparents is the NC Aquarium, because he and his grandparents can share a great deal of time together while talking, eating, playing, and having interesting experiences there. The worst indoor public space for him is the Burger King, because he hates to be in a loud place.

**Participant 4 (girl)**

She is 10 years old and is Asian-American. Generally, she reads books or sometimes watches TV if she has no other plans. When homework is assigned, she does it on weekday afternoons. On Saturday afternoon, she tries to do something special with her family. On Sundays, she and her family go to church. When she sees her friends, she spends her time at her house or at her friends’ house. They play with their pets or play games. Since she and her friends have different schedules, their meetings are limited. When she visits with her grandparents, it is always at her house. She and her grandparents watch a blurred old television or go to the grocery store and buy something. She usually meets her grandparents on special holidays and likes to meet her grandparents at their home. Since she has never actually been anywhere else but the store and her grandparents’ house, she has no best and worst indoor public spaces to compare.

**5.4.2 Image Data from Collages**

After individuals completed their workbooks, participants (N=12) created collages. Since the older and children group workshops were conducted at separate times, the collages were presented and
analyzed within an age group. Since each participant used images and printed words together during creating collages, the individual’s explanation and interpretation was necessary. In order to manage the data from the collages, one data collection file was created for each participant including: what the participant said while presenting their collage, the handwritten notes on the collage, and which images and printed words were selected (from those 100 provided) and included in the collage. In this section, analysis of the image data will be presented. Analysis of the text data (printed words selected, handwritten notes on the collage and transcriptions of the verbal explanations) is presented in Section 5.4.3.

While creating collages, workshop participants (six older adults and six children) selected from 100 images provided by the researcher to represent what the preferences for an indoor public space. On average older adults selected 12 images and children selected 11 images in order to convey what they wanted in/from the space. Two examples of individual’s completed collages are shown in Figure 5.3 and 5.4.
Figure 5. 3 Examples of Completed Collages of an Older Adult’s from the Individual Activities

Figure 5. 4 Examples of Completed Collages of a Child’s from the Individual Activities
5.4.2.1 Image Analysis - Centeredness Factors

A number of researchers (Fadiman & Frager, 1976; Gustafson, 2001; Newell, 1997) who study environments and behaviors suggested three categories to characterize the relationship of environment to human beings, which is referred to as the focused environmental perceptual framework. According to researchers who study about environment and behavior studies, when people “list places they considered important and describe what these places meant to them (Gustafson 2001, p.5),” three poles often emerged: (p) person, (E) environment, and (B) behavior (Lewin, 1935).

Employing the three categories of focused environmental perceptual framework, Patricia Newell (1997) who studied people from different cultural backgrounds employed the outcome focused environmental perception framework of human, landscape, and interaction. In advance of the workshops, the 100 images were sorted into those three categories: C1 – environment centered, C2 – people centered, and C3 – behavior centered. Among the 100 images, the each of the three categories was fairly equally represented thus affording similar opportunity of image selection from a group:

- **C1 – Environment Centered: 38 images in representing physical space attributes only**
- **C2 – People Centered: 31 images representing people present in space only**
- **C3 – Behavior Centered: 31 images representing both people & physical space attributes or reflected people/environment interface associated with activity/behavior**

After the workshop was complete, the images selected by each participant, which were included in their collage, were sorted and counted (based on the initial categorization in the three categories in the environmental perceptual framework). Older adult participants selected 47 images (C1: 23, C2: 12, and C3: 12) and children selected 52 images (C1: 24, C2: 13, and C3: 15) among 100 images (see Tables 5.1 and 5.2).
Table 5. 1 All Images that Older Participants Selected

<table>
<thead>
<tr>
<th>Environment Centered (C1)</th>
<th><img src="environment_centered_images" alt="Images" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>People Centered (C2)</td>
<td><img src="people_centered_images" alt="Images" /></td>
</tr>
<tr>
<td>Behavior Centered (C3)</td>
<td><img src="behavior_centered_images" alt="Images" /></td>
</tr>
<tr>
<td>Environment Centered (C1)</td>
<td><img src="image1" alt="Images of environments centered" /></td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>People Centered (C2)</td>
<td><img src="image2" alt="Images of people centered" /></td>
</tr>
<tr>
<td>Behavior Centered (C3)</td>
<td><img src="image3" alt="Images of behavior centered" /></td>
</tr>
</tbody>
</table>
5.4.3 Text Data from Making Collages

Analysis of the text data (printed words selected, handwritten notes on the collage and transcriptions of the verbal explanations) from the collages, presentations and discussions during the workshops were completed for each age group. As with image selection, participants selected from 100 words during the assembly of collages. The method for word selections was described in Section 4.2.3.2. Participants were instructed to provide handwritten notes in addition to their selection of images or words when creating their collage and that they would be able to present their opinions about their collage to the group during a presentation and expressed their reasons for selecting specific images during the group discussion. Since interpreting all words that the participants selected and expressed were crucial to understanding their preferences regarding an ideal indoor public space, selected words, additional handwritten notes on the paper, opinions expressed verbally during the group discussion were synthesized in a combined analysis.

Even though participants selected the same image, they had different ideas about the image. Since the researcher needed to understand precisely the participants’ needs and preferences based upon the results of the collages, interpreting each image of the results of the completed collages was critical. Analyzing data required a time intensive procedure in which data associated with the selected images was identified by listening to audio recordings of the workshop presentations and discussions. In order to provide a minimum structure to the qualitative data, during the discussion the research specifically asked:

“Why did you select each image and what are your thoughts about the images you selected?”

When capturing this data, the researcher eliminated extraneous words or phrases from the participants’ responses such as I like to… because, this picture is, or this is comfort because.

5.4.3.1 Text and Opinion Data – Coding Process

The coding process of the data resulting from text responses and opinions in the participatory design was the same as that of the survey. To reiterate the coding process, all words including the additional handwritten notes of participants and their opinions about selected images in the group discussion were read and transcribed onto a typed form. Each text response was then identified as
an interpretation of one or a number of thoughts or concepts and translated into single words or short-hand phrases in the same manner as the previous coding process in the survey.

The letter R (representing text response) accompanied with a number code was also assigned within the cluster (Byrne, 1996). Numbers were assigned to create meaningful groupings of like descriptions provided by the participants – the number itself was meaningless and only represented an additional like grouping. Since text response data in the participatory design were somewhat different from the survey, additional R-factors were added and the categorized numbers were increased. The order of added numbers was followed by the last number, R69. So a total of individual R-factors numbered from 1 to 69. The three perception modes that analyzed all text response data are the same as those of the survey (see Section 4.5.4 for details).

5.4.3.2 Classification of Coded Text and Opinion Data into Three Perception Modes

Having assigned the contents of text responses and opinions of participants to individual R-factor numbers, R-factor numbers were classified into one of the three perception modes (or categories):

1. Perceptible Mode: Space Factors, Features, and Quality

   The perceptible mode is physical qualities of the environment. R1 to R67 were the same factors as from the survey’s perceptible modes (see Section 4.5.4.2 for details). Since new factors needed to describe for the perceptible mode are created, two factors are added and were numbered R68 and R69:

   • R68 – **Indoor**: indoor playground, movie theater, amusement park, museum, gym, aquarium
   • R69 – **Town Center**: community center, town center

2. Functional Mode: Space Features/Elements or Activities

   The functional mode is associated with the use of a space. How a person can interact with or within a particular space is significant. This mode is associated with the ability of the environment to allow or encourage a given behavior and action required to complete a desired task. The functional mode includes a physical feature or element that supports a
particular activity. The functional mode is defined the same as from the survey (see section 4.5.4.2 for details).

3. Affective Mode: Space Qualities

The affective mode is an indicative of the symbolic or meaning associated with a specific physical environment and reflects the value it imparted. How a person feel, rather than what he/she saw experiences, is imperative. The affective mode is the same as from the survey’s (see Section 4.5.4.2 for details).

5.5 Discussion

5.5.1 Image Data

The researcher identified 100 images representing one of three centeredness categories (see the Section 5.4.2). The proportion of images, among the 3 factors, selected to represent an ideal future space by the two age groups were similar (see Figure 5.4). Older adults selected image representations of the environment factor most frequently (49%) and both the behavior factor (26%) and the people factor (25%) approximately equally. Children also selected the environment factor images most frequently (47%), the behavior factor images next (29%), and the people factor (24%) the last. The frequency of selection (or order of importance) for the three categories was the same regardless of group.
In a cross-cultural study, the reasons given by adult participants for the selection of favorite places were clustered according to three factors: *place-centered*, *person-centered*, and *person-environment interaction* (Newell, 1997). Slightly different from Newell’s findings, in this study both older adults and children ranked *place (environment)* first, *people/environment (behavior)* second and *person (people)* last. Both age groups placed greater value on ‘environment’ where people can be safe and have a sense of belonging.

### 5.5.2 Text and Opinion Data

After analyzing data from the individual activities of making collages and the group discussion, the results of the three perception modes (*perceptible*, *functional* and *affective*) had somewhat different patterns for each group (see Figure 5.5). Older participants regarded the three perception mode importance equally, while children commented or described characteristics within the *affective* mode\(^6\) of the environment more frequently than the other two modes.

Similar to the results of the open-ended question in the survey (see Section 4.6.4, Figure 4.19), the older group’s comments and descriptions were representations of the *functional* mode of the

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\(^6\) Affective mode was defined in the conceptual framework (Section 3.2) as the environmental qualities that are less definable but reflect human feelings and meaning.
environment more frequently (35%) rather than the other two modes. While the *functional* mode was represented most, the three perception modes were of similar importance for the environment of an ideal indoor public space for older adults. Children, on the other hand, expressed the importance of the *affective* mode more frequently than the other modes. This indicates that children used more abstract images to represent the ideal future indoor public space than did the older adults. The three perception modes were discussed more specifically including the space attributes defined by the R-factors.

![The Result of Percentage of Three Perception Mode for Older Adults](image1)

![The Result of Percentage of Three Perception Mode for Children](image2)

Figure 5. 6 Expression of Three Perception Mode when Defining Ideal Space by Older Adults and Children in Participatory Design

5.5.2.1 Space Perception: Perceptible Mode

For the *perceptible* attribute clusters (which can be subdivided into *design, people,* and *natural*), the two age group's preference was very different (see Figure 5.6). Older adults preferred describing their ideal environment using *natural* attributes, mentioning *design* attributes second, and *people* attributes last. Whereas children preferred describing using *design* attributes, *natural* attributes

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7 Preference was ascribed to an attribute when an individual mentioned or commented on one of the 69 R-factor categories which were previously assigned to a cluster.
second, and *people* attributes last. The result of the older adult’s *perceptible* mode during the participatory design study was different from the result of those of the survey (the order of importance: *design*, *people*, and *natural* attributes). Based on the two results of the survey and the participatory design study, older adults seem to have different opinions regarding their current satisfactions and future hopes. Even though children's results were the same for the survey and participatory study preferring *design* attributes to describe their ideal environment, they considered *natural* attributes for future hopes in comparison with the result of the survey (see Section 4.6.4.1. in Figure 4.20) where they were reflecting on what currently exists.

![Figure 5.7 Comparative Pie Charts by Percentage of Perceptible Mode Clusters Preferred by Older Adults and Children in Participatory Design](image)

The two age groups in this participatory design study were interested in a few factors among the 15 defined (see Figure 5.7). The older adults preferred *manicured* spaces (noting clean feel and well kept) and having easy access to *restrooms*. They also wanted *lighting* systems that allowed them to feel safe and comfortable. Their comments regarding preferences for *manicured*, *restrooms*, and *general lighting* factors are representative of general design features. These results for older adults were similar to the result of the survey’s text response data (see Figure 4.21).
In comparison to older adult’s responses of design attributes, children considered a more visual design than did the older adults (see Figure 5.7). The meaning of the designed space according to them was defined by abstract images such as special, beautiful, cool, fancy, sophisticated, and great. What children said about the colorful factor seems to be understood in the same context. As Kline et al., (1983) mentioned, young people are likely to be sensitive to visual changes. Additionally since they are so visually oriented, considering current cultural trends is important when designing for children.

The results of the natural attributes in the perceptual mode by the two age groups are presented in Figure 5.8. Similar to the survey results (see Section 4.6.4.1, Figure 4.23), older adults preferred natural attributes when describing ideal indoor public space with equal preference for water and plants/trees factors. Children preferred the water factor in an ideal environment compared to the other two attributes. This reflects the importance of the nature in an urban landscape reinforcing the findings of Herzog and Gale (1996) that people want to have urban buildings within a natural context. Given the strong preferential association between natural environments and the presence
of the water (Ulrich, 1983), it is not surprising that both age groups considered these attributes when describing their ideal environment.

![Figure 5.9 Comparative Bar Charts by Percentage of Natural Oriented Perceptible Mode Preferred by Older Adults and Children in Participatory Design](image)

Older adults considered the *different age’s present* factor more important than children did while the children considered the *diversity* factor more important than did the older adults (see below Figure 5.9). These results were similar to the survey’s text response data (see Figure 4.22). Results from both the survey and the participatory design study support the idea that individuals from both age groups are friendly and tolerant of various age generations. Older adults seem to like having many people of varied ages in an indoor public space, while children seem to consider not only varied ages, but also a variety in the spaces they can enjoy. Similar to the survey results, both groups were similarly divided in their preference for *not crowded* and *crowded* factors.
For the functional attribute clusters (Figure 5.10) (which can be subdivided into active, passive, social and safety), the older adults preferred describing their ideal environment using passive recreation attributes most frequently (46%), social attributes (22%) second, safety issues (18%) third, and active recreation attributes (14%) last. The children, on the other hand, described their preference in the attributes in following order: active recreation attributes (40%), passive recreation attributes (31%), social attributes (15%), and safety issue attributes (14%). Compared to older adults’ responses to the functional attribute in the survey (see Section 4.6.4.2, Figure 4.24) in which the social attribute was most important, in this participatory design study older adults placed more importance on the passive recreation attributes for the design of future indoor public space. Children preferred the active recreation attributes which contrasted with the responses to the survey in which the passive recreation attributes was most important. As Figure 5.10 shows, it is reasonable to think that children consider recreation, either passive or active, as an important attribute in the design of ideal spaces.
Compared to the two age groups’ responses shown in the survey results (see Figure 4.25), the percentage of the active recreation attribute decreased by almost half for older adults and increased by almost half for children. The active recreation cluster (Figure 5.11) indicates that children placed higher value on playing, activities, and sports/games factors than older adults did. The result supports children’s preference for variety in recreation regardless of whether it is active or passive for new and exciting public spaces (Pianta, 1992) and older adults prefer relatively passive recreation such as watching, touching, or hearing experiences. Thus, it is important to consider both sets of preferences when designing the future indoor public space.
The results of the passive recreation attributes in the functional mode for both age groups are presented in Figure 5.12. Nearly half of the older adults rated the passive recreation attribute highly including three specific behaviors (seating/resting, talking and watching). The seating/resting (20%) was the most frequently mention attribute by the older adults. The top two passive recreation attributes (seating/resting and talking were usually mentioned at the same time by older adults. The children’s’ top two most frequently mention passive recreation attributes were the talking and the watching factors. Though there were different expressions of which was most important, the top three passive recreation feature preferences for both groups were the seating/resting, talking, and watching. These findings are similar to those of Stine (Stine, 1997) when investigating creating outdoor learning environments for both children and adults in which people valued socializing, relaxing, and observing most.
Based upon the result of the social attribute (Figure 5.13) assessment, the features supporting socialization for older adults seemed to be eating, learning, or participating in something together. Older adults also seemed to prefer having programs for two people more than children did. Like older adults, children noted features for eating or drinking when describing their ideal indoor public space. Music was an important factor for children.
The two age groups showed similar preferences for features attributed to the safety issue when describing an ideal indoor public space (see Figure 5.14). An interesting result was that each group considered the other group’s needs within the interior and the result was the same as the responses rating important components of Differing Physical Activities in the survey (see Section 6.1.2, Figure 4.15). This suggests that the two age groups consider the needs of their companion more important than their own needs when visiting an indoor public space. Thus they described the features which would make the space physically friendly for intergenerational friends as needing to be included in their ideal space.

![Figure 5.15 Comparative Bar Charts by Percentage of Safety Issue Oriented Functional Mode Preferred by Older Adults and Children in Participatory Design](image)

5.5.2.3 Space Perception: Affective Mode

The two age groups selected various featured images representing their ideal indoor public space; the selected images attributed to the affective mode were somewhat different for the two groups (see Figure 5.15). The top three factors of the affective mode selected by older adults were beautiful/attractive (20%), inviting/familiar (17%), and comfortable (14%). These factors focused on psychological comfort or satisfaction through an indoor public space. Older adults also preferred
images of a protective factor (13%) and liked a space where they can awaken distant memories during their visit to the space (represented by the images in the contemplative factor - 10%).

The top three factors of the affective mode selected by children was the inviting/familiar factor (19%), having fun (19%) and engaging (15%) and beautiful/attractive (14%). The environment of a future indoor public space that children envision is likely to be focused on “fun” and “happy.” The result is very similar to the results of the survey in study 1 (see Section 4.6.4.3, Figure 4.29).

![Figure 5. 16 Comparative Bar Charts by Percentage of Affective Mode Preferred by Older Adults and Children in Participatory Design](image-url)
6. STUDY 3: OBSERVATION

In the first two studies, surveys and participatory design methods were used to understand the differences in perceptions and preferences regarding indoor public spaces between older adults and children. The results revealed that the two age groups liked similar types of indoor public spaces, and that various museums were the favorite indoor public spaces. The two age groups commonly agreed on the idea that they need a new indoor public space where they can interact with intergenerational friends, even though the detailed concepts of indoor public spaces were slightly different from each other. Since the two previous studies were focused on what participants said and what they made, a final study using observation was conducted to understand what pairs of individuals do in real indoor public spaces and reconciles the findings between their opinions (expressed in the survey and while making collages) and real behaviors. Thus, Study 3 was designed to compare social interactions between intragenerational pairs and intergenerational pairs.

6.1 Review of Observational Techniques

Observation methods of assessment can be obtrusive and unobtrusive. Obtrusive observational methods such as direct observation have been an important assessment tool in many action research studies and in case studies (Marrelli, 2007). A researcher can observe human behavior directly and understand what subjects really do in their environment. However, the limitation of direct observation is that the result is reactive (Redman et al., 1989). In other words, people who are aware of being observed are likely to be affected and change their reactions. So, the results are likely to be distorted far from the truth (Marrelli, 2007). Because of the limitation of such obtrusive observational methods, unobtrusive measurements have been used in behavior modification studies to assess behavior.

An unobtrusive method of assessment proposed by Webb et al. provides two clear advantages: the unobtrusive method is not reactive in that it does not change the behavior of the people being studied; and it offers a wide range of alternatives to complement more traditional measurements.
(Marrelli, 2007). Marrelli (2007) noted that a researcher watches or listens to people without having previous knowledge about the people being observed in unobtrusive observations.

### 6.1.1 Behavior Mapping Approach

Because the people are not aware of being observed, the measurement does not influence their behavior. Behavior mapping is “an unobtrusive, direct observational method” for recording the locations where participants are and measuring what they are doing simultaneously (Cosco, Moore, & Islam, 2010). Behavior mapping is based on the concepts of behavior setting (R. Barker, 1976; H. Heft, 1998) and affordance (E. Gibson & Pick, 2000; J. J. Gibson, 1986). It allows researchers to understand relationships between the behavioral dynamics and the environment and to assess how the behavior of participants is related to detailed physical characteristics of the environment (Cosco et al., 2010).

Several researchers have used behavior-mapping approaches to code and assess people’s activities and behaviors within a physical environment or setting. Brown et al. (2006) recorded young children’s physical activity levels by recording coded data representing their physical activity, as well as detailed indoor and outdoor social and non-social contextual information. Specifically, they included transition, outdoor activity context (e.g., games, snacks, etc), and limited predefined physical setting codes (e.g., sandbox, open space, etc). McKenzie, Marshall, Sallis, and Conway (2000) assessed an instrument to directly observe group physical activity (PA) and measured the leisure-time PA of adolescents throughout their school days. The researchers defined ‘target areas’, which included three outdoor ‘area types’ (court space, play space, and field), and coded for area improvements (exclusively sports-related). McKenzie et al. (1991) coded associated environmental events, including physical location, antecedents, and consequences. To assess the instrument’s reliability and validity, they observed their subjects for 8 consecutive weeks at home and at school. Cosco et al. (2010) modified earlier behavior mapping approaches to develop a protocol suitable for preschool environment (including codes for manufactured, natural, and mixed toy use; and gender).

Though most of the aforementioned studies only observed and evaluated children’s physical activity levels, these methods were applied to exploring ideas and insights from the activities of this study’s
target population, which included both children and older adults. In order to ‘know’ what people are doing in an indoor public space, the observational method of behavior mapping was employed how to gather information from older adults and children in this study.

6.1.2 Time-based Observation

Many researchers reported time-based behaviors (e.g., total time in the museum, and average time per exhibit) as a way to provide information of visitors’ behaviors within a particular research site. Comparing groups of people as weekend/weekday groups and family/non-family groups, Sandifer (1997) observed the time-based visitor behaviors at an interactive science museum. He realized that families spent more time than non-families in individual exhibitions regardless of the day of the visit. He also found no difference in average time spent per exhibit for both family and non-family groups who visited on weekends. In an assessment of science exhibits, Diamond (1986) found that the average total time for family members was slightly over 2 hours at both the Lawrence Hall of Science (220 exhibits) and the Exploratorium (600 exhibits). Combining data from both institutions, Diamond found that 57% of exhibit-visitor interactions were less than one minute long, where 18% were over three minutes long.

Some studies specifically focused on how exhibits draw the visitors’ attention. Sandifer (2003) identified four attention-oriented exhibition characteristics: technological novelty, user-centeredness, sensory stimulation, and open-endedness. The results showed that the two of these characteristics, technological novelty and open-endedness, help to increase an average visitor holding time. Serrell (1997) compiled a large database, containing data from a comparative investigation on the duration and allocation of visitors’ time in 108 exhibitions. She found that visitors typically spend less than 20 minutes in exhibitions, regardless of the topic or size of the exhibitions. She also noted that visitors watched exhibitions at a rate of 200 to 400 square feet per minute, and visitors typically spent less time per unit in larger exhibitions.

Based upon time-based observation methods, in this study, the interaction time that older adults and children had with each other, while observing the exhibits, was recorded.
6.2 Population Sampling and Site Selection

Two types of groups were selected. Since the purpose of this study was to observe how the exhibit design influenced the interaction between an intergenerational pair (child and grandparent), a control and interest group approach was used in the population sampling. The control groups consisted of pairs of older visitors while the interest group consisted of visitors in intergenerational pairs. Because this study was conducted using an unobtrusive observation method, the researcher estimated the age of the samples and sorted them into one of the two groups. The estimation of age was based on individual’s size, clothing style, appearance, behavior, and physique. The researcher did not interact with individuals, unless they addressed the researcher to inquire what she was doing.

A total number of 24 pairs, including 12 older (intragenerational) pairs and 12 intergenerational pairs, were observed. The ‘older’ people were selected as individuals who appeared over 65 years old, and the ‘children’ were selected as those who appeared in the age between 7 and 14 years old.

Based upon the results of the first two studies (survey and participatory design) in which data was collected from both age groups, the Story of North Carolina in the North Carolina Museum of History was selected as the location for this observation study. The Story of North Carolina is one section in the NC Museum of History that opened in September 2011. This permanent exhibition displays artifacts, multimedia presentations, dioramas, hands-on interactive components, and other components to chronicle life in North Carolina from the earliest inhabitants through the 20th century. Since the exhibition opened recently and there were a variety of activities to convey historical information about North Carolina through touchscreens, watching videos, and exhibitions, in which a visitor can participate, the space was suitable for observing how the exhibit design influenced people.

6.3 Data Collection

Observation of visitor groups was conducted in Spring 2012. The 12 older pairs (control group) and the 12 intergenerational pairs (interest group) consisted of 24 people each, thus 48 individuals were
selected for the participant observations. In order to select specific groups for the observation, the researcher waited and watched visitors in the lobby of the NC History Museum pretending to be as a visitor. To avoid a time-of-day bias, observations were conducted on both weekdays and weekends, in the morning and the afternoon. When a suitable pair (according to the researcher’s perception) of either group entered into the exhibition, the researcher noted their arrival time and the observation began. The researcher followed the pair from a distance and recorded the behaviors of the selected pair throughout their stay in the exhibition, without informing them. The researcher did not obtain written consent forms from individuals, since she observed the public behavior (this protocol of observation and recording of the public without obtaining informed consent was approved by the NCSU IRB).

The research first recorded general information, such as the pair’s characteristics (older pair or intergenerational pair), date observed, and start time at the Story of North Carolina in the exhibition. Throughout the observation, the researcher recorded three pieces of information for the visitor pair: the location within the exhibition, the duration at a location, and the interactive behaviors between the pair of visitors while at a location. Interactive behavior was defined as when the visitor pair demonstrated one of 8 behaviors, shown in Table 6.1, such as talking and listening to each other, touching and looking at an exhibit. The goal of collecting this data was to understand the visitors’ patterns of interactive behaviors within the exhibition and to compare how the two groups spent their time. Since most visitor pairs demonstrated more than one behavior simultaneously, the researcher recorded multiple codes (of their multiple behaviors) for each location. For example, if visitors looked at an object or touched an object while talking to each other then, the researcher recorded ‘talking/listening’ and ‘looking at an object’ at the same location.

<table>
<thead>
<tr>
<th>Types of Interactive Behaviors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Talking/listening</td>
<td>Two persons talk and listen to each other.</td>
</tr>
<tr>
<td>2 Looking at an object</td>
<td>Two persons look at the same object.</td>
</tr>
<tr>
<td>3 Looking at a video clip</td>
<td>Two persons watch the same video.</td>
</tr>
</tbody>
</table>
More specifically, this data was collected to document what exhibit characteristics encourage visitors to linger and promote interactive behaviors. For this study, the researcher chose 15 designated exhibit locations within the exhibition with engaging characteristics. In other words, they were not just displays with descriptive boards in front of exhibits; but they included touching objects, hand-on exhibits, and technologically novel exhibits (see Tables 6.2 and 6.3). The 15 designated exhibits locations consisted of six video-based and nine hands-on exhibits. Additionally, if visitors demonstrated behaviors that were not listed (but related to the interactions between an older adult and a child), such unexpected behaviors were recorded long-hand on the behavior mapping sheet.

Table 6.1 Continued

<table>
<thead>
<tr>
<th></th>
<th>Looking at each other</th>
<th>Two persons look at each other.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Touching an object</td>
<td>Two persons touched the same object or one of the two persons touched it.</td>
</tr>
<tr>
<td>6</td>
<td>Gesturing</td>
<td>One of two persons has a gesture.</td>
</tr>
<tr>
<td>7</td>
<td>Taking a picture and related behaviors</td>
<td>Two persons take a picture while talking, listening, or touching.</td>
</tr>
<tr>
<td>8</td>
<td>Others</td>
<td>Seeing a brochure, holding hands etc.</td>
</tr>
</tbody>
</table>

Table 6.2 Examples of General and Engaging Exhibits

<table>
<thead>
<tr>
<th>General exhibits</th>
<th>Engaging exhibits</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="General exhibits" /></td>
<td><img src="image2.png" alt="Engaging exhibits" /></td>
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</tbody>
</table>
Table 6. 3 The 15 Designated Exhibitions\(^8\)

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<th>2(^{nd})</th>
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<tbody>
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<tr>
<td><img src="image9.jpg" alt="Image 9" /></td>
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<td><img src="image11.jpg" alt="Image 11" /></td>
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<tr>
<td><img src="image13.jpg" alt="Image 13" /></td>
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<tr>
<td><img src="image15.jpg" alt="Image 15" /></td>
<td></td>
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</tbody>
</table>

\(^8\) Note: Full size pictures are indicated in the appendix c-3.
In short, observations were recorded, whenever the selected pair demonstrated by noting the location, the duration of the stay, and the length of samples’ interactive behaviors, and the total time spent at the Story of North Carolina. A stopwatch was used to measure the time, and the researcher collected all data. Visitor pairs appeared unaware that they were being observed throughout their tour in the museum. While none of the individuals observed asked the researcher questions or made undue eye-contact with her, occasionally a visitor in the museum would ask her if she was conducting a survey. This was not disruptive.

6.4 Results

6.4.1 Interactive Time by Group

This study consisted of 24 observations of pairs of visitors (12 older pairs and 12 intergenerational pairs) in a museum setting. The visitor pairs spent part of their time in the exhibit by themselves and part of their time interacting with each other (see Figure 6.1 and 6.2). For the older pairs, the average time spent in the Story of North Carolina exhibition was 63 minutes 41 seconds, and the average interactive time was 28 minutes 10 seconds. Thus the older pairs were interacting approximately 44% of the time they were in the exhibition. During the rest of the time, the individuals in the pair being observed spent average of 35 minutes 31 seconds alone even though they were in the same space. For the intergenerational pairs, average time in the exhibition was 49 minutes 32 seconds. The average interactive time was 28 minutes 11 seconds, which is about 57%. Thus, the intergenerational pairs spent (57%) proportionally more time interacting with each other than the older pair (at 44%).
6.4.2 Interactive Behaviors by Group

6.4.2.1 Older Pair – Types of interactive Behaviors

For the older pairs, **watching an object** was the most observed (41%) type of interaction while spending time at a designated exhibit location. **Watching a video clip** (26%) was the second most observed, followed by **watching an object + talking/listening** (10%). Accounting for less than a quarter of the total observed interaction time, the remaining types of interactions at a designated exhibit location were: **watching an object + talking/listening + touching it or gesturing** (9%), **talking/listening + looking at each other** (8%), **watching an object with touching it** (3%), **watching a video clip with talking/listening** (2%), and **watching an object + talking/listening + others** (1%). No one took pictures. The combined percentage of time that included **watching an object** or **a video clip** as the type of interaction was approximately two-thirds (67%) (see Figure 6.3).
6.4.2.2 Intergenerational Pair – Types of Interactive Behaviors

Intergenerational pairs demonstrated somewhat different proportions of interactions compared to older pairs of visitors. Roughly equal proportions of interactions were observed for intergenerational pairs, while watching an object + talking/listening + touching it or gesturing (26%), watching an object + talking/listening (21%), and watching a video clip (20%). In the decreasing order of percentage, intergenerational pairs were observed watching an object (13%) (see Figure 6.4), watching an object with touching (11%), watching an object + talking/listening + others and taking a picture (4%), and watching a video clip with talking/listening (1%).

Figure 6.3 The Result of Mean of Types of Interactions by the Older Pairs
6.4.3 Interactions at Selected Locations

6.4.3.1 Exhibits with Video Clips

Throughout the *Story of North Carolina* exhibition, 6 of the 15 exhibits included video clips. Since the content of the clips are not pertinent to the assessment for clarity the exhibits are referenced by numbers 1-6 with Exhibit #1 being closest to the beginning of the exhibition and #6 closest to the exit. The percentage time pairs of visitors’ interactions included watching video clips are presented by group in Figure 6.5. For the older pairs of visitors their time was nearly equally split between three exhibits; the 3rd video clip exhibit (27%) was the most watched and the 1st and 2nd exhibits (23%) were close seconds. Nearly half of the time the intergenerational pairs, were observed interacting in the 1st video clip exhibit (47%). The intergenerational pairs spent a quarter of their time at the 3rd video clip exhibit (23%) followed by 18% at the 2nd video clip, and 4th video clip. While the older pairs showed relatively similar preference for the 6 different types of video clips, the intergenerational pairs showed a prominent interest in the 1st video clip. The distinguishing characteristics of the exhibits including video clips will be discussed further in Section 6.6.2.
6.4.3.2 Hands-on Exhibits

Of the 15 exhibits in the *Story of North Carolina* exhibition, hands-on activities were present in 9 exhibits (these did not include the 6 exhibits with video clips). The 9 hands-on exhibits were classified into one of two categories:

- **Simple Hands-on Exhibits.** An exhibit was considered to be simple hands-on if a visitor can touch an exhibit or lifts an exhibit’s flap, and read the description about the exhibit (see Table 6.4).

- **Complex Hands-on Exhibits.** An exhibit was considered to be a member of this category (Table 6.5) if it meets at least one of the following criteria:
  1. The exhibit emitted sounds on its own or when in use.
  2. The exhibit had one or more visual parts or objects that moved on their own or when the exhibit was in use.
  3. The exhibit had lights that blinked or flashed on their own or when the exhibit was in use.

* Note: Since the content of the clips are not pertinent to the assessment for clarity, the exhibits are referenced by numbers 1-6 with Exhibit #1 being closest to the beginning of the exhibition and #6 closest to the exit.
Like the exhibits with video clips the content of the exhibits were not pertinent to the assessment; hence, the exhibits are referenced by numbers 1-6 or 1-3 with Exhibit #1 being closest to the beginning of the exhibition and #6 closest to the exit. S in combination with a number indicates a simple hands-on exhibit and C in combination with a number indicates a complex hands-on exhibit.

Table 6.4 The List of Selected Simple Hands-on Exhibits

<table>
<thead>
<tr>
<th>Simple Hands-on Exhibits</th>
<th>S-1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>S-2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>S-3&lt;sup&gt;rd&lt;/sup&gt;</th>
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<tr>
<td>S-5&lt;sup&gt;th&lt;/sup&gt;</td>
<td><img src="image13" alt="Image" /></td>
<td><img src="image14" alt="Image" /></td>
<td><img src="image15" alt="Image" /></td>
</tr>
<tr>
<td>S-6&lt;sup&gt;th&lt;/sup&gt;</td>
<td><img src="image16" alt="Image" /></td>
<td><img src="image17" alt="Image" /></td>
<td><img src="image18" alt="Image" /></td>
</tr>
</tbody>
</table>
Table 6.5 The List of Selected Complex Hands-on Exhibits

<table>
<thead>
<tr>
<th>Complex Hands-on Exhibit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C-1</strong>&lt;sup&gt;st&lt;/sup&gt;</td>
<td>There are three different types of hands-on exhibits. Visitor can lift the bucket, milk the cow, and gather the eggs by moving the chicken.</td>
</tr>
<tr>
<td><strong>C-2</strong>&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>There are 14 different types of buttons and 8 small imitations of model. Whenever visitors push each button, they can hear the specific sound and see the motions about North Carolina’s improvements in transportation, education, and agriculture from 1840 to 1860.</td>
</tr>
<tr>
<td><strong>C-3</strong>&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Visitor can participate in taking a picture and they can check the picture on the back wall.</td>
</tr>
</tbody>
</table>

Based upon the time spent at a selected location, both groups were observed exhibiting highly interactive behaviors at Complex hands-on exhibits. The similarity observed between the groups’ behaviors is depicted using pie charts (Figure 6.6) of behaviors at the 9 hands-on exhibits.
6.5 Discussion

6.5.1 Comparison of Characteristics of Types of Interaction

After analyzing data of each pair’s behavior, the percentages of interactive time among the total time spending time at the specific exhibition were 44 and 57% for older/intergenerational pair respectively (see Figure 6.7). The intergenerational pairs had more interactions with each other than the older pairs. Moreover, pair’s in the older group proportion of passive interaction was higher than the intergenerational group pair’s (see Figure 6.8). While the older pairs demonstrated more passive interaction (87%), the intergenerational pairs had similar percentages of passive interaction (59%) and active interaction (41%). It seems that when two generations meet interaction increases. While the older pairs preferred passive interaction (87%), the intergenerational pairs had similar percentages of passive interaction (59%) and active interaction (41%). It seems that when two generations meet, a chance of interaction increases.
6.5.2 Comparison of Selected Exhibits

6.5.2.1 Exhibits with Video Clips

The older pairs and intergenerational pairs differed in the viewing of exhibits with video clips in the museum (see Figure 6.9). The older pairs tended to ask their companions’ opinions and select a video according to their interests. In the intergenerational pairs, on the other hand, older adults seemed to respect their grandchildren’s choice and select a video clip according to the children’s preferences. Children appeared to select a video clip not by its contents, but by the environment of the video, such as where the video clip was installed and whether the environment has special elements. The intergenerational pairs spend the most time and had the highest level of active interaction while viewing the 1st video clip. This video was installed inside a recreated American Indian Dwelling, a reproduction of a typical Piedmont Siouan home with goods that Indians used.
Children seemed to be curious about the mini environment when they stepped inside, looked around the goods, and watched the video. In the case of the 3rd video clip, the environment where the video clip was installed was a small theater, a little cozy room, which also seemed to trigger children’s curiosity and attract them to watch the video. Children seemed to have a curiosity about rooms that feel closed, cozy, and special. As they progressed further into the exhibition, children tended to lose their concentration on the exhibits and started interacting more with their grandparents. This was evident when they did not show any interest in the 5th and 6th video clips.

These results suggest that when installing a video screen for audiences who are in various age groups, the content of the video is an important factor for older adults. The more important factors for children were the design elements, such as proper use of a closed space, which drew children’s curiosity and let them feel comfortable.

6.5.2.2 Hands-on Exhibits

Pairs of visitors were observed at nine hands-on exhibits. Six of the nine were simple hands on exhibits. Though there were twice as many simple hands on exhibits, both groups spent time more
time at the three complex hands-on exhibits. Both groups’ percentages of complex hands-on exhibits preference were similar (see below as Figure 6.10 and 6.12).

a. The Result of Observation in Simple Hands-on Exhibits

As visitors moved through the exhibits, both older and intergenerational pairs spent less time in the six simple hands-on exhibits. One interesting point was a result of watching the 2\textsuperscript{nd} exhibit where visitors spent more time, even though the six hands-on exhibits looked similar from a distance. It appeared that the reason why both groups spent the most time at the 2\textsuperscript{nd} exhibit was that it contained many objects from real life providing people with various materials to discuss.

![Figure 6.10 The Result of Observation of Simple Hands-on Exhibits by the Two Pairs](image-url)
In all exhibits except for the 2nd exhibit, visitors could lift the flap of the interactive exhibits and read the descriptions about the exhibits. The 2nd exhibit had restored items from pirate ships, and visitors were able to lift the flap to look at objects within the exhibit. Even though the 2nd exhibit has no specific description, visitors seem to be excited and enjoyed talking to each other while looking into the exhibit. This indicates that even with simple interactive exhibits it is important to provide elements that allow people to conceptually create or imagine an environment rather than exhibits which convey simple knowledge through the display.

b. Complex Hands-on Exhibits

The observation of three complex hands-on exhibits showed that the older pairs spent the most time at the 2nd exhibit. This exhibit was also where older pairs spent the most time among the total nine hands-on exhibits. It seemed that the older pairs enjoyed touching simple exhibits, which automatically played sounds and showed motions. The intergenerational pairs, on the other hand, showed equal attraction to complex hands-on exhibits spending between 20% and 24% (see Figure 6.12) at each of them. Even though the researcher only observed three complex hands-on exhibits, the intergenerational pairs spent more than 60% of the total interactive time in these three exhibits. In other words the intergenerational pairs spent less than 40% of their interactive time observing the six simple hands-on exhibits. The intergenerational pairs tended to stay longer at exhibits, about which they could laugh together and make jokes. Thus, the capacity of the exhibit is to offer fun while stimulating multiple senses was an important factor for the both older and intergenerational pairs.
Figure 6. The Result of Observation of Complex Hands-on Exhibits by the Two Pairs
7. CONCLUSIONS

7.1 Framework Development and Comments for Indoor Public Space

Given the similarities between older adults and children in preference for social interaction spaces, the development of concepts for indoor public space design that incorporate the results of the two research methods, survey and participatory design, assessing the five affordances and the three perceptual modes is appropriate. The 69 specific space factors (from the five conditional affordances and the three perceptual modes) were included in the development of the design framework for indoor public spaces for intergenerational groups. The five affordances had 44 components. Out of the 44 components, the components that the two age groups rated similarly and important (average ratings >3) included 18 components:

1. Safety issue – not be crowded, wheelchair/stroller, handrails, wide path/walk
2. Sense of belonging – peace/quiet, beautiful/attractive
3. Multiple activities – watching, talking, food/eating, café
4. Differing physical abilities – playing, sitting/resting, child-centered interior, adult-centered interior, elevator
5. Intergenerational engagement – supports having fun, engaging, protective

The variety of reasons why people like a selected indoor public space was collected using a survey and people’s desires for an ideal (imagined) indoor public space by using the method of participatory design. Based upon subjective responses from the two methods, the researcher identified 69 factors divided into the three perceptual modes (perceptible, functional, and affective). The perceptible mode was subdivided into design, people, and natural attributes and the functional mode is subdivided into active, passive, social and safety attributes. The following 23 factors are the characteristics that the two groups selected while completing the survey and the participatory design workshop.
1. Perceptible space mode – security, designed space, diversity, different age present, not crowded, crowded, water
2. Functional space mode – playing, activities, sports/games, seating/rest area, talking, watching, food/eating, café, music, programs for two people, reading books
3. Affective space mode – restful, beautiful/attractive, protective, inviting/familiar, having fun, comfortable

The researcher combined 18 important components from the five conditional affordances and 23 factors from the three perceptual modes and deleted overlapped results in order to create the design framework. The resulting design framework has 33 space characteristics for intergenerational groups (see Figure 7.1) pertaining to the creation of indoor public spaces.

Among the 33 characteristics, the 8 characteristics, which were overlapped with the five affordances and the three perceptual modes, were Watching, Café, Food/Eating, Talking, Sitting/Resting, Not Crowded, Having Fun, and Protective. When designing indoor public spaces for intergenerational groups, these 8 characteristics are the minimum or most basic to be included.
7.2 Intergenerational Planning Direction for Each Group

Even though the goal of this study was to suggest a design framework, which would promote effective interaction between two disparate age groups and would increase their quality of life, it is, at the same time, important to consider the design components each group characteristically values. From the results of the three studies, the children group preferred particular design components that older adults group did not prefer, and vice versa. These differences, between groups, of preference for design components are summarized in Table 7.1.
Table 7. 1 Preferred Activities and Space Attributes by Each Group

<table>
<thead>
<tr>
<th></th>
<th>Older adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preferred Activities</strong></td>
<td>Meeting place</td>
<td>Hanging out</td>
</tr>
<tr>
<td></td>
<td>Tables</td>
<td>Using internet</td>
</tr>
<tr>
<td></td>
<td>Learning</td>
<td>Store/shopping</td>
</tr>
<tr>
<td></td>
<td>Gardening</td>
<td></td>
</tr>
<tr>
<td><strong>Space Attributes</strong></td>
<td>Barrier free</td>
<td>Privately owned</td>
</tr>
<tr>
<td></td>
<td>Handrails</td>
<td>Colorful furniture</td>
</tr>
<tr>
<td></td>
<td>Distinctive colors</td>
<td>Open space</td>
</tr>
<tr>
<td></td>
<td>Stairs (no handrails, high steps)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signage-good contrast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signage-large font size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accessible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restrooms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parking area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>general lighting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manicured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>People present</td>
<td></td>
</tr>
</tbody>
</table>

7.3 Research Summary

This dissertation, using a series of three studies, has investigated the attributes of indoor public spaces with an eye toward enhancing interaction to increase the quality of life for intergenerational groups (older adults and children). This dissertation was based on an ecological perspective, which assumes that environment influences human behavior, and applied five conditional affordances and three perceptional modes in analyzing the results. In order to conduct this dissertation, the researcher sought to develop an effective framework for designing indoor public spaces that would support quality of life enhancement for intergenerational groups. Using surveys, participatory design, and observation, the researcher collected people’s subjective opinions, examined their ideas, and observed their behaviors in a real indoor public space. Even though the third study was conducted in one place, a museum, for observing people's behaviors, the results have implications, which would not have been found using surveys and participatory design alone. Ultimately, this
research may serve as a foundation for developing design policies and a design model when creating new indoor public environments.

Public space is open to everyone. People in all age groups should be able to visit freely and enjoy their quality of life in public indoor spaces. Conceptually, although older adults and children are from the opposite ends of the life span; researchers and designers need to be equally mindful of both groups’ particular physical conditions and psychological needs. With the increasing number of older adults who raise their grandchildren, many researchers are interested in studying urban public spaces for intergenerational groups and have focused on outdoor space design. Outdoor public spaces, however, are likely to be affected by weather and safety issues in contrast to indoor public spaces; hence, research on indoor public spaces are essential for the development of meaningful intergenerational designs.

The hypotheses of this dissertation were: first, the two age groups will prefer similar types of spaces that have mutually preferred features, attributes, and qualities, and secondly, they will want indoor public spaces where they can visit easily with intergenerational friends. The researcher also expected to find unexpected results while observing people’s behavior.

To evaluate these hypotheses, three studies were developed and conducted. From the results, the researcher found which components are particularly important for designing public indoor spaces for both age groups among the five conditional affordances (findings of study 1 – survey). She also found a variety of space attributes that people in the two age groups want in an ideal public indoor space (findings of study 1 – survey and findings of study 2 – participatory design). According to both groups, images of the ideal public space include characteristics, Watching, Café, Food/Eating, Talking, Sitting/Resting, Not Crowded, Having Fun, and Protective.

Through the results of the observational study, the researcher found that when individuals from different generations meet, their interactions are more frequent and more active than those of individuals from the same generation. The researcher also found that even though some exhibits had similar characteristics within the exhibition, the active interaction time between the pairs of visitors in intra- and inter-generational groups was effected by the display settings or the contents.
For example, designers should note that when installing a video screen for audiences who are in various age groups, the content of the video is an important factor for older adults. The more important factors for children were the design elements, such as proper use of a closed space, which drew children’s curiosity and let them feel comfortable and immersed. In the same manner as the way the value of a chair while providing a place to sit is depreciated if the chair is uncomfortable — people also seemed to consider "real" needs, such as comfort rather than a simple provision of a place to sit, in spaces. Above all things, in order for an indoor public space to provide social interaction, simulating multiple senses was an important factor for intergenerational groups. Similarly, promoting laughter (including joy and fun) was one of the most important reasons that people visit a place or come to see a design. Volkswagen also exploited ‘the fun theory’, based upon the simple insight that more people change human behavior for the better if it is fun.

When considering "good" environments, policymakers and designers are currently primarily concerned with the technical aspects of the environment or the contents of programs being provided. The findings of this dissertation may serve as a mechanism to not only provides specific design directions but also to shift the focus of policymakers, designers and researchers to designs, which will facilitate social interaction. Designers must play essential roles in this process. Above all, the design of a "good" place starts from a deep understanding of human beings. Understanding the characteristics of intergenerational groups and knowing their needs will be the key to connect people and their environment.

7.4 Limitations

Limitations of this dissertation include the small number of subjects participating in the participatory design study, limited experience analyzing data of the open-ended responses from the survey and the participatory design, and focusing on the content and interaction style of the exhibitions rather than the design of the space in the observational study.

Even though the sample size in the participatory design was twelve, each individual showed a wide range of characteristics through his/her creative result (making a collage). The researcher could
understand a variety of desires about the future indoor public spaces. Thus, for the qualitative study, it did not really matter for the number of twelve that participated in the study.

When analyzing data of the open-ended responses from each participant in the survey and participatory design, the researcher tried to adopt the three perception modes in order to analyze subjective data and make them more an objective criteria. There was a limitation as to only what consider the three perception modes among a variety of methods. The researcher also did not get advice from other experts who’s work related to processing qualitative environment and design data. For future research, data analysis methods should include an inter and intra-rater evaluation by having at least two or three experts review the same data sets.

In this dissertation, the portion of the observation was a lot of the content of the exhibitions (and the use of media) rather than the design of the space. The purpose of the observation was to understand what pairs of individuals do in real indoor public spaces and to compare social interaction between intragenerational pairs and intergenerational pairs. Because the researcher was trying to observe interactions of each pair in the museum, most observation was focused on each pair who used the content of the exhibitions rather than the design of the space. The researcher also had an unobtrusive observational method, followed the pair from a distance, and recorded the behaviors of selected pair throughout their stay in the exhibition, without informing them. So there were no chances to have an interview with a pair, take a photo, and to ask them about the design of the space in the museum.

7.5 Suggestions for Future Research

Though the researcher used three different methods of investigation, the findings of this dissertation are limited to a range of the included variables and the studied context. What this dissertation provides is the groundwork for further research studies that should look further to define the physical characteristics of indoor public spaces that support social interaction between older adults and children. This dissertation focused on the value of indoor public spaces, particularly
for intergenerational groups. The finding suggests the need for design policies that provide opportunities for intergenerational social interaction rather than social segregation.

There are two major challenges that await future researchers with a similar research focus:

**Demographic Comparisons**

Since the main purpose of this dissertation was to investigate whether older adults and children preferred similar indoor public spaces for social interaction, assessments were only conducted to determine whether the two age groups were similar in terms of gender and ethnicity. Since this study was conducted in the U.S.A., most participants were U.S. citizens but of various races. Cross-cultural comparisons (for example between South Korea and the U.S.A.) may extend the boundaries of knowledge for intergenerational groups’ interactions. Because South Korea is one of the fastest growing older populations in the world, there are many working couples as a result the number of older adults who are raising their grandchildren are increasing. When designing instruments for cross-cultural research, researchers need to consider many factors such as a wide range of research contexts, language variety, and distinct cultures. In spite of many problems, all these diverse factors may support the potential value of applying a systematic approach in defining an intergenerational design development instrument in order to avoid potential problems.

In addition to gender and ethnicity, socio-economic factors may also affect the type and characteristics of an ideal indoor space preferred by the both age groups (Devlin, 1994). Realizing that social status and income levels often affect educational levels obtained and the extent of life experiences realized (Isaacs, 2000), socio-economic factors may contribute to environmental preferences and resulting design recommendations.

One limitation associated with the reported results of this dissertation is the age range of the younger group included in the investigations. The 'children' group was defined as between the ages of 7 and 14 years based on previous investigations including children. Even though children with these age ranges can describe their own behavior in relationship to others, they are likely to spend most of their time in school during weekdays and prefer to play with their peers rather than adults. Caring for children between the ages 3 and 6 years, may be more stressful for older adults since
more vigilance is required of any supervising adult at this developmental stage compared to the age range included in this investigation. Thus, future researchers should consider the relationship between older adults and younger children.

**Urban vs. Rural Settings**

Though the focus of most intergenerational studies has involved older adults and children who live in urban settings, many of the individuals in these two age groups live in rural areas and little research has been conducted in those settings. It is important for researchers and designers to understand the preferences of the people who live in small towns and the range of indoor public spaces that they experience.

**Extended Observation Research**

The researcher focused on observing people's behaviors in a museum based upon the results of the first two research studies. In these studies, both age groups agreed that museums were the best indoor public spaces to spend their leisure time with intergenerational friends. By observing the interactions between pairs of visitors in the two age groups, the researcher found unexpected behaviors, which were not identified through the survey or the participatory design focus group. If the researcher has observed behaviors in different types of indoor public spaces, the result of this study may have been affected and differently applied recommendations for indoor public spaces.
REFERENCES


Appendix A: Document Used in Survey

A-1 Institution Review Board Approval

From: Carol Mickelson, IRB Coordinator
North Carolina State University
Institutional Review Board

Date: May 13, 2011

Title: Surveying opinions regarding an existing public indoor space where older adults and children interact with each other

IRB#: 2022

Dear Ms. Kim,

The project listed above has been reviewed by the NC State Institutional Review Board for the Use of Human Subjects in Research, and is approved for one year. This protocol will expire on May 12, 2012 and will need continuing review before that date.

NOTE:
1. You must use the attached consent forms which have the approval and expiration dates of your study.
2. This board complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU the Assurance Number is: FWA00003429.
3. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.
4. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website.
5. Your approval for this study lasts for one year from the review date. If your study extends beyond that time, including data analysis, you must obtain continuing review from the IRB.

Sincerely,

Carol Mickelson
NC State IRB
A-2 Consent Form for Older Adults and Children

North Carolina State University * College of Design

OLDER ADULT INFORMED CONSENT FORM for RESEARCH

Title of Study: Surveying opinions regarding an existing public indoor space where older adults and children interact with each other

Principal Investigator Hyunjee Kim  Faculty Sponsor Sharon Joines

What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to suggest a guideline an existing indoor public space to support the quality of life for older adults and children. With the fast growth of older population, more elderliness started to take care of their grandchildren. These social phenomena indicate that the relationship between those two groups is more closely connected than it did in any other time. Consequently, meeting the needs of both groups has grown into a significant issue. In order to develop the guidelines, I need to collect opinions of older adults and children regarding how they to use and why they come to indoor public space.

What will happen if you take part in the study?
1. You will be asked to complete several questions that include rating the level of the importance, completion of short survey questionnaires.
2. You will also be asked demographic information will be asked about your age, gender, and ethnicity.
3. Total time for your participation is expected to be 20~30 minutes.
Risks
There should be no risk to you from the questions - there is no right or wrong answers. Your answers and your information are confidential. If at any time you are uncomfortable, you are allowed to discontinue your participation in this survey without penalty or risk of injury to you.

Benefits
There are no direct benefits to you for your participation. The benefit associated with this study is that researchers will be able to understand more effective and usable designs for the older adults and children, which may support a good environmental design.

Confidentiality
The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study. You will NOT be asked to write your name on any study materials so that no one can match your identity to the answers that you provide.

Compensation
There is no compensation for participation in this study.

What if you have questions about this study?
If you have questions at any time about the study or the procedures, you may contact the researcher, Hyunjee Kim at 3216 Quiet Mill Rd, Raleigh, NC 27612 or at 919-760-0806.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent To Participate
“I have read and understand the above information. I have received a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

Subject’s signature________________________________ Date ____________

Investigator's signature____________________________ Date ____________
North Carolina State University * College of Design

CHILDREN PARTICIPANT INFORMED CONSENT FORM for RESEARCH

Adult Consent and Child Assent

Title of Study: Surveying opinions regarding an existing public indoor space where older adults and children interact with each other

Principal Investigator     Hyunjee Kim
Faculty Sponsor           Sharon Joines

We are looking for children and older adults to help with a research study. Since you are an adult and are currently with a child, we are asking that you give your permission to allow the child to participate in this study. You can give your permission if you are the parent of the child or if you are the current adult supervising the child at this time.

What are some general things you should know about research studies?
You are being asked to provide your permission for the child you are with to take part in a research study. The child’s participation in this study is voluntary. The child has the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. Participants are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to suggest a guideline an existing indoor public space to support the quality of life for older adults and children. With the fast growth of older population, more elderliness started to take care of their grandchildren. These social phenomena indicate that the relationship between those two groups is more closely connected than it did in any other time. Consequently, meeting the needs of both groups has grown into a significant issue. In order to develop the guidelines, I need to collect opinions of older adults and children regarding how they to use and why they come to indoor public space.
What will happen if you take part in the study?
1. The child will be asked to complete several questions that include rating the level of the importance, completion of short survey questionnaires.
2. The child will also be asked demographic information such as the child’s age, gender, and ethnicity.
3. Total time for your participation is expected to be 20~30 minutes.

Risks
There is no minimal risk of harm. We will not ask personal information and this survey will be conducted with you present and in this area. There should be no risk from the questions - there are no rights or wrong answers. Answers and your information provided will be confidential. If at any time you or the child is uncomfortable, you and the child are allowed to discontinue your participation in this survey without penalty or risk.

Benefits
There are no direct benefits for participation. The benefit associated with this study is that researchers will be able to understand more effective and usable designs for the older adults and children, which may support a good environmental design.

Confidentiality
The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. You will NOT be asked to write your name or the child’s name on any study materials so that no one can match identities to the answers that are provided. No reference will be made in oral or written reports which could link you to the study.

Compensation
There is no compensation for participation in this study.

What if you have questions about this study?
If you have questions at any time about the study or the procedures, you may contact the researcher, Hyunjee Kim at 3216 Quiet Mill Rd, A3, Raleigh, NC 27612 or at 919-760-0806.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).
Consent To Participate
“I have read and understand the above information. I have received a copy of this form. I agree to allow the child that I am supervising at this time to participate in this study with the understanding that I (or they) may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I (or they)am otherwise entitled.”

Adult’s signature_______________________________ Date _____________

Investigator's signature_____________________________ Date _____________

Child Assent
“I understand that I am being asked to help with a research study and that I can remain with the adult that is watching over me at this time. I know that I will be asked questions about how I like the rooms in those components. I understand if I do not want to answer a question or stop doing this study, it is okay, and everyone will still like me and that I will not be in any trouble. I know that if I do not understand something the researcher says or asks, I can ask questions to help me understand.
I agree to be in this study and know that I can stop at any time, if I want.”

Child’s signature_______________________________ Date ______________
A-3 Questionnaire

Questionnaire

Subject#: ___________________      Date: ___________________

1. Imagine you and your grandparents/grandchildren go to an indoor public space in order to enjoy spending time together. Please indicate how important each component is for you when visiting an indoor public space. Rate the importance for each component.
   (1: least important, 5: most important)

<table>
<thead>
<tr>
<th>Safety/ Security</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Encourages a feeling of personal safety)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Not crowded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Wheelchair/Stroller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Privately owned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Handrails</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Wide path/walk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Barrier free</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Distinctive colors (used mark locations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Stairs (no handrails, high steps)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Security guard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Least Necessary | Most Necessary
--- | ---
| **Sense of Belonging** *(Welcoming messages/a connection to the space)* | 1 | 2 | 3 | 4 | 5 |
| 1. Natural features | | | | | |
| 2. Designed space | | | | | |
| 3. Colorful furniture | | | | | |
| 4. Open space | | | | | |
| 5. Plants/trees | | | | | |
| 6. Music | | | | | |
| 7. Cozy feeling | | | | | |
| 8. Beautiful/attractive | | | | | |
| 9. Peace/quiet | | | | | |
| 10. General lighting | | | | | |

### Least Necessary | Most Necessary
--- | ---
| **Multiple Activities** *(Flexible/accommodates lot of uses)* | 1 | 2 | 3 | 4 | 5 |
| 1. Watching | | | | | |
| 2. Sports/games | | | | | |
| 3. Gardening | | | | | |
| 4. Talking | | | | | |
| 5. Using internet | | | | | |
| 6. Stores/shopping | | | | | |
| 7. Food/eating | | | | | |
| 8. Meeting place | | | | | |
| 9. Cafe | | | | | |
| 10. Reading books | | | | | |
### Differing physical abilities
(Supports mobility/people of all ages can get around)

<table>
<thead>
<tr>
<th>Least Necessary</th>
<th>Most Necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Playing</td>
<td>5</td>
</tr>
<tr>
<td>2 Sitting/Resting</td>
<td>4</td>
</tr>
<tr>
<td>3 Tables</td>
<td>3</td>
</tr>
<tr>
<td>4 Different ages</td>
<td>2</td>
</tr>
<tr>
<td>5 Child-centered interior</td>
<td>1</td>
</tr>
<tr>
<td>6 Adult-centered interior</td>
<td></td>
</tr>
</tbody>
</table>
2. Please write down the specific name and location of favorite public indoor space located in greater Triangle area to visit with a friend.

_________________________________________________________________________

2.2 What is it about your favorite public indoor space that makes it supportive for visiting with a friend?

_________________________________________________________________________

3. What are three words that describe your vision of a future indoor public space experience?

_________________________________________________________________________

• Please answer the following questions.

We will not be able to match these answers to you.

* Your Age ____________

* Gender: M ___ F ___

* Ethnicity: African ___ Asian ___ Native American ___
Cocaine ___ Latino ___ Other ___

Thank you so much for letting us know what places are most valuable to you!
A-4 Recruitment Scripts

**Recruitment Script (for older adult)**

Hello my name is Hyunjee Kim, a Ph. D student in the College of Design at NCSU. I am conducting a research study for my dissertation. The purpose of this study is to create a guideline for redesigning existing indoor public spaces to support the quality of life for older adults and children. To develop the guideline I want to know the opinions of older adults and children regarding how they to use and why they come to the indoor public spaces.

I am interested in recruiting two groups of people, an ‘older’ group and a ‘child’ group, to participate in my survey. The results will be used in the development of design guidelines to improve the creation of public indoor spaces that encourage intergenerational interaction for the quality of life.

The study will take 20–30 minutes. During this time I will ask you questions about you and your use of spaces and will ask you to review some photos of indoor public spaces. We would not have to go anywhere to complete the study – we could sit right here.

Would you be willing to participate in my study?
Recruitment Script (for child)

A-read to adult to recruit a child

Hello my name is Hyunjee Kim, a Ph. D student in the College of Design at NCSU. I am conducting a research study for my dissertation. The purpose of my study is to create a guideline for redesigning existing indoor public spaces to support the quality of life for older adults and children. To develop a guideline, I want to know the opinions of children regarding how they to use and why they come to indoor public spaces.

The results will be used in the development of design guideline to improve the creation of public indoor spaces that encourages intergenerational interaction for the quality of life. The study will take 20–30 minutes. During this time, I will ask the child with you several questions about his/her use of spaces and will ask him/her to review some photos of indoor public spaces. There is no risk of harm to the participant (the child with you) and I will not ask him/her any personal information. We would not have to go anywhere to complete the study—we could sit right here.

Would you let your him/her participate in my study if he/she is willing?

If yes from adult with child....

B-read to child

Hello, my name is Hyunjee Kim, a Ph. D student in the College of Design at NCSU. I am studying how to create better places for adults and children to use by redesigning existing indoor public spaces. To develop a guideline for creating better space, I want to know your opinions about how you use and why you come to indoor public spaces.

This will take 20–30 minutes. During this time, I will ask you questions about your use of spaces and will ask you to look at and give me your opinions about some photos of indoor public space.

Would you be interested in participating in my study for my school work?

If you have any questions please call me, Hyunjee Kim:

- Ph. D student, Design for Health and Well-being, College of Design, NCSU
- Cell phone number: 919 760 0806
- Email address: hjkim2@ncsu.edu
- Home address: 3216 Quiet Mill Rd, A3, Raleigh, NC 27612
Appendix B: Document Used in Participatory Design

B-1 Institution Review Board Approval

From: Carol Mickelson, IRB Coordinator
North Carolina State University
Institutional Review Board

Title: Creating “Make tools” to listen to opinions regarding an existing public indoor space where older adults and children interact with each other

IRB#: 2071

Dear Ms. Kim,

The project listed above has been reviewed by the NC State Institutional Review Board for the Use of Human Subjects in Research, and is approved for one year. This protocol will expire on June 15, 2012 and will need continuing review before that date.

NOTE:

1. You must use the attached consent forms which have the approval and expiration dates of your study.

2. This board complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU the Assurance Number is: FWA00003429.

3. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.

4. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website.

5. Your approval for this study lasts for one year from the review date. If your study extends beyond that time, including data analysis, you must obtain continuing review from the IRB.

Sincerely,

Carol Mickelson
NC State IRB
Recruitment Script (for older adult)

Hello, my name is Hyunjee Kim, a Ph.D. student in the College of Design at NCSU. I am conducting a research study for my dissertation. The purpose of this study is to develop guidelines for redesigning an existing indoor public space, which supports the quality of life for older adults and children. To develop these guidelines, I want to know your opinions and ideas regarding why you would come and how you would use indoor public spaces.

I am interested in recruiting two groups of people, an ‘older’ group and a ‘child’ group, to participate in my survey. The results will be used in the development of design guidelines to improve the creation of public indoor spaces that encourage intergenerational interaction for the quality of life.

The study will take 60–70 minutes. During this time you will participate in three sessions
- The first activity is to complete questions about your use of indoor public spaces.
- The second activity is the making of collages using images and words that I gave you. You will be asked to create your “own” indoor public space that you would want to use during this activity.
- The third activity is to present and share your ideas and what you creat with other adults in the study.

Would you be willing to participating in my study?
Recruitment Script (for child)

Hello, my name is Hyunjee Kim, a Ph.D. student in the College of Design at NCSU. I am studying how to create better places for adults and children to use by redesigning existing indoor public spaces. To develop guidelines for creating better spaces, I want to know your opinions about why you would come and how you use indoor public spaces.

The study will take 60–70 minutes. During this time you will participate in three sessions:

- The first activity is to complete questions about your use of indoor public spaces.
- The second activity is making collages using images and words that I gave you. You will be asked to create your “own” indoor public space that you would want to use during this activity.
- The third activity is to present and share your ideas and what you create with other children in the study.

Would you be willing to participate in my study?
B-3 Consent Forms for the Older and Children Group

North Carolina State University * College of Design

OLDER ADULT INFORMED CONSENT FORM for RESEARCH

Title of Study  Creating “Make tools” to listen to opinions regarding an existing public indoor space where older adults and children interact with each other

Principal Investigator      Hyunjee Kim      Faculty Sponsor      Sharon Joines

What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to develop design guidelines useful when redesigning an existing indoor public space to support the quality of life for older adults and children. With the fast growth of older populations, older adults are taking care of their grandchildren more often. This social phenomenon may indicate that the relationship between those two groups is more closely connected than it has been in any other time. Consequently, meeting the needs of both groups has grown into a significant issue. In order to develop the guidelines to redesign suitable indoor public spaces you will use a participatory design method. The participatory design approach allows an individual to participate in the design process by articulating and creating solutions using toolkits to express themselves. By allowing participants to create and express their ideas by making solutions, the researcher can directly reflect on their ideas, solutions, and opinions.
**What will happen if you take part in the study?**

1. During the data collection session, you will be asked to participate in three activities including complete a workbook, create collages, and participate in a group discussion with the other participants in your study session.
   a) Filling in a workbook – this workbook contains different types of questions to collect information about memories you have. The purpose of this workbook is to assist you in recalling your experiences and feelings about public spaces. These memories may help you to generate ideas.
   b) Making collages – you will have 100 images and 100 words which serve to trigger associations about your memories. The images and words cover feelings, things, ideals, etc. that you might associate with interacting with your grandchildren.
   c) Group discussion – you will share the items you have made and your ideas with other adults participating in the study session. During the group discussions, I will record your presentation by using an audio recorder.

2. You will also be asked to provide demographic information, such as their age, gender, and ethnicity.

3. Total time for participation is expected to be 60–70 minutes.

**Risks**

There are no physical risks to you from these activities and there is no right or wrong answers. Your answers and your information are confidential. There is the potential for recalling unpleasant memories. If an unpleasant experience are recalled it is suggested that you seek help from a counselor or contact the Division of Health and Human Services, if you would like.

If at any time you are uncomfortable, you are allowed to discontinue your participation in the study activities without penalty or risk of injury to you.

**Benefits**

There are no direct benefits to you. The benefit associated with surveying this study is that researchers will be able to understand more effective and usable designs for the older adults and children to support a good environment.

**Confidentiality**

The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study. You will NOT be asked to write your name on any study materials so that no one can match your identity to the answers that you provide. You will be assigned a code number and all study materials will be labeled with this number, rather than your
name. I will keep a master list linking your name to your participant number which will be destroyed after the study is completed. Audio recordings will also be destroyed after the study is completed.

**Compensation**
There is no compensation for participation in this study.

**What if you have questions about this study?**
If you have questions at any time about the study or the procedures, you may contact the researcher, Hyunjee Kim at 3216 Quiet Mill Rd, A3, Raleigh, NC 27612 or at 919-760-0806.

**What if you have questions about your rights as a research participant?**
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

**Consent To Participate**
“I have read and understand the above information. I have received a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

Subject's signature_________________________________  Date _____________

Investigator's signature______________________________  Date _____________
What are some general things you should know about research studies?
You are being asked to provide permission for your child to take part in a research study. Your child’s participation in this study is voluntary. Your child has the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. Participants are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to develop design guidelines useful when redesigning an existing indoor public space to support the quality of life for older adults and children. With the fast growth of older populations, older adults are taking care of their grandchildren more often. This social phenomenon may indicate that the relationship between those two groups is more closely connected than it has been in any other time. Consequently, meeting the needs of both groups has grown into a significant issue. In order to develop the guidelines to redesign suitable indoor public spaces you will use a participatory design method. The participatory design approach allows an individual to participate in the design process by articulating and creating solutions using toolkits to express them self. By allowing participants to create and express their ideas by making solutions, the researcher can directly reflect on their ideas, solutions, and opinions.

What will happen if you take part in the study?
Please know that your parent or guardian will remain with you at all times during the study activities.
1. During the data collection session, your child will be asked to participate in three activities including complete a workbook, create collages, and participate in a group discussion with the other participants in your study session.

c) Filling in a workbook – this workbook contains different types of questions to collect information about memories you have. The purpose of this workbook is to assist your child in recalling their experiences and feelings about public spaces. These memories may help them to generate ideas.

d) Making collages – your child will have 100 images and 100 words to work with which serve to trigger associations about their memories. The images and words cover feelings, things, ideals, etc. that they might associate with interacting with their grandchildren.

c) Group discussion – your child will share the items they have made and their ideas with other children participating in the study session. During the group discussions, I will record your child’s presentation by using an audio recorder.

2. Your child will also be asked to provide demographic information, such as their age, gender, and ethnicity.

3. Total time for participation is expected to be 60–70 minutes.

**Risks**

There are no physical risks to your child from these activities and there is no right or wrong answers. Your child’s answers and study activities will be kept confidential. There is the potential for your child to recall unpleasant memories. If an unpleasant experience is recalled your child may stop participation at any time, if they want to. As a parent you may decide to seek help from a counselor or contact the Division of Health and Human Services if you feel this would help your child.

**Benefits**

There is no direct benefit to your child from their participation in this study. The benefit associated with surveying this study is that researchers will be able to understand more effective and usable designs for the older adults and children to support a good environment.

**Confidentiality**

The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. You will NOT be asked to write your name or the child’s name on any study materials so that no one can match identities to the answers that are provided. Your child will be provided with a participant number which will be added to all study materials, rather than their name. I will keep a master list linking your child’s name to their participant number which will be destroyed after the study is completed. Audio recordings will also
be destroyed after the study is completed. No reference will be made in oral or written reports which could link you to the study.

**Compensation**
There is no compensation for participation in this study.

**What if you have questions about this study?**
If you have questions at any time about the study or the procedures, you may contact the researcher, Hyunjee Kim at 3216 Quiet Mill Rd, A3, Raleigh, NC 27612 or at 919-760-0806.

**What if you have questions about your rights as a research participant?**
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

**Consent To Participate**
“I have read and understand the above information. I have received a copy of this form. I agree to allow to let my child participate in this study with the understanding that I may allow them to participate or to stop their participation at any time without penalty or loss of benefits to which I or they are otherwise entitled.”

Parent/Guardian’s signature___________________________ Date ____________

Investigator’s signature______________________________ Date ____________

**Child Assent**
“I understand that I am being asked to help with a research study and that I can remain with my parent during all of the study activities. I know that I will be asked questions about my experiences and I will be asked to make collages using several pictures and words. I will be also asked to share my ideas with other children in the study. I understand if I do not want to answer a question or stop doing this study, it is okay, and everyone will still like me and that I will not be in any trouble. I know that if I do not understand something the researcher says or asks, I can ask questions to help me understand. I agree to be in this study knowing that I can stop at any time, if I want.”

Child’s signature______________________________ Date ____________
B-4 Information for Workshop Activities

Dear Participant,

Welcome!! Thank you for participating in this workshop. This workshop will take approximately 60 to 70 minutes, consisting of three session elements: filling in a workbook, individual activities (collages), and group work. You will be provided with a toolkit for use during this workshop.

The kit will include:
- Various (100) images and (100) words
- Large size white paper
- Markers, glue, and scissors

Order of the workshop activities:

1. Individual activities - Filling in a workbook
   Before making collages, you will receive a small workbook with simple questions about your experiences, when you spend time with your grandparents/grandchildren. A workbook contains different types of questions and information about the memories you have. The purpose of this workbook is to assist you in recalling your experiences and feelings in order to support idea generation. This part of the study will take between 10-20 minutes to complete.

2. Individual activities - Making collages
   You will have 100 images and 100 words, which serve to trigger associations about your memories. The images and words cover feelings, things, ideals, etc. that you might associate with interacting with your grandchildren or grandparents.

   Please make your “own” collages using the images and words to describe the question:
   *What do you plan to do in your spare time in the next 5 years?* OR
   *What will you do when you visit your grandparents/grandchildren while playing in the future?*
   Use images and words to make spaces for your ideal indoor public space, where you can interact with your grandparents/grandchildren.

3. Group discussion
   You will share the items you made with your tool kit. The group will discuss the ideas that you present from your collage.
Workbook Questions

Subject#: ___________________  Date: ___________________

Please answer the following questions.

**About your typical life**

1. What is your typical weekday afternoon like?
   
   __________________________________________________________________________

2. What is your typical weekend afternoon like?
   
   __________________________________________________________________________

**About you and your friends**

3. Where do you spend your time when you meet with your friend(s)?
   
   __________________________________________________________________________

4. What do you do when you meet with your friend(s)?
   
   __________________________________________________________________________

5. How many times do you get together with your friends during one week?
   
   __________________________________________________________________________

**About you and your grandparents / grandchildren**

6. Where do you spend your time when you meet with your grandparents/grandchildren?
   
   __________________________________________________________________________

7. What do you do when you meet with your grandparents/grandchildren?
   
   __________________________________________________________________________

8. How many times do you get together with your grandchildren/grandparents during one week?
   
   __________________________________________________________________________
About people and indoor public spaces

9. Where do you visit with your grandparents/grandchildren when you go out with your grandparents/grandchildren?
__________________________________________________________________________

10. Where is your favorite public indoor space for visiting with your grandparents/grandchildren?
__________________________________________________________________________

11. Please tell us about the best indoor public space you have been to with your grandparents/grandchildren.
__________________________________________________________________________
Why?____________________________________________________________________

12. Please tell us about the worst indoor public space you have been to with your grandparents/grandchildren.
__________________________________________________________________________
Why?____________________________________________________________________

• Quick reminder:
We will not be able to match these answers to you.

* Your Age: _____________
* Gender: M ___ F ___
* Ethnicity: African ____ Asian ____ Native American ____
            Caucasian ____ Latino ____ Other ____

Thank you for completing this workbook. Let's move on to making the collages!
B-6 Materials for Creating Collages

For individual activities - Making collages

You have given 100 images and 100 words, which serve to trigger associations about your memories. The images and words cover feelings, things, ideals, etc. that you might associate with interacting with your grandchildren or grandparents.

Please make collages using the images and words as described below:

1. What do you plan to do in your spare time in the next 5 years? or What will you do, when you visit your grandparents/grandchildren while playing in the future?

Use images and words to make spaces for your ideal indoor public space, where you can interact with your grandparents/grandchildren.
<table>
<thead>
<tr>
<th>Adjective</th>
<th>Adjective</th>
<th>Adjective</th>
<th>Adjective</th>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<td>lively</td>
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<td>engagement</td>
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<tr>
<td>up</td>
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<td>cool</td>
<td>colorful</td>
<td>frightened</td>
<td>gymnastics</td>
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<tr>
<td>fine</td>
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<td>afraid</td>
<td>community center</td>
<td>activities</td>
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<tr>
<td>pleasant</td>
<td>bright</td>
<td>awkward</td>
<td>home</td>
<td>interchange</td>
</tr>
<tr>
<td>adoring</td>
<td>light</td>
<td>nervous</td>
<td>park</td>
<td>exchange</td>
</tr>
<tr>
<td>compassionate</td>
<td>magnificent</td>
<td>careful</td>
<td>town center</td>
<td>playing</td>
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<td>admiring</td>
<td>splendor</td>
<td>caution</td>
<td>amusement park</td>
<td>diversity</td>
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<tr>
<td>kind</td>
<td>splendor</td>
<td>caution</td>
<td>amusement park</td>
<td>diversity</td>
</tr>
<tr>
<td>loving</td>
<td>luxurious</td>
<td>overwhelmed</td>
<td>gallery</td>
<td>eco-sensitive</td>
</tr>
<tr>
<td>warm-hearted</td>
<td>memorial</td>
<td>cautious</td>
<td>school</td>
<td>inclusive</td>
</tr>
<tr>
<td>thankful</td>
<td>flower</td>
<td>heated</td>
<td>center</td>
<td>crowded</td>
</tr>
</tbody>
</table>
100 Images
Appendix C: Document Used in Observation

C-1 Institution Review Board Approval

From: Carol Mickelson, IRB Coordinator
North Carolina State University
Institutional Review Board

Date: June 16, 2011

Title: Observing behaviors in an existing public indoor space where older adults and children interact with each other

IRB#: 2095

Dear Ms. Kim,

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101 b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review.

NOTE:
1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.

2. Any changes to the research must be submitted and approved by the IRB prior to implementation.

3. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days.

Please forward a copy of this letter to your faculty sponsor, if applicable. Thank you.

Sincerely,

Carol Mickelson
NC State IRB
# C-2 Behavior Mapping Sheet

<table>
<thead>
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<th>Subject N.</th>
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<th>Day/Time</th>
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**Category** –
1. Touching objects from settlements
2. Video related to settlement
3. Touching objects related to frontier
4. Touching objects related to community
5. Video related to revolution
6. Activities related to family
7. Buttons related to crossroad
8. Touching objects related to together
9. Video related to crisis
10. Video related to freedom (standing)
11. Video related to vote
12. Touching objects related to vote
13. Activity related to state
14. Video related u-boat
15. Touching objects related to U-boat

1. talking/listening/
2. Look @ an object/
3. Look @ a video clip/
4. Look @ each other/
5. Touching an object/
6. Gesturing/
7. Talking a picture & related behaviors/
8. others

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<th>Time</th>
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<tr>
<th>starting</th>
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<th>Time</th>
<th>Activity</th>
<th>Category</th>
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<tbody>
<tr>
<td>2:40</td>
<td>Community Pottery</td>
<td>1. Touching objects from settlement</td>
<td>2. Video related to settlement</td>
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<td>2:25</td>
<td>The Institution of Slavery</td>
<td>3. Teaching objects related to community</td>
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<td>4:47</td>
<td>Modern Age</td>
<td>4. Video related to revolution</td>
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<td>4:59</td>
<td>1.7</td>
<td>5. Activities related to family</td>
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<td>5:29</td>
<td>2. Rolling out the barrel</td>
<td>6. Buttons related to crossroad</td>
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<td>6:44</td>
<td>2. The Decline of the Roman Empire</td>
<td>8. Video related to modern life &amp; society</td>
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<td>7:20</td>
<td>North Carolina at War</td>
<td>10. Gesturing/Touching a picture &amp; related behaviors</td>
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<td>7:51</td>
<td>NC Joins the Confederacy</td>
<td>11. Talking/Listening</td>
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<td>7:50</td>
<td>2. 1861-1865</td>
<td>12. Touching an object</td>
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<td>8:40</td>
<td>2. 1864-1865</td>
<td>13. Others</td>
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| 9:30 | 2. The Final Years | 14. Talking/Listening

**Time**

- Starting
- Ending
- Acting
- Other

**Notes**

- Modern Age
- Modern Railroad
- The Great Depression
C-3 Pictures of the 15 Designated Exhibitions

1st Exhibition
2nd Exhibition
3rd Exhibition
4th Exhibition
5th Exhibition

6th Exhibition
7th Exhibition
8th Exhibition
9th Exhibition
10th Exhibition
11th Exhibition

12th Exhibition
15th Exhibition