The Lively, Healing, and Intergenerational Semi-Open Spaces in Older Adults Care Homes' Courtyard: Joyful Older Adults and Children

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Abstract

The Lively, Healing, and Intergenerational Semi-Open Spaces in Older Adults Care Homes' Courtyard: Joyful Older Adults and Children

Sara Kariminejad

The global population of older adults is rising, projected to reach 1.4 billion by 2030, surpassing the number of children by 0.1 billion and making up around 25% of the total population. Older adults are more susceptible to anxiety due to factors such as diminished self-esteem, reduced independence (both physical and financial), limited activity and mobility, loss of social connections, and chronic illnesses. Additionally, depression and loneliness are common among older adults and often go untreated. Research shows that intergenerational activities in interactive environments can enhance self-confidence, social interaction, recognition, and intellectual development for both older adults and children.

This study aims to create an intergenerational semi-open space within the courtyards of elderly care homes, tailored to the environmental needs and preferences of older adults and children. By integrating desirable features and elements, this space promotes mental well-being for both age groups, facilitating quality time together. To understand their environmental preferences, two theoretical frameworks were applied: Ulrich's Supportive Design Theory (1991) and the Six Design Attributes by Windley and Scheidt (1980).

In the methodology, a qualitative approach using painting and writing techniques involved 25 participants, comprising 14 older adults (aged 60-95) and 9 children (aged 8-14) in Montreal. Five themes were derived from the collected data: 1. Nature, 2. Homelike, 3. Socializing, 4. Activity, and 5. Attributes of Space. The study highlighted that participants highly valued "Positive Distraction" and "Sensory Perception" as key elements in designing intergenerational spaces. "Perception of Control" was also of interest, particularly in connection with "Positive Distraction," and shared content similarities with other elements. In contrast, "Social Support" and "Sociality" were rated lower. Interestingly, all elements were mentioned by participants except for 'Legibility,' a crucial aspect of well-designed intergenerational spaces according to the 'Six Design Attributes' concept by Windley and Scheidt (1980). The study recommends that designers should still incorporate 'Legibility' into their designs, even if the participants don't mention it. Additionally, the study identified design considerations, offered recommendations, and created architectural diagrams based on the extracted themes.

Dedicated to my lovely parents: Ebrahim and Sharifeh

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1. Introduction

Older adults and children are two vulnerable groups in society who need special attention, especially in space design. In recent years, researchers have shown great interest in studying the relationship between children and older adults, as well as the benefits of intergenerational activities (Bradford, 2012; Chai & Jun, 2017; Garin et al., 2014; Larkin et al., 2010; Polat et al., 2019).

Some older adults and most children enjoy participating in intergenerational activities, such as storytelling, playing games, and cooking together. The physical environment can have an effect on strengthening or weakening social relationships and intergenerational activities among people (Norouzi, 2016). The physical environment significantly impacts both children (Bradford, 2012) and older adults (Garin et al., 2014) and can be especially effective in the emotional, social, and cognitive development of children, as well as the mental health of older adults (Norouzi, 2016).

Moreover, these physical environments play an essential role in facilitating interactive activities, such as playing together, telling stories, making memories, singing, or listening to music. Intergenerational and interactive activities enable people of all ages, particularly youngsters and older adults, to share their skills, knowledge, and experiences (Jarrott, 2011; Kaplan & Kaplan, 2002; Newman, 2014). Older adults have acquired this knowledge and experience over their lifetime through activities such as cooking and storytelling, which they can pass on to children (Norouzi et al., 2015), while children possess intrinsic abilities that others may not be aware of but can share with older adults (Holmes, 2009). Likewise, lively and intergenerational spaces can provide both adults and children with beneficial and memorable experiences (Larkin et al., 2010). In fact, these spaces, which serve as a means of intergenerational interaction, help promote and encourage creativity.

Older adults enjoy spending time with children, and since some of them are separated from their grandchildren, visiting and spending time with children brings them pleasure (Femia et al., 2008; Heyman & Gutheil, 2008). Individual activities limit social relations and isolate children and older adults, but intergenerational activities bring them closer together (Smith, 2002). If social connections between these two age groups are limited, and they spend all of their time with their peers, they may develop negative attitudes toward one another, particularly children who may develop negative attitudes toward older adults (S. Bales, Susan J. Eklund, Catherin, 2000).

Environmental features are one of the primary resources for creating pleasant moments for all age groups. These features can alleviate some of the negative feelings that children and older adults may experience during their lives. Unpleasant environments might be associated with the use of inappropriate environmental features in space design. In recent years, researchers have shown (Adams et al., 2010;

Gaminiesfahani et al., 2020; Huisman et al., 2012; Jiang, 2020; Pearson et al., 2019; Ulrich, 1991) that environmental features play a significant role in creating attractive and pleasurable environments. These environmental features also provide opportunities for intergenerational connections.

In fact, environmental features are factors related to design elements in spaces, such as views of nature, plants, aquariums, large windows, colors, dolls, TVs, high or low ceilings, movable chairs, quiet areas, comfortable furniture, paintings of trees and grass, access to music, bright graphics on walls, video games, puzzles, art projects, etc. All of these features can be categorized into three elements of the supportive design theory: positive distraction, a sense of control, and social support (Ulrich, 1991).

In this study, the preferred environmental features of older adults and children are examined through their artwork to determine their preferences and needs. These preferences are then used to inform the design of spaces that cater to their specific requirements. Older adults often grapple with isolation and depression, particularly in hospitals and elderly care homes (Mulsant & Ganguli, 1999; Zammit & Fiorini, 2015). Social engagement plays a vital role in preventing depression and improving the well-being of older adults (Mendes De Leon et al., 2003). Thus, the introduction and design of intergenerational spaces in older adults' care homes seem promising in promoting interactive activities with other individuals, especially children, to counteract isolation and depression. To create these spaces, it is essential to identify the environmental preferences of both older adults and children and incorporate them into the design. Environmental preferences encompass various factors related to the design features of spaces. The primary aim of this study is to introduce and design an intergenerational healing space for children residing near older adults' care homes and for older adults in the courtyards of these care homes. Such spaces are intended to foster opportunities for intergenerational connections, offering pleasant environmental features tailored to their preferences. These features, in turn, contribute to the mental well-being of both age groups, enabling them to spend quality time together in intergenerational spaces.

This dissertation has the potential to be a valuable resource for architectural designers, planners, and practitioners interested in developing, enhancing, or expanding intergenerational public spaces, particularly those within older adult care homes. By identifying and introducing various design principles and considerations, it offers insights that can guide future projects. Furthermore, this research may assist policymakers in facilitating the development of intergenerational spaces in Canada, ultimately promoting a win-win relationship between older adults and children. They engage in intergenerational and interactive activities within these specially designed spaces, eliminating the need to hire specific individuals for each group. The outcomes of this research-creation include:

- Attracting more attention and funding from governments for the design of intergenerational spaces in healthcare settings.

- The potential for future studies to build upon this research topic, expanding interactive and intergenerational research in various contexts.

- Promoting the idea that older adults and children can form meaningful friendships in society, offering opportunities for intergenerational connections in settings such as hospitals, kindergartens, play areas, older adult care homes, and public gardens.

- Capitalizing on the interactions between older adults and children to benefit both age groups.

This research-creation contributes significantly to the fields of architectural design and environmental psychology research, with the potential to positively impact the design of spaces for intergenerational interactions.

2. Literature Review, Background and Problem Statement

2.1. The relationship between older adults and children

The relationship between older adults, especially grandparents, and children is a complex and significant connection that holds great importance in the lives of both generations. These intergenerational relationships are characterized by emotional support, and children often find comfort and security in their grandparents during times of stress or crisis (Silverstein & Marenco, 2001). Furthermore, grandparents play a crucial role in transmitting knowledge, traditions, and cultural values to the younger generation, contributing to the preservation of family history and heritage (Bengtson & Black, 1973).

In many cases, older individuals provide essential childcare and parental support, enabling parents to balance work and other responsibilities while also offering emotional support and knowledge transfer (Fuller-Thomson et al., 1997). Research has shown that positive relationships with grandparents can enhance a child's well-being, self-esteem, and social development (Mueller & Elder, 2003). Additionally, grandparents can significantly impact a child's education by assisting with homework, participating in reading activities, and encouraging academic development (King & Elder, 1997). Their presence is particularly valuable in challenging family circumstances, as it can increase a child's resilience and coping skills (Cox & Harter, 2003).

The relationship between the elderly and children also has far-reaching implications for the well-being of both generations. Caring grandparents have a positive impact on the psychological development of individuals, nurturing mental health and security (Hayslip & Kaminski, 2005). Moreover, the support and companionship provided by senior citizens help alleviate feelings of loneliness and isolation, which are

common in the lives of older individuals (Umberson & Karas Montez, 2010). This reciprocal friendship enhances the quality of life for both age groups.

In conclusion, the relationship between the young and the old is dynamic and an essential aspect of family life. It contributes in various ways to the emotional, social, and educational growth of children while nurturing strong and lasting bonds within families. This connection plays a vital role in the development and well-being of both generations by strengthening emotional connections, enhancing resilience, and contributing to a sense of purpose and satisfaction in later life.

2.2. The benefits of intergenerational public spaces

Intergenerational public spaces have been shown to offer numerous advantages for both users and the community, as highlighted in prior studies (Nelischer & Loukaitou-Sideris, 2022).

(Cushing & Van Vliet, 2018) argue that interactions between older individuals and younger people in public places yield direct and indirect benefits for all parties involved. These benefits encompass psychological advantages, such as pro-social behavior, positive outlooks, and overall life satisfaction, as well as individual physical benefits, including maintaining active and healthy lifestyles. Moreover, there are community benefits, such as a sense of collective empowerment and an increase in volunteerism, associated with intergenerational public spaces.

For instance, in a 2017 study conducted by Dawson, the primary focus was on the experiences of older individuals participating in intergenerational exercise programs at a park in Charlotte, North Carolina. The research evaluated improvements in health, physical activity, and overall quality of life through surveys administered before and after the program. The results revealed that those who engaged in these intergenerational programs reported greater levels of enjoyment and a sense of achievement. This study underscores how intergenerational programs can enhance the physical and mental health of participants while promoting active aging and the general well-being of the community.

Shifting our attention to the younger end of the age spectrum, (Haider, 2007) emphasizes the importance of public spaces that facilitate children's ability to experience freedom, engage in play, and interact with people from different generations. These spaces encourage children to explore their surroundings independently and support their social, physical, and creative development.

From a similar perspective, (Forsyth, 2020) introduces the concept of age- and children-friendly communities as comprehensive frameworks for approaching the planning, design, and evaluation of healthy environments. These frameworks aim to create environments that are supportive of both children and older adults, fostering well-being and community development.

2.3. Physical Environment

A person's perceptions, emotions, well-being, and behavior can all be impacted by the built environment (Sanoff, 1991). It's crucial to ensure that physical surroundings can accommodate the diverse personal, social, physical, and psychological needs of individuals of varying ages and abilities when designing spaces that serve multiple generations (Kaplan et al., 2007). Additionally, these spaces should be developed to encourage relationships between all generations and provide them with the tools they need to engage in worthwhile and interesting activities. Architects must immerse themselves in the intergenerational context, gradually assimilating and understanding its completeness, to design an intergenerational space properly. To put it simply, architects should become familiar with the functional requirements and recognize the spatial needs for social engagement among older individuals and children engaging in intergenerational exchanges (Norouzi, 2016). Furthermore, while creating spaces for children, architects should consider how the space will benefit the children's caregivers in addition to the needs of the children themselves, including child development educators and intergenerational facilitators (Norouzi, 2016). As a result, young people and the elderly, as well as the community as a whole, can greatly benefit from the physical environment.

2.3.1. The Effects of Physical Environment on Children

Through contact and relationships with their immediate social and physical environment, children develop their sense of identity (Howes & Aikins, 2002). The environment around children should be created to assist their physical, social, cognitive, and emotional growth. The impact of the social or physical environment on human behavior has been modeled using the ecological systems theory. The theory argues that several environmental systems have an impact on a child's development. Formulated by Urie Bronfenbrenner, (1996), this theory offers a framework for investigating the connections between individuals' environments within their local communities and wider society using the five systems, including:

- Microsystem: Defined as the system nearest to the person and with which they have direct contact, such as their home, school, place of worship, place of employment, and neighborhoods.
- Mesosystem: Explains how the many components of a person's microsystems interact.
- Exosystem: Deals with connections between the person and secondary social contexts in which the person does not play a direct role, such as when a child's experiences at home are influenced by their parents' experiences at work.
- Macrosystem: Outlines the cultural contexts of the person's life.
- Chronosystem: Speaks about the patterning of environmental events over the course of the person's life.

According to this theoretical framework, each system has roles, norms, and regulations that impact and help mold the child's behavior. (Evans, 2006), an environmental and developmental psychologist from Cornell University, conducted research on the influence of the physical environment on children's behavior and well-being, including academic achievement, cognitive, social, and emotional development, and their relationship with their parents and peers. He examined several elements of the physical environment, including illumination, noise, and space size, and concluded that the environment had an impact on children's development both directly and indirectly through adult caregivers (i.e., the microsystem).

The relationship between social engagement and children's mental health and cognitive development has been the subject of numerous research. The following are some key points:

- Neighborhood Safety and Child Development: Children's growth greatly depends on the safety of the neighborhood where they live. (Leventhal & Brooks-Gunn, 2000) study shows that children exposed to unsafe and chaotic areas may experience higher stress levels, potentially negatively impacting their cognitive and emotional development.

- Access to Play Spaces: Encouraging children's social interaction and physical activity can be achieved by providing them with access to secure and well-designed play areas in their neighborhoods. (Veitch et al., 2006) study highlights the value of neighborhood parks and playgrounds in promoting active play, which is essential for children's physical and social development.

- Access to Nutritious Food Environments: Access to healthy food choices is crucial for a child's dietary habits and overall health. (Larson et al., 2009) studies suggest that children living in communities with limited access to healthy foods may be more likely to develop poor eating habits and face issues like childhood obesity.

- Transportation and Active Commuting: The transportation environment can affect children's levels of physical activity. Research by (McDonald et al., 2013) suggests that living in neighborhoods with safe walking and biking infrastructure can encourage children to engage in active commuting to school, promoting a healthier lifestyle and reducing the risks associated with traffic.

- Natural Play Environments: Playgrounds featuring natural elements like logs and boulders have garnered attention for their beneficial effects on children's development. According to (Fjørtoft, 2004) research, these settings can help children develop creativity, problem-solving abilities, and a stronger connection to nature.

- Green Schoolyards: The concept of "green schoolyards" involves transforming school grounds into natural settings. Research by (Kuo et al., 2018) indicates that green schoolyards not only provide opportunities for physical activity and outdoor learning but also enhance children's attention spans, cognitive abilities, and overall well-being.

- Childhood Asthma and Air Quality: The air children breathe can significantly impact their health. (Gauderman et al., 2004) study establishes a connection between air pollution and childhood asthma. Therefore, efforts to improve air quality through urban design and pollution control measures are crucial for the respiratory health of children.

These paragraphs offer a general overview of how children's physical environments can impact their health, happiness, and development. Policymakers, urban planners, and healthcare experts must comprehend these relationships to design environments that support optimal growth and health for this age group. It's important to note that the effects of the physical environment may vary depending on cultural, geographic, and socioeconomic factors, factors researchers frequently consider in their studies. As such, a well-designed environment provides children with the opportunity to explore, feel safe, and form strong relationships (Dudek, 2005; Strong-Wilson & Ellis, 2007).

2.3.2. The Effects of Physical Environment on Older Adults

Our senses are indispensable tools for comprehending the environment, processing diverse inputs, assessing input quality, and formulating responses to our surroundings. However, as individuals age, the senses of sight, hearing, smell, and touch may undergo changes. These sensory alterations can significantly influence one's connection with their environment, impacting factors such as lighting, color, glare, background noise, and even taste. Architects and environmental designers can enhance the quality of life for older individuals by recognizing the impact of their design choices on various sensory modalities and tailoring spaces to accommodate these changes. For example, age-related changes can affect the way we perceive and interact with the visual environment. As individuals age, the cells in the retina responsible for normal color vision become less sensitive, resulting in diminished brightness and reduced contrast between colors. Additionally, aging often leads to a gradual loss of peripheral vision, with the visual field shrinking by one to three degrees every decade (Heiting, 2014). Therefore, when creating spaces for the elderly, architects should pay close attention to the source of light, its intensity, distribution, brightness, and color. Additionally, they should consider materials and surfaces that reflect light and ensure luminance balance throughout the visual source.

The built environment can, on the other hand, have a positive impact on an elder's quality of life, even though natural age-related changes can have a detrimental impact on elders' ability to stay physically and socially engaged (Crews & Zavotka, 2006). Architects can assist with this issue by being aware of these difficulties and utilizing lighting and color contrast that would improve elders' quality of life. Openings to the outside, such as windows and skylights, provide significant psychological and spatial benefits because

they encourage older people to venture outside, give them a sense of time and weather, and reduce their feelings of confinement inside the structure. Elderly individuals who are blind or partially sighted may benefit from other design elements, such as the use of texture to distinguish and identify areas. One of the strongest links between smell and memory is scent, and food-related odors are some of the most enjoyable. Making bread, for example, is incredibly evocative and is often associated with a sense of being at home. Depending on the location, balconies and porches introduce sounds like birds chirping and waves, as well as aromas that are specific to certain seasons and weather conditions (Regnier, 2002). A garden, whether located inside or outside, can stimulate a variety of senses, including sound, color, and aroma.

Privacy is an important aspect of elders' lives (Duffy et al., 1986; Morgan & Stewart, 1998). Dimensions of privacy have been described concerning the physical environment as visual, acoustic, and olfactory by (Keen, 1989), and in the social environment by (Netten, 1989), as the need to have control over the level of separation and interaction from and with others. Personal space is each person's immediate environment, which should be under the control of the person using the area (Barnes & The Design In Caring Environments Study Group, 2002). Elders should have the option to choose the locations and activities they want to engage in. The freedom to choose reduces the feeling of their privacy being invaded (Brawley, 1997) and provides a sense of ownership and control that can help improve their quality of life (Willcocks et al., 1987).

Designing environments that cater to the needs of seniors can help address various competing concerns. Such environments can assist seniors in compensating for age-related deficiencies in a discreet, non-institutional manner, provide them with the privacy they require, and offer opportunities for different levels and types of social engagement. (Duffy et al., 1986) discovered that while most seniors consistently prefer designs that offer seclusion, both caregivers and designers favor spatial layouts that promote social interaction. This emphasizes the importance of involving seniors in the design process. The success of a program relies on how well the perspectives of senior participants in intergenerational programs are integrated into the assessment of spatial environment design within intergenerational communities. The setting can make a difference (Gans et al., 2009). The constructed environment affects various aspects of an individual's life experience, from children's academic achievement to the physical and social well-being of seniors, as described in the previous sections. A more effective way to understand how architecture relates to these experiences is through architectural phenomenology. Numerous studies have focused on the relationship between social engagement and older individuals' mental health and cognitive function. The following are a few important points:

- Impact of Housing on Older Adults: The physical environment significantly influences the health and quality of life for older individuals. Research conducted by (Lawton & Nahemow, 1973)

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suggests that the structure and arrangement of homes can impact the independence and mobility of older individuals.

- Natural Environments and Well-being: Being in natural settings can have positive effects on the mental and physical health of older people. Studies like those by White et al. (2010) have shown that exposure to green areas and natural settings can reduce stress, improve mood, and enhance cognitive performance in older individuals. Access to parks and other green spaces is essential for promoting active aging.

- Noise Pollution and Cognitive Health: Noise pollution in urban environments can negatively impact the cognitive health of older individuals. Research, such as that conducted by (Tzivian et al., 2015), suggests that prolonged exposure to loud noise may lead to cognitive decline in aging adults. Efforts to reduce noise pollution and create quieter urban environments can be beneficial.

- Urban vs. Rural Environments: The choice of living in urban or rural areas can significantly influence the lifestyles of older individuals. According to research by (Peel et al., 2004), older individuals in rural areas may experience better health outcomes due to increased opportunities for social interaction and physical activity in rural environments.

- Age-Related Vision and Lighting: Older individuals, due to age-related vision impairments, may be more susceptible to falls and accidents in poorly lit areas. Proper illumination in households and public settings is crucial for improving the safety and independence of older individuals with visual impairments, as emphasized in studies by (Falkenberg et al., 2019).

In the context of reviewing the literature and previous research, it becomes apparent that, although the role of well-designed environmental features, interactive activities, and engagement in supporting positive intergenerational effects is acknowledged, few studies have delved into the fundamental design principles for creating intergenerational spaces based on the preferences of the participants, especially within the courtyards of senior care homes. The identification of these principles contributes to enabling designers to take into account the needs of both older adults and children when designing a shared interactive space.

2.4. Courtyards as intergenerational spaces

In the context of the architecture and urban planning, a courtyard is a physical arrangement characterized by an enclosed or semi-enclosed area frequently encircled by walls or buildings, creating a private and regulated outdoor space. Architectural experts like Lynch (1960) contend that courtyards play a crucial role in both building design and site planning due to their versatility in serving diverse purposes across various cultural and historical contexts. These areas provide chances for social interaction, bring natural light into the building, and integrate aesthetics into the structure of the building, all of these contribute to the spatial organization of built environments.

Throughout the history of architecture, courtyards have served as gathering places for people since they are positioned as key components in the design. (Forsyth, 2020) points out that research on age-friendly environments emphasizes the vital importance of community areas and activities that foster socialization, recreational engagement, and general well-being. Therefore, courtyards can work as welcoming gathering places for people of all ages, encouraging casual conversations and enhancing belonging.

2.5. Research problem

Most of the time, older adults experience the challenges of unpleasant environments and the monotony of nursing care homes, which can have adverse effects not only on their physical health but also on their mental well-being (Cacioppo & Cacioppo, 2014; Rico-Uribe et al., 2016). For instance, hospitalization and the hospital environment can be stressful and frightening for older individuals, especially those with dementia (Hung et al., 2018). Additionally, depression is more prevalent in hospitals and older adult care homes (Mulsant & Ganguli, 1999; Zammit & Fiorini, 2015). In this context, Palazzolo (2015) asserts that anxiety and depression in older adults can result from factors such as pain, disability, medication use, reduced social interactions or emotional support, isolation, avoidance of others, and concerns about mortality. Therefore, it appears that diminished social connections and emotional support play a role in the depression and isolation experienced by older adults, and these factors are closely related to their environment and social engagement. Indeed, there exists a connection between social involvement and the mental health and overall well-being of older adults (Mendes De Leon, 2003).

Hence, the introduction and design of an intergenerational space in the courtyards of older adults' care homes can serve as a means to encourage older adults to engage in interactive activities with others, particularly children, thus alleviating their sense of isolation and depression. Moreover, it contributes to reducing negative attitudes that children may hold toward older adults (Bales et al., 2000) (Figure 1).
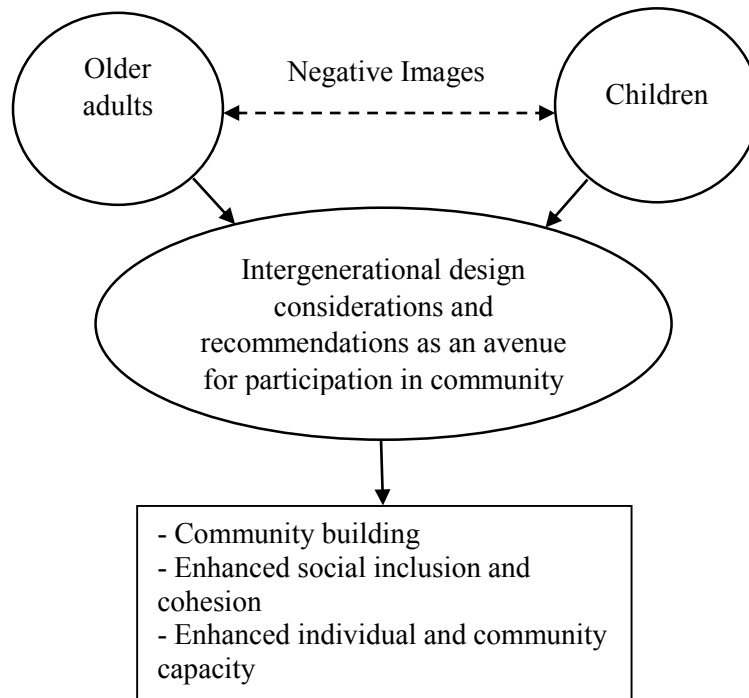
Figure 1: Conceptual Framework

Therefore, it becomes evident that taking into account the environmental needs and preferences of both children and older adults in the design of intergenerational spaces can have a positive impact on the physical and mental health of both age groups. With this understanding, the research purpose is:

- Introducing and designing an intergenerational and interactive healing space for children residing near elderly care homes and for older adults within the courtyards of elderly care homes. The primary goal is to provide opportunities for intergenerational connections. Creating a space with inviting environmental features customized to their preferences is expected to positively impact the mental health of both age groups, enabling them to enjoy quality time together in intergenerational settings (Figure 2).

In this study we try to answer three main questions listed as follows:

1. How can we introduce and design intergenerational healing spaces for both older adults and children within the courtyards of older adults' care homes?
2. What design considerations and preferences should be taken into account for developing the intergenerational space in older adults' care homes?
3. How can we translate the design considerations into actionable design recommendations?

Figure 2: Engaging older adults and children in intergenerational spaces

2.6. Outcomes

In the short term, the benefits for the participants may appear to be relatively modest. However, in the long term, this study presents a win-win scenario for both sets of participants. They mutually support each other by engaging in intergenerational and interactive activities, facili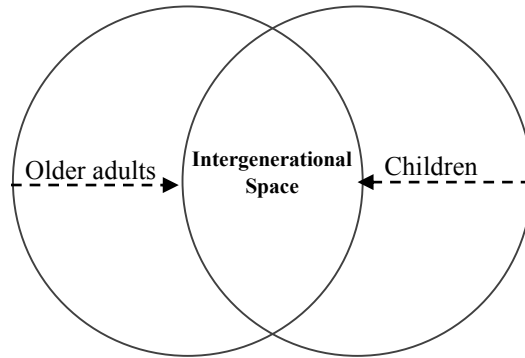tated by the designed intergenerational environments. The study eliminates the need to hire specific groups, such as supportive individuals, to engage each group within intergenerational spaces. By introducing and designing an intergenerational space in the courtyard of a senior care home, this research creates a situation where older adults can interact with children and avoid isolation, while simultaneously providing children with the opportunity to acquire knowledge, skills, and experiences from older adults.

To support these outcomes, several significant outputs could be generated, including:

- Research articles that contribute to the academic understanding of intergenerational spaces.
- Attracting more attention and funding from governments to design intergenerational spaces in healthcare settings, potentially leading to broader implementation.
- The development of this research topic, specifically focused on intergenerational healing spaces in healthcare settings, into a more extensive and ongoing area of interactive and intergenerational research for future studies.
- The promotion of the idea that older adults and children can form meaningful friendships with each other within society. This includes the creation of opportunities for intergenerational connections in various settings such as hospitals, kindergartens, play areas, older adult care homes, and public gardens, allowing both groups to benefit from their interactions.

This research holds the potential to foster positive changes in the way we design and utilize intergenerational spaces, ultimately enhancing the well-being of older adults and children and promoting a more interconnected and supportive society.

3. Theoretical framework

In my current MA degree program in design, I leveraged my academic background, particularly my experience in designing a children's hospital based on the specific needs of children. I expanded upon this experience by extending my research to focus on older adults. The primary aim of my research is to introduce and design spaces for older adults that align with their preferences, ultimately enhancing their quality of life in later years. Additionally, I aim to foster engagement between older adults and children in these spaces. One prevalent issue among older adults is the feeling of loneliness and isolation, which can lead to depression.

To address this, I took an approach where I identified what older adults prefer to see and experience during hospitalization and compared these preferences to those of children. By identifying similarities, I can create intergenerational healing spaces that cater to the preferences of both groups, effectively designing interactive and intergenerational spaces. These spaces aim to provide a more enjoyable experience for users, increasing the confidence, knowledge, and happiness of children while decreasing the sense of isolation and depression in older adults.

This approach underscores the significance of providing enhanced environmental care for older adults through the design of interactive and intergenerational healing spaces, with the potential to improve their healthcare experiences and contribute to an overall increase in their quality of life.

In the concept development phase, after a thorough review of relevant literature, I opted for a research-centered human design approach. During this phase, I explored previous "design attributes" and identified two concepts that were pertinent to my research. These concepts played a crucial role in shaping the research questions for my research-creation project. Furthermore, they facilitated the collection of data by guiding the participants in depicting their preferences and subject matter in the paintings.

3.1. Human-Centered Design

Human-Centered Design (HCD) is a problem-solving and innovation approach that places a high emphasis on understanding and addressing the requirements, desires, and actions of the final consumers or clients. It has garnered substantial acknowledgment and is broadly embraced across diverse domains such as design, technology, healthcare, and business. The primary objective of HCD is to produce solutions that not only work effectively but are also user-centric, streamlined, and pleasant to use. Provided below is an explanation of Human-Centered Design to underscore its fundamental principles and techniques:

Understanding User Needs: HCD commences by embracing a sense of empathy, a concept prominently

featured in Don Norman's book, "The Design of Everyday Things," initially published in 1988 (Norman, 2008). Norman underscores the significance of creating products with a profound comprehension of user psychology to elevate usability and contentment.

Continuous Improvement: The iterative aspect of HCD is explained by Tim Brown in his 2009 publication "Change by Design." Brown delves into the importance of prototyping, testing, and adjusting as core components of the design thinking process. He emphasizes the worth of perpetually learning from users and making well-informed design choices grounded in their input.

Emphasizing Collaboration and Diverse Expertise: The significance of collaboration and the contribution of varied viewpoints to the design process are explored in "Creative Confidence" by Tom Kelley & David Kelley, released in 2013. The authors contend that collaboration fosters the development of more inventive and user-focused solutions, a key principle of HCD.

Rapid Idea Testing through Prototyping: In HCD, prototyping plays a pivotal role, and the notion of constructing minimum viable products (MVPs) for swift idea evaluation is introduced by Eric Ries in his 2011 work, "The Lean Startup." Ries's lean startup methodology aligns with HCD's focus on generating low-fidelity prototypes for the early acquisition of user feedback.

Utilizing HCD Principles in Healthcare: Peter H. Jones in his 2013 publication, "Design for Care", examines the implementation of HCD principles within the healthcare sector. The book delves into how HCD can elevate the quality of healthcare by prioritizing the patient's experience, illustrating the extensive scope of this methodology's application.

As a result, I employed Human-Centered Design (HCD) in the final phase of my creative practice to ascertain the requirements and environmental preferences of children and older adults concerning intergenerational spaces. Consequently, while implementing the Human-Centered Design (HCD) approach with the participants, I endeavored to identify and categorize their concepts regarding their ideal spaces for socializing and spending time with others. Based on their environmental preferences and ideas, I then introduced design principles and initiated the research-creation process.

3.2. Design Attributes

Considering the characteristics of the environment and how they impact the well-being of users when constructing intergenerational and healing spaces entails two design principles. The first is the Ulrich Supportive Design Theory in 1991, which applies to enclosed spaces. The second is the set of six design attributes proposed by Windley and Scheidt in 1980, which is tailored for open spaces.

3.2.1. Ulrich's Supportive Design Theory

Ulrich's Supportive Design Theory is a fundamental concept in the realm of designing healthcare facilities. According to this theory, if the physical and social environments within medical centers contain stressful elements, they are less likely to fulfill a supportive role for patients (Ulrich, 1991). The theory comprises three key components: positive distraction, a sense of control over the environment, and social support, all of which are aimed at enhancing the physical environment of medical facilities to create a more pleasant space, promote patient well-being, and reduce stress (Andrade & Devlin, 2015).

This theory considers the utilization of user preferences in the design of spaces and consists of three primary elements:

1. Perceptions of Control (PC): This aspect concerns the user's ability to control their immediate environment. It includes features like movable furniture, the option to leave the room, or the capacity to adjust the room's temperature, providing individuals with a sense of control over their surroundings.
2. Positive Distraction (PD): Positive distraction refers to any tools or activities that help users divert their attention toward engaging and enjoyable activities. Examples include access to a TV, exposure to nature, colorful walls, music, views of nature, art, balconies, and more. These elements serve as sources of positive distraction to alleviate stress and promote well-being.
3. Social Support (SS): Social support involves interactions with supportive, caring, and helpful individuals such as family and friends. These connections provide emotional and psychological support to patients, contributing to their overall well-being (Ulrich, 1991).

3.2.2. Six Design Attributes (Windley & Scheidt, 1980)

The taxonomy of 11 environmental features developed by Windley and Scheidt (1980) serves as a valuable analytical tool for evaluating open spaces and their role in facilitating or hindering intergenerational interactions. Although this list of qualities is built on extensive prior research, it is important to note that it is neither exhaustive nor completely independent. These 11 attributes address complex person-environment relationships and are identified as sensory stimulation, legibility, comfort, privacy, adaptability, control, sociality, accessibility, density, meaning, and quality. Within this taxonomy, six attributes or characteristics are particularly critical for promoting intergenerational design: sensory stimulation, legibility, adaptability, control, sociality, and meaning (Haider & Kaplan, 2004).

Sensory perception is an important aspect of these attributes. It involves the quality and intensity of stimulation experienced through our senses. While sight is crucial, it is essential to consider all senses, particularly for children and adults who benefit from feeling, touching, and exploring their environment.

Open spaces should engage all of the senses to promote curiosity, imagination, creativity, and support children's development (Haider & Kaplan, 2004).

Legibility is a crucial concept in urban environments, and it pertains to how quickly individuals can recognize and understand the recurring patterns within the environment's components. Kevin Lynch, in 1960, defined a legible environment as one that is well-structured, distinctive, memorable, engages the senses, and encourages interaction. Understanding legibility is essential for comprehending the adaptive potential of open spaces, as the ability to form a mental representation of a city is linked to how adults and the elderly acquire and process environmental information (Haider & Kaplan, 2004).

Adaptability is another important attribute. An environment is considered adaptable if it allows users to modify or reorganize its components to suit new tasks. This capacity to alter a space, even in minor ways, positively engages both adults and children, fosters cognitive skill development, and encourages imaginative play. To create open spaces that appeal to individuals of different generations, it's vital to develop design strategies that can adapt to the evolving needs of a community and its residents (Haider & Kaplan, 2004).

Control, in the context of the environment, refers to the extent to which individuals can assert territorial claims and personalize the space. Encouraging territorial claims can be achieved through symbols and cues that prompt both children and adults to take ownership of public spaces. Children are naturally drawn to ambiguous objects and unfinished play areas, but they also prefer some level of interaction with adult activity zones. Successful urban settings typically engage both adults and children while granting each group a degree of autonomy. Therefore, urban spaces should offer usable areas for solitude and avoid imposing interactions between different user groups (Haider & Kaplan, 2004).

Sociality in open spaces refers to how they promote human interaction. A setting is more likely to encourage social interactions, both physically and symbolically, when it is welcoming and accessible. Open spaces that are visible from multiple angles tend to attract people and discourage undesirable or criminal behavior (Haider & Kaplan, 2004).

Meaning in urban open spaces represents the socio-cultural values shared by city residents, including traditions and shared memories. Successful environments leave an impression on people of all ages and convey a sense of belonging. For a city to thrive and for its residents to live happily, individuals must feel connected to their immediate surroundings (Haider & Kaplan, 2004) (Figure 3).
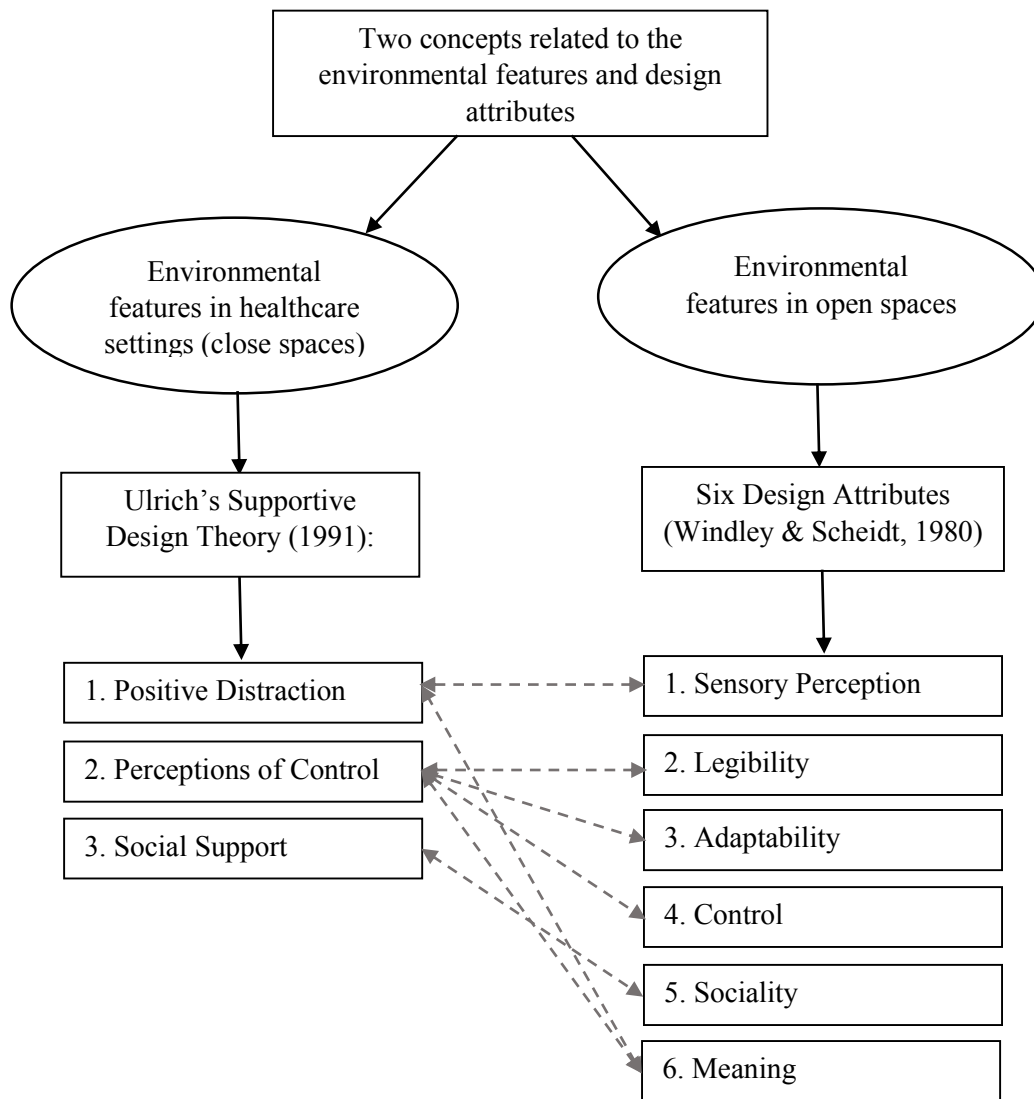
Figure 3: Theoretical framework

4. Methodology

To provide a clear and transparent account of how this study was executed (Figure 4), I will explain the methodology in three phases:

Phase 1: Finding Design Concepts through Human-Centered Design: I focus on identifying design concepts using a human-centered design approach.

Phase 2: Collecting and Analyzing Data through Painting and Writing Techniques: I collect and analyze data using painting and writing techniques.

Phase 3: Developing Design Considerations and Recommendations: I develop design considerations and recommendations based on the findings from the previous phases.

In this section, I will discuss the second phase, which involves collecting and analyzing data. This phase encompasses the use of painting and writing techniques, participant details (including numbers, ages, organizations, and dates), data extraction and collection procedures, data screening, ethical approval, and the selected method for analysis - namely, the thematic analysis method.
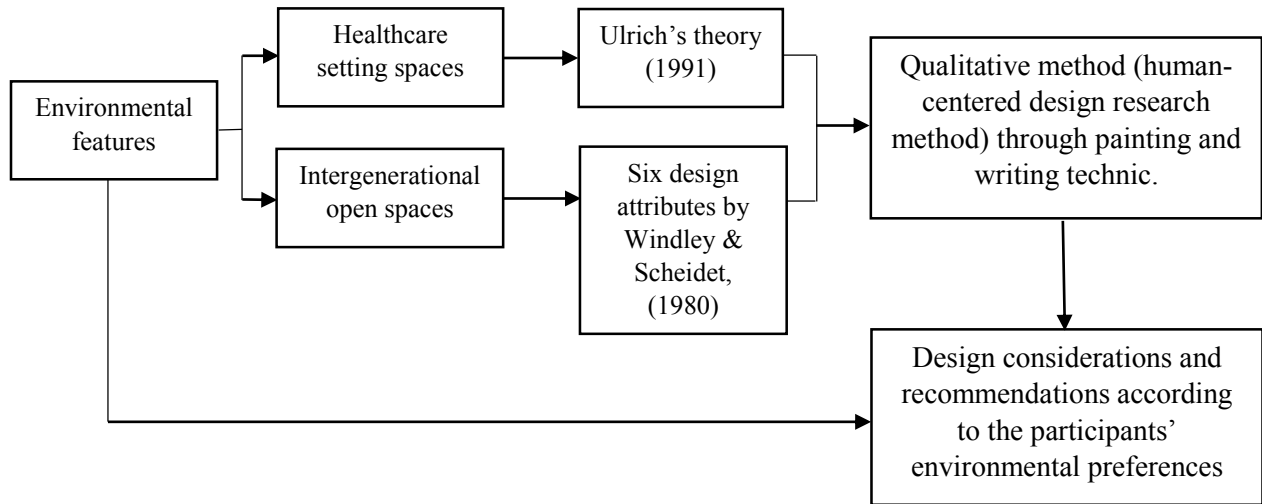
Figure 4: Methodological overview

In this study, I opted for a qualitative research method to gather data. The approach I employed for addressing the primary research questions outlined in the preceding chapter involved using a human-centered design research method, employing painting and writing techniques. The research was guided by the principles of Ulrich's supportive design theory (Ulrich, 1991) and the design attributes proposed by (Windley & Scheidt, 1980). These concepts are rooted in reducing stress and enhancing user well-being in healthcare settings. In this research, I leveraged these theories to discern the preferences and requirements of the study participants, encompassing children and older adults, in the design of semi-open intergenerational healing spaces within the courtyards of elderly care homes.

4.1. Painting and Writing Technique

One of the appropriate research methods is the use of painting as a tool for response. Painting and writing is a participatory and enjoyable activity that people of all ages, especially children and the older adults, can participate in. Painting is an unlimited technique and gives an overview of the painter's attitude (research participants) and feelings and reveals their views and beliefs. Children can express their ideas, concerns,

and experiences more effectively through drawings and illustrations than they do through verbal statements (Diem-Wille, 2018). The application of painting in psychological and anthropological analysis has a long history. Schilder and Waschler probably first used child painting as a research tool in 1935 (Eiser, 1985), and Machover in 1949 introduced the classical method of personality assessment. This technic also can be used as an individual work or as part of an extensive group research project.

4.1.1 Validity and Credibility of Painting and Writing Techniques

Paintings and other visual data have significant potential to reveal participants' feelings, opinions, and personal experiences. By capturing non-verbal expressions of ideas and emotions, researchers argue that the inclusion of visual data can enhance the validity of qualitative research (Wang & Burris, 1997). Combining textual reflections or narratives with visual data can further enhance the reliability of research findings. The work of (Rose, 2001), which emphasizes the positive effects of correlating data from various sources to ensure reliability and scientific rigor, supports this approach.

According to (Tracy, 2010), involving peer reviewers or external experts in the analysis of both visual and textual data can enhance the credibility of the research process. To establish and maintain credibility in research, it is essential to transparently disclose the methods used for data collection and analysis, encompassing both creative and written methodologies (Tracy, 2010). Additionally, as suggested by Bagnoli (2009), employing defined procedures for the analysis of visual data can also boost the reliability of research results.

In this research, participants were asked to paint on the following topics: "What would you like to see, do, feel, smell, or experience when you are in a space within the courtyard of elderly care homes?" (This painting's topic is for older adults.) and "What would you like to see, do, feel, smell, and experience when you are in a space like a park?" (This painting's topic is for children). Through their paintings, I extracted their environmental preferences. By identifying commonalities among these preferences, I can propose design considerations and recommendations to create lively, healing, and intergenerational spaces.

4.2. Participants

The research involved participants from the City of Montreal, comprising two age groups: children aged 8 to 14 years and older adults aged 60 to 95 years (see Figure 5). In total, 25 participants took part in the research, including 14 older adults and 9 children. Notably, two participants produced paintings with no discernible content; their artworks consisted of blank canvases or a few disorganized lines. I recruited participants through both in-person engagement and social media platforms, utilizing the engAGE Living Lab project and the Art Hives project (refer to Figure 6). Importantly, I did not restrict participation based on gender, ethnicity, or social class, ensuring inclusivity in the study.

Figure 5: The participants in the EngAGE Living Lab and Art Hives lab
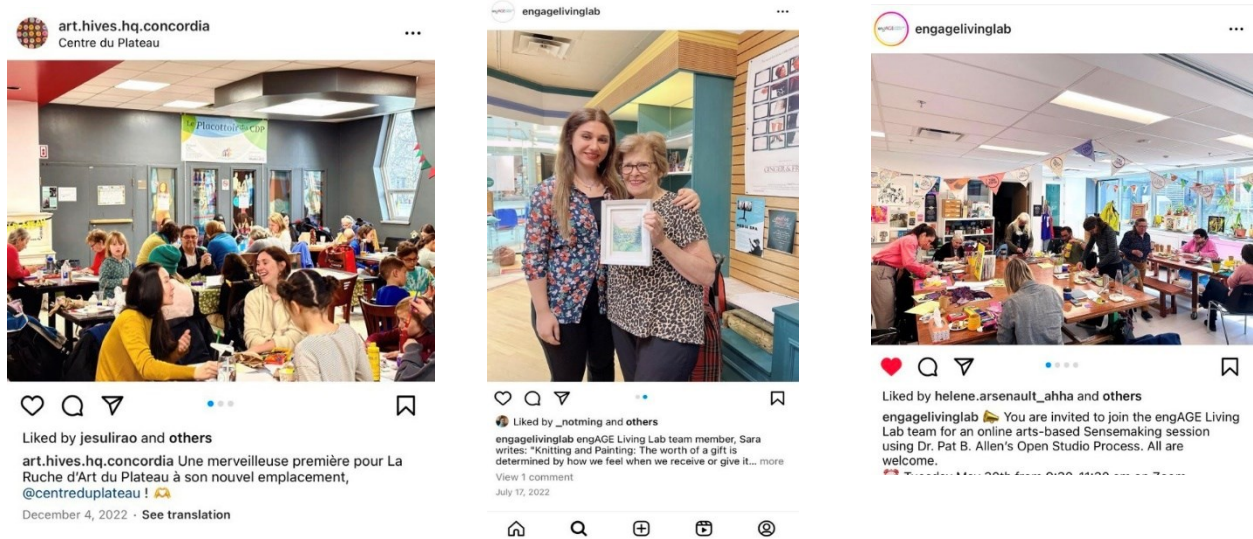
Figure 6: Access to the participants and reflect it in the social media

4.3. Invitation

Professor Janis Timm-Bottos, from the Faculty of Fine Arts at Concordia University, led both the engAGE Living Lab and the Art Hives Lab. To invite participants from both age groups, namely older adults and children, I employed a two-pronged approach. I used a social media post as well as physical posters for participants who did not have access to social media. These posters were prominently displayed in both labs (see Figure 7). Additionally, participants who preferred to complete their artwork at home were given the option to submit their paintings via email, with my contact information provided in the invitation poster shared on social media.

At the Engage Living Lab and Art Hives, participants were provided with complimentary art supplies to create their paintings, either individually or in groups. The data collection continued until the design

preferences consistently mentioned in their artworks became repetitive. The participants were not constrained by time limits and had the freedom to choose from a wide array of painting tools, such as pens, colored pencils, watercolors, and more.

Figure 7: The invitation poster for the participating in the research

4.4. Ethical approval and Collecting Data

Before collecting data from the participants, I followed the ethical guidelines of Concordia University, particularly in working with vulnerable age groups. I submitted an ethics approval application, and after approximately three months, I received the ethics approval on February 1, 2023, bearing certification number 30017124. With the approval in hand, I initiated the data collection process.

I collected the participants' paintings along with their names and ages. Each piece of data was assigned a unique code, serving as an identifier. I maintained a list that linked these codes to the respective participants' names. Only I had access to the identity of the participants, and I would share this information with my supervisor if necessary. The data was stored on my computer and secured with a password. I was the sole individual with knowledge of the password, and it was kept confidential.

For those participants who took part from their homes, they were allowed to retain their physical paintings. This was because they shared images of their artwork with me via email, as indicated in the invitation

poster. However, in cases where participants joined in person, I asked if they were comfortable with me retaining their paintings. For those who agreed, I held onto the paintings; if not, I took photographs of their artwork and promptly returned the originals to the participants.

I was careful not to assume the role of a 'skilled researcher' and instead aimed to create a non-judgmental environment in which children and older adults could easily and confidently express their opinions and preferences (Alderson, 1999). Participants in the study, which included children and older adults, were assured that their personal information and opinions would be kept private and anonymous. All participants in this research were fully informed about the research process. They received a written information sheet that covered various important aspects, including their right to discontinue their participation without facing any negative consequences. The written information sheet included the following details:

- Explanation of their specific role in the research.
- Emphasis on the importance of confidentiality and privacy.
- Reassurance regarding their ability to withdraw from the study at any time.
- Acknowledgment that participation was entirely voluntary.
- Commitment to protect participants from physical and mental harm.

The process of collecting data through the 'painting and writing technique' was more appealing to children and older adults compared to other methods such as questionnaires or interviews.

4.5. Method for Analysis: Thematic Analysis Method

Thematic analysis is a qualitative research approach used to identify, investigate, and present patterns or themes within the data. While there are various methods for thematic analysis, I will outline a six-step procedure frequently employed, based on the work of (Braun & Clarke, 2006), which is highly esteemed in the field of qualitative research (Figure 8). In this research, I employed this method to identify the themes within participants' paintings (Figure 9).

The Thematic Analysis Method

1	•**Familiarization with Data:** This entails extensively familiarizing yourself with the qualitative information you have gathered.
2	•**Generating Initial Codes:** Identifying significant data points in this step and giving them names or codes that are descriptive.
3	•**Searching for Themes:** Identifying patterns, connections, and potential themes among the codes once you've coded a fraction of the data.
4	•**Reviewing Themes:** Evaluating the themes' coherence and significance and, if necessary, reorganizing or combining the codes and themes.
5	•**Defining and Naming Themes**: Creating concise explanations for each subject and giving it titles or labels that accurately reflect its essence.
6	•**Writing the Report**: Writing a thorough explanation of the research methodology, the themes that were found, quotes or instances that back them up from the data, and an interpretation of the results.

Figure 8: The Thematic analysis method (Braun & Clarke, 2006)

A: Child, 11 years old

Themes: Homelike,
Sitting and eating together/
Socializing

B: Older adults, 73 years old

Themes: Greenery, Play,
Nature, Socializing

C: Older adults, 65 years old

Themes: Greenery/ Flowers,
Gardening
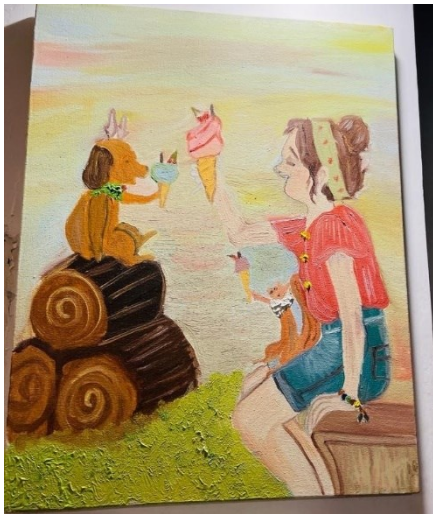
D: Child, 14 years old

Themes: Play/ Pets,
Sitting and eating together,
Greenery, Nature
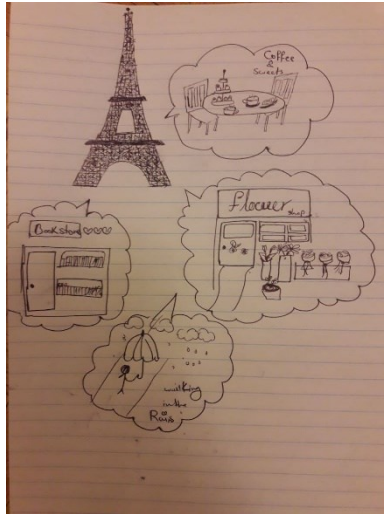
E: Child, 14 years old

Themes: Walking,
Sitting and eating together/
Reading, Flowers

F: Older adults, 93 years old

Themes: Greenery, Nature

Figure 9: Identifying the themes of participants' paintings

5. Results

After describing the context of this research through the literature review and introducing the method, I will now describe each section of the research-creation phases. I collected data from the participants and attempted to apply various codes to conceal their identities. Subsequently, I shared and analyzed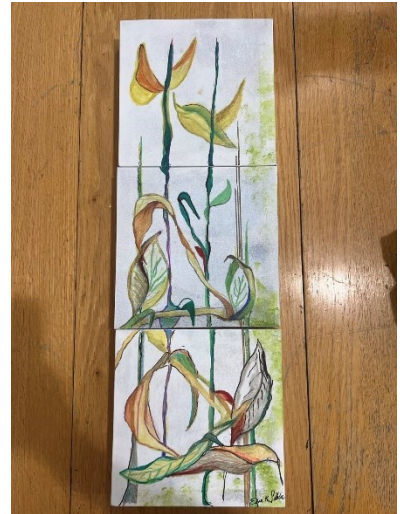 the data and its coding with a child development specialist and a psychologist specializing in drawing analysis. I then categorized the information and endeavored to identify the themes (see Table 1). Additionally, I sought to identify the relationships between different parts of the data, with Ulrich's theory elements and the Six Design Attributes by (Windley & Scheidt, 1980) (see Table 2).

According to the table 1, I extracted five themes and the details of these themes from the paintings and writings of the participants, including Nature, Homelike, Socializing, Activity, and Attributes of Space. Additionally, I considered the number of the older adults and children who mentioned these themes and details in their paintings and writings.

In the 'Nature' theme, the details included greenery, flowers, ponds/fountains, fish, and birds. Among these, greenery and flowers garnered the interest of 12 and 11 participants, respectively.

The 'Homelike' theme was mentioned by 5 participants.

The 'Socializing' theme encompassed three details: 1. Family & friends support, 2. storytelling, and 3. eating together. Seven participants expressed interest in the detail 'eating together.'

The 'Activity' theme had 9 details: 1. Exercise, 2. Play/Game, 3. Dancing, 4. Reading books, 5. Playing with pets, 6. Celebrating events, 7. Playing music, 8. Art and making art, 9. Gardening. Gardening ranked the highest with 8 participants showing interest, followed by exercise and play/game, each with 7 participants' interest.

The 'Attributes of Space' theme included 10 details: 1. Bright colors, 2. Bright & colorful lights, 3. Lighting/Sun, 4. Benches/Sitting areas, watching, enjoying/Meditation & relaxing, 5. Aquarium, 6. Big windows/Big TV/Big table, 7. Pictures on the wall, 8. Separate room/Cozy place, 9. Fireplace, 10. Adjustable and comfy furniture, and 11. Pathways with large pots and sculptures. 'Pathways with large pots and sculptures' was the most interesting detail in this theme, mentioned by 7 participants, followed by 'Benches/ Sitting & watching' mentioned by 6 and, 'Bright colors' and 'Bright & colorful lights,' each mentioned by 5 participants.

Table 1: Categorizing the data and finding themes

Themes (number of participants)	Themes' details	Older adults	Children	Participants' total
1. Nature (17)	1. Greenery	8	4	12
	2. Flowers	7	4	11
	3. Pond/ Fountain and fish	2	1	3
	4. Birds	3	2	5
2. Homelike (5)	1. Homelike	2	3	5
3. Socializing (7)	1. Family & friends support	2	3	5
	2. Story telling	2	3	5
	3. Eating together	3	4	7
4. Activity (21)	1. Exercise	4	3	7
	2. Play/ Game	3	4	7
	3. Dancing	1	2	3
	4. Reading book	2	2	4
	5. Playing with pets	3	3	6
	6. Celebrating events	2	3	5
	7. Playing music	2	2	4
	8. Art staff and making art	1	3	4
	9. Gardening	6	2	8
5. Attributes of Space (23)	1. Bright colors	3	2	5
	2. Bright & colorful lights, Lightening / Sun	3	2	5
	3. Benches/ Sitting & watching, enjoying/Meditation & relaxing	4	2	6
	4. Aquarium	2	2	4
	5. Big windows/ Big TV/ Big table	3	1	4
	6. Pictures on the wall	1	2	3
	7. Separate room/ Cozy place	2	1	3
	8. Fireplace	1	1	2
	9. Adjustable and comfy furniture	3	1	4
	10. Pathways with large pots and sculptures	4	3	7

Referring to Table 2, I organized the main themes in alignment with both Ulrich's theory and the Six design attributes by Windley & Scheidet, which I drew from the literature review for this research.

'Positive Distraction' from Ulrich's theory aligns with 'Sensory Perception' and 'Meaning' from the Six design attributes, they focusing on engaging people positively through sensory experiences. Themes such as 'Nature', 'Activity,' Attributes of Space', and 'Homelike' are relevant in this context.

'Perception of Control' from Ulrich's theory and 'Control', 'Adaptability', Meaning, and "Legibility" from the Six design attributes share similarities. They revolve around the idea of individuals having control over their environment. Themes like 'Activity', 'Homelike', and 'Attributes of Space' contain details relevant to this concept.

Ulrich's 'Social Support' and the Six design attributes' 'Sociality' both emphasize community engagement and the sense of support from others. The theme 'Socializing' aligns with this feature.

Although "Legibility" was similar with the 'Perception of Control' from Ulrich's theory, but participants didn't mention it in their paintings and writings. It appears that the idea of legibility may not have been clear to them. Thus, it is better that designers consider this concept in their designs for participants.

Furthermore, it appears that older adults and children are more interested in items that enhance their engagement with the environment, including sensory experiences such as listening, smelling, seeing, and more. In fact, 'positive distraction' from Ulrich's theory and 'Sensory Perception' from the Six design attributes play a vital role in enhancing the enjoyment and pleasure of the space for older adults and children. Afterward, items related to 'Perception of Control' from Ulrich's theory, as well as 'Control' and 'Adaptability' from the Six design attributes, garnered more interest from the participants. Finally, Ulrich's 'Social Support' and the Six design attributes' 'Sociality' were of the lowest importance in the opinions of the participants (Figure 10). In order to prioritize the results and conduct a more comprehensive evaluation, a quantitative approach will be recommended for the future of this study.

Table 2: Identifying and categorizing the relationships between the design concepts and the extracted themes

Ulrich's theory (1991)	Six design attributes by Windley & Scheidet, (1980)	Themes and their details (number of participants)
1. Positive distraction	1. Sensory perception	**Nature (17):** Greenery (12), Flowers (11), Pond/ Fountain and fish (3), Birds (5).
		Activity (21): Exercise (7), Play/ Game (7), Dancing (3), Reading book (4), Playing with pets (6), Celebrating events (5), Playing music (4), Art staff and making art (4), Gardening (8)
		Attributes of Space (23): Bright colors (5), Bright & colorful lights, Lightening / Sun (5), Benches/ Sitting & watching, enjoying/Meditation & relaxing (6), Aquarium (4), Big windows/ Big TV/ Big table (4), Pictures on the wall (3), Fireplace (2), Pathways with large pots and sculptures (7).
	2. Meaning	**Homelike (5)**
2. Perception of control	3. Control	**Activity (21):** Celebrating events (5)
	4. Adaptability	**Attributes of Space (23):**
	5. Meaning	Bright & colorful lights, Lightening / Sun (5), Benches/ Sitting, watching, enjoying/Meditation & relaxing (6),
	6. Legibility[1]	Separate room/ Cozy place (3), Adjustable and comfy furniture (4)
		Homelike (5)
3. Social support	7. Sociality	**Socializing (7):** Family & friends support (5), Storytelling (5), Eating together (7)

Legibility[1]: While "Legibility" was similar to Ulrich's 'Perception of Control' theory, participants did not mention it in their paintings and writings.
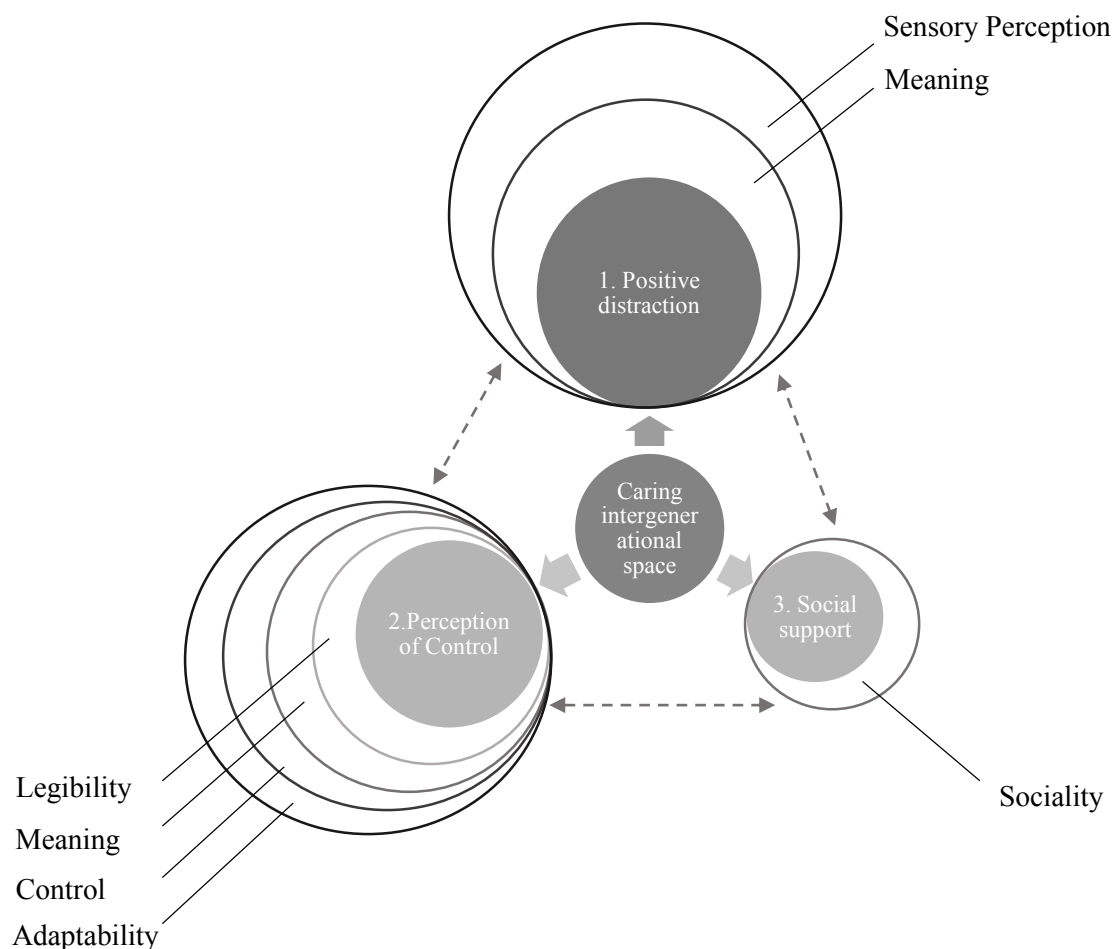
Figure 10: Caring intergenerational space

6. Design Considerations and Design Recommendations

According to the results of this research and the literature review, I identified design considerations, which are mentioned in Table 3. These considerations include being in nature, gardening, greenery, play/games, eating food, pathways, sitting and watching/relaxing, and celebrating.

Among these considerations, being in nature, gardening, and greenery received the highest rankings from both older adults and children in this research, as discussed in the results section. These activities offer significant physical and mental health benefits for both age groups, providing opportunities for relaxation, physical activity, and a connection to the natural world.

Numerous studies highlight the positive effects of nature and green spaces on users. For instance, Shanahan et al. (2016) explained that spending time in natural settings, such as walking or hiking, can improve

cardiovascular health, muscle strength, and balance in older adults. Additionally, exposure to nature has been shown to lower cortisol levels, reduce stress, and enhance mood in older adults, thereby reducing signs of depression and anxiety (Barton & Pretty, 2010). Similar benefits, such as stress reduction and improved emotional well-being, have been observed in children, potentially lowering their risk of developing anxiety and depression (Kuo, 2015). Nature-based activities have the potential to enhance cognitive function, attention, and memory in older adults, reducing their risk of cognitive decline (Bratman et al., 2015). Nature-based activities can also enhance concentration and focus, especially in children who struggle with these aspects (Faber Taylor & Kuo, 2009). Furthermore, they foster children's imagination, creativity, and problem-solving skills (Tim Gill, 2014).

To create intergenerational spaces that cater to both older adults and children while connecting them with nature and greenery, it's crucial to carefully balance accessibility, safety, and interesting design aspects. Refer to Table 3 for specific design recommendations in these areas.

Play/ Game: Among the activities that participants enjoyed in intergenerational settings were play and games. These activities can have a significant impact on the physical and emotional health of both children and older individuals, offering a multitude of advantages that enhance overall well-being.

Engaging in sports and other physical activities helps senior citizens maintain or improve their physical fitness and mobility. Research has shown that both children (Robinson et al., 2015; Tremblay et al., 2016) and older adults (Baert et al., 2011; Laver et al., 2017) can benefit from regular physical activity, including playing sports like tennis or even video games that encourage movement. Furthermore, games promote relaxation and reduce stress, which supports mental health. Playing games can help alleviate feelings of depression and anxiety in younger individuals (Russ, 2003) and older adults (Fujiwara et al., 2009). Engaging in strategy games, crossword puzzles, and memory games can help improve memory and cognitive performance in senior citizens. Games and puzzles foster children's creativity, critical thinking, and problem-solving skills (Hirsh-Pasek et al., 2008).

I have provided some design recommendations in Table 3 to assist in the development of spaces that cater to these activities.

Eating food: Another activity that engaged the participants was eating together. Eating in intergenerational settings fosters social interaction, offers opportunities for mutual support and learning, and can enhance feelings of belonging and well-being. The functions of food in intergenerational settings are numerous and essential. These include promoting social interaction and bonding, offering nutritional benefits, facilitating learning and skill transfer, preserving cultural traditions, combating ageism, and providing emotional support.

When children and older people share meals, they can engage in conversations, share stories, and strengthen familial or community bonds (Cornwell & Waite, 2009). Sharing meals can also encourage healthier eating

habits since older individuals can serve as role models for younger generations by consuming a balanced diet (Dev et al., 2013). In addition, it can aid in the preservation and transmission of cultural traditions, values, and eating customs to younger generations (Kreuter et al., 2003).

Mealtime conversations have the potential to challenge stereotypes and negative attitudes towards older people, thereby reducing ageism in society. These intergenerational mealtime rituals can benefit the physical and mental health of both children and older individuals when incorporated into family, school, and community programs. They promote emotional support, enhance nutrition education, and foster a sense of community.

Designing intergenerational spaces and dining areas can facilitate cross-generational communication, cultural exchange, and the sharing of common experiences. In Table 3, I have provided design suggestions for such areas.

Pathway: The "pathway" was an element that participants referenced in their paintings and writings. This concept pertains to actual walkways or routes that facilitate intergenerational encounters in these areas. Well-constructed pathways in intergenerational spaces can promote social interactions between younger and older individuals, leading to positive emotional experiences for both age groups.

These interactions can be particularly beneficial for older individuals who may be experiencing feelings of loneliness and depression, thus improving their mental health. For children, engaging with older generations can enhance their emotional well-being by teaching empathy, communication skills, and fostering a sense of connection (Wenger, 2017). Older adults can find a sense of purpose and meaning in participating in intergenerational programs and using pathways within such settings. According to (Erikson, 1982), they may feel valued and contribute to the happiness of the younger generation, both of which can improve their mental health.

Pathways in intergenerational environments play a crucial role in enhancing the well-being of both children and older adults. To maximize the benefits of these spaces, it is essential to consider their programming, design, and accessibility. Creating pathways in intergenerational places that are safe, easily accessible, and enjoyable for all users requires thoughtful planning. In Table 3, I have provided design recommendations for pathways in such settings.

Sitting and watching/ relaxing: The participants also expressed a preference for sitting, watching, and relaxing in these settings. The role of sitting, watching, and relaxing in intergenerational spaces can significantly impact the physical and mental health of both older individuals and children.

Creating comfortable seating areas in intergenerational spaces can help reduce stress levels and promote mental well-being. Peaceful observation and relaxation activities can contribute to a calming environment that is beneficial to both older adults and children (Ulrich, 1984). These inviting seating areas can also

facilitate generative storytelling and knowledge sharing, contributing to the preservation of cultural traditions and heritage (Iwasaki et al., 2010).

When designing intergenerational spaces with seating and relaxation areas, it is crucial to consider accessibility, ensuring that these spaces can be used by people of all physical abilities. Creating inclusive spaces fosters a sense of well-being and belonging for everyone (Imrie & Luck, 2014).

Designing welcoming and pleasant spaces that encourage conversation and relaxation is essential when creating sitting and relaxation areas in intergenerational settings that serve both elderly people and children. Table 3 contains several design recommendations related to these preferences.

Celebrating: The participants expressed an interest in celebrating events in intergenerational settings. Celebrations can have a positive impact on the physical and emotional health of both children and older adults. They provide opportunities for social interaction, emotional expression, and a sense of community. Celebratory activities often include elements of joy, laughter, and emotional expression, which can help alleviate stress for both older adults and children (Pressman et al., 2009). Physical activities such as sports, dancing, and games are often part of celebrations and can improve physical health and vitality for both age groups (Physical Activity Guidelines Advisory Committee, 2018).

Participating in conversations, storytelling, and group activities during celebrations can promote intergenerational empathy, communication, and understanding (McAdams et al., 1997).

Creating spaces that encourage celebrations with different age groups is a great way to support the physical and mental well-being of both young people and older adults. These occasions foster feelings of happiness, community, and cultural continuity, which can improve people's overall well-being and strengthen intergenerational ties.

Designing intergenerational spaces that facilitate celebratory activities should consider elements of comfort, accessibility, and adaptability. You can find some design recommendations related to celebratory spaces in Table 3.

Table 3: Design considerations and design recommendations

Themes/ Design considerations	Illustrative Quote	Specific Design Recommendations
1. Children and older adults enjoy celebrating parties together, such as birthday parties, Halloween parties, Thanksgiving parties, and more.	"I would like to take part in birthday parties and always share my birthday party with others." (Child, 12). "I like being in happy places and parties and seeing people around me." (Older adult, 70).	- **Multi-Use Areas:** Using changeable seating and arrangement options to create flexible spaces that can support a variety of celebrations, such as birthday parties, family reunions, cultural festivals, and community events (Figure 11). - **Outdoor Kitchens or Barbecue Areas.** - **Ample Seating and Tables:** Allowing both children and older people to eat, socialize, and partake in special meals while having plenty of chairs and tables available. Taking into account choices for kid-sized sitting, picnic tables, and benches (Figure 12). - **Providing a stage or performance area** where joyful activities, such as musical or dance presentations or storytelling, can occur (Figure 13). - **Sound systems and adjustable lighting** should be used in performance spaces to improve the celebratory mood. - **Using decorative elements** to enhance celebrations, such as bunting, banners, and seasonal decorations. Take into account distinctive ornaments that highlight the community's diverse cultures (Figure 14). - **Including cultural and aesthetic components**, such as paintings, sculptures, or cultural displays, that can act as conversation starters and focus points during celebrations.
2. Being in nature and gardening can be interesting activities for both	"I would like to have access to vegetables and flowers both inside and outside of the space, and use the	- **To avoid exposure to the sun**, take into account areas that are shaded by trees, pergolas, or canopies (Figure 15). - **Including sensory gardens** with scented flowers, rough plants, and wind chimes to stimulate the senses, which can be helpful for senior citizens and pique the interest of children. If older

children and older adults.	vegetables in making food." (Older adult, 65) "I like to see flowers in pots and plant them with my friends." (Child, 11)	persons are interested in gardening, they should take into account accessible raised garden beds (Figure 16). - **Creating wildlife habitats** with ponds, birdhouses, gardens, and feeders to encourage children and older adults to observe and learn about the local fauna. - **Designing nature routes or trails** with educational signage that promotes discovery and nature observation for people of all ages. arranging environmental walks with a guide to encourage learning and interaction between generations. - **Incorporating community gardens** in the play area will encourage gardening activities among people of all ages (Figure 17).
3. Making and eating foods together	"I like to make some easy foods for children, I really enjoy when I do that" (Older adults, 72). "I like to eat snacks and food with others" (Child, 14).	- **Picnic and Dining Areas:** To accommodate people of all ages, a variety of dining areas should be available, including picnic tables, outdoor dining sets, and seating designs with various heights and widths (Figure 18). - **Including raised garden** beds or community gardens where people of all ages can grow vegetables that can be used in shared meals. - **Establishing designated food preparation facilities** with cutting boards, sinks, and cupboards for storing supplies and equipment to facilitate food classes and shared meal preparation. - **Cultural Exchange Spaces:** Designing spaces that display various culinary traditions (Figure 19). - **Intergenerational Cooking Events:** Arranging potlucks and intergenerational cooking meetings to promote cultural interaction and food sharing (Figure 20).
4. Informal activities like play/games for	"I love dogs and like to walk with them outside, seeing other people's	- **Designing play areas that are appropriate for both young children and senior citizens.** For instance, providing accessible fitness equipment that is suitable for use by people of all ages and also accessible to individuals with disabilities (Figure 21).

having joyful moments in older adults and children.	dogs that play with mine." (Older adults, 93) "I like to spend my time with my dog and go for walks with her." (Child, 14)	**- Installing interactive educational stations** with content that is suitable for children and older adults, such as puzzles, games, or storyboards with natural themes. **-** With seating nearby for older adults to supervise or enjoy the sound of running water, **consider age-appropriate water features** like fountains or small streams for children to play in (Figure 22). **- installing interactive play features** like giant chess boards, musical instruments, and sensory play panels that promote communication and collaboration between generations. **- Applying sand, rocks, and other natural play objects** to encourage imaginative and creative play. These elements may stimulate children's curiosity and offer possibilities for interaction with older people.
5. The attributes of space include: a. Sitting, watching, and relaxing. b. Pathway.	"I would like my view to be the garden through a big window so that I can admire the beautiful flowers." (Older adults, 75) "I enjoy walking, running, and playing with others there." (Child, 9)	**a. Sitting, watching and relaxing:** **- Supplying a range of seating alternatives**, such as benches, seats, lounge seating, hammocks, and bean bags, to satisfy various tastes and requirements (Figure 23). **- Designing seating places** with a variety of seating styles and sizes so that young children and elderly people can sit together in comfort is known as intergenerational seating. **- Including imaginative seating components** like colorful benches or seats in the shapes of animals or objects. **- Designing seating spaces with high platforms or observation decks** that offer views of surrounding play areas, wildlife, or natural phenomena, such as binoculars or telescopes for moonlight or bird watching. **- Creating hidden seating nooks or alcoves with tall plants or privacy screens** to provide a sense of privacy and tranquility for relaxation, such as quiet spaces where people can read or meditate.

- **Utilizing modular or lightweight seating** that is simple to rearrange to fit various group sizes or activities and is also simple for people with disabilities to use.

- **Seating for Rest and Observation:** Installing various seating alternatives, such as benches with backs and armrests for senior citizens and children-friendly furniture like little stools or low benches for children (Figure 24).

- **Restorative Spaces:** Creating restorative spaces allows older people to practice mindfulness and relaxation while children participate in more peaceful activities like reading or painting. (Figure 24).

b. Pathway:

- **Dual Pathways:** To prevent conflicts, the pathways should be clearly divided into one for faster, stronger movement (such as jogging or cycling) and another for slower, leisurely strolls.

- **Considering playful elements:** Engaging children and stimulate their imaginations, considering incorporating playful items along the pathway, such as bright signage, sculptures, interactive art, and sensory play panels.

Including play areas next to the pathway so children can explore them.

- **Landscaping and Greenery:** Creating a beautiful and sensory-rich area by incorporating well-maintained landscaping with a variety of native plants, trees, and shrubs (Figure 24).

- **Including small water elements** like fountains or reflecting pools along the pathway would help to relax visitors' senses and will give children safe places to see aquatic life.

- **Universal Accessibility:** Including ramps, chairs, and activity areas for senior citizens with handrails and mobility aids (Figure 26).

Figure 11: Multi-Use area

Figure 12: Ample seating and tables

Figure 13: Providing a stage or performance area

Figure 14: Using decorative elements like colorful banners

Figure 15: Considering natural shaded areas to protect against the sun

Figure 16: Incorporating sensory

Figure 17: Interacting community gardens

Figure 18: Picnic and dining area

Figure 19: Cultural exchange spaces

Figure 20: Intergenerational cooking and different shapes of dining area

Figure 21: Multi-generational play spaces

Figure 21: Multi-generational play spaces

Figure 22: Considering age-appropriate water features

Figure 23: Providing a variety of seating options

Figure 24: Seating for rest and observation, Restorative spaces

Figure 25: Landscape and greenery

Figure 26: Universal accessibility

7. Conclusion

This study synthesizes the literature on intergenerational public spaces and their benefits for the physical and mental health of children and older adults in society. The literature and research background of the study encompass concepts related to the relationships between children and older adults as the target age groups for my research. It also covers the advantages of intergenerational spaces for both age groups, including individual health and well-being, social cohesion, solidarity, and community development. The study explores the effects of environmental features and unfriendly spaces on the well-being of individuals, especially children and older adults. For instance, previous scholars have reported that unwell-designed environmental features in spaces for older adults at the end of their lives can lead to issues like depression and anxiety. Therefore, this study aims to identify preferable environmental design features for both age groups when introducing and designing an intergenerational space in the courtyard of senior care homes, an area that lacks comprehensive research in this regard. Ulrich's Theory and six design attributes from the literature review have been instrumental in guiding this study. After collecting and analyzing data, I identified the preferred environmental features of the participants and categorized them using Ulrich's theory and the six design attributes into five themes, namely Nature, Homelike, Socializing, Activity, and Attributes of Space.

Both 'Positive Distraction' and 'Sensory Perception' were the elements of both design concepts that held the highest rank in the participants' opinions. Subsequently, 'Perception of Control' shared similarities in content with 'Adaptability,' 'Control,' 'Legibility,' and 'Meaning,' which piqued the participants' interest after 'Positive Distraction.' However, 'Social Support' and 'Sociality,' which exhibited similar content, were rated the lowest by the participants.

The results revealed that all elements of both design concepts were mentioned by the participants except for 'Legibility.' Surprisingly, 'Legibility,' one of the six design attributes, was not considered or mentioned by the participants in the study, even though it is a vital aspect of designing intergenerational spaces according to the concept of six design attributes. It appears that this element is not well-known to the participants and does not readily come to their minds as a desirable feature. While 'Legibility' undeniably plays a role in well-designed intergenerational spaces, it remains absent from participants' discussions. Therefore, designers of intergenerational spaces should consider including 'Legibility' in their designs, even if the participants did not explicitly mention it.

Moreover, based on the identified themes, I have developed comprehensive design considerations and recommendations, which have been translated into architectural diagram renders through various simulations. In the artificial intelligence (AI) section, I meticulously delineated the keywords extracted

from Table 3 under the heading "Specific Design Recommendations." Additionally, I conducted post-production enhancements on the generated images to refine the quality of the architectural diagram renders. Acknowledging the current developmental stage of artificial intelligence, especially in image production, it is crucial to underscore the inherent limitations of the technology. As noted by Bölek et al. (2023), AI, while demonstrating promise, is still evolving and may not comprehensively account for the multifaceted intricacies inherent in architectural design. This acknowledgment prompts a call for future research endeavors to scrutinize and address the nuanced challenges associated with cultural and contextual dimensions within the evolving landscape of AI-driven design. Examining how AI can evolve to accommodate and incorporate cultural sensitivities and contextual nuances will undoubtedly contribute to a more sophisticated and inclusive integration of these vital aspects into the broader architectural design discourse.

References

Adams, A., Theodore, D., Goldenberg, E., McLaren, C., & McKeever, P. (2010). Kids in the atrium:
Comparing architectural intentions and children's experiences in a pediatric hospital lobby. *Social Science & Medicine (1982)*, *70*(5), Article 5. https://doi.org/10.1016/j.socscimed.2009.10.049

Alderson, P. (1999). Children as Researchers: The Effects of Participation Rights on Research
Methodology. In *Research With Children Perspectives and Practices* (1st edition, p. 17).
Routledge.

Andrade, C. C., & Devlin, A. S. (2015). Stress reduction in the hospital room: Applying Ulrich's theory
of supportive design. *Journal of Environmental Psychology*, *41*, 125–134.
https://doi.org/10.1016/j.jenvp.2014.12.001

Baert, V., Gorus, E., Mets, T., Geerts, C., & Bautmans, I. (2011). Motivators and barriers for physical
activity in the oldest old: A systematic review. *Ageing Research Reviews*, *10*(4), 464–474.
https://doi.org/10.1016/j.arr.2011.04.001

Bagnoli, A. (2009). Beyond the standard interview: The use of graphic elicitation and arts-based methods.
Qualitative Research, *9*(5), Article 5. https://doi.org/10.1177/1468794109343625

Bales, S. S., Eklund, S. J., & Siffin, C. F. (2000). CHILDREN'S PERCEPTIONS OF ELDERS BEFORE
AND AFTER A SCHOOL-BASED INTERGENERATIONAL PROGRAM. *Educational Gerontology*, *26*(7), Article 7. https://doi.org/10.1080/03601270050200662

Barnes, S. & The Design In Caring Environments Study Group. (2002). The design of caring
environments and the quality of life of older people. *Ageing and Society*, *22*(6), Article 6.
https://doi.org/10.1017/S0144686X02008899

Barton, J., & Pretty, J. (2010). What is the Best Dose of Nature and Green Exercise for Improving Mental
Health? A Multi-Study Analysis. *Environmental Science & Technology*, *44*(10), 3947–3955.
https://doi.org/10.1021/es903183r

Bengtson, V. L., & Black, K. D. (1973). Intergenerational Relations and Continuities in Socialization. In *Life-Span Developmental Psychology* (pp. 207–234). Elsevier. https://doi.org/10.1016/B978-0-12-077150-9.50015-0

Bölek, B., Tutal, O., & Özbaşaran, H. (2023). *A systematic review on artificial intelligence applications in architecture*. https://doi.org/10.47818/DRArch.2023.v4i1085

Bradford, H. (2012). *Appropriate environments for children under three*. Routledge.

Bratman, G. N., Hamilton, J. P., Hahn, K. S., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences*, *112*(28), 8567–8572. https://doi.org/10.1073/pnas.1510459112

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brawley, E. C. (1997). *Designing for Alzheimer's disease: Strategies for creating better care environments*. Wiley.

Bronfenbrenner, U. (1996). *The ecology of human development: Experiments by nature and design*. Harvard University Press.

Brown, T., & Katz, B. (2009). *Change by design: How design thinking can transform organizations and inspire innovation*. HarperCollins Publishers.

Cacioppo, J. T., & Cacioppo, S. (2014). Social Relationships and Health: The Toxic Effects of Perceived Social Isolation: Social Relationships and Health. *Social and Personality Psychology Compass*, *8*(2), Article 2. https://doi.org/10.1111/spc3.12087

Chai, H. W., & Jun, H. J. (2017). Relationship Between Ties With Adult Children and Life Satisfaction Among the Middle-Aged, the Young-Old, and the Oldest-Old Korean Adults. *The International Journal of Aging and Human Development*, *85*(4), 354–376. https://doi.org/10.1177/0091415016685834

Cornwell, E. Y., & Waite, L. J. (2009). Social Disconnectedness, Perceived Isolation, and Health among

    Older Adults. *Journal of Health and Social Behavior*, *50*(1), Article 1.

    https://doi.org/10.1177/002214650905000103

Cox, M. J., & Harter, K. S. M. (2003). Parent-child relationships. *Well-Being: Positive Development*

    across the Life Course, *Lawrence Erlbaum Associates Publishers*, 191–204.

Crews, D. E., & Zavotka, S. (2006). Aging, Disability, and Frailty: Implications for Universal Design.

    Journal of PHYSIOLOGICAL ANTHROPOLOGY, *25*(1), Article 1.

    https://doi.org/10.2114/jpa2.25.113

Cushing, D. F., & Van Vliet, W. (2018). Intergenerational Communities as Healthy Places for Meaningful

    Engagement and Interaction. In S. Punch & R. M. Vanderbeck (Eds.), *Families,*

    Intergenerationality, and Peer Group Relations (pp. 239–265). Springer Singapore.

    https://doi.org/10.1007/978-981-287-026-1_10

Dev, D. A., McBride, B. A., Fiese, B. H., Jones, B. L., & Cho, On Behalf Of The Strong Kids R, H.

    (2013). Risk Factors for Overweight/Obesity in Preschool Children: An Ecological Approach.

    Childhood Obesity, *9*(5), Article 5. https://doi.org/10.1089/chi.2012.0150

Diem-Wille, G. (2018). *The early years of life: Psychoanalytical development theory according to Freud,*

    Klein and Bion. Routledge.

Dudek, M. (Ed.). (2005). *Children's spaces*. Architectural Press.

Duffy, M., Bailey, S., Beck, B., & Barker, D. G. (1986). Preferences in Nursing Home Design: A

    Comparison of Residents, Administrators, and Designers. *Environment and Behavior*, *18*(2),

    Article 2. https://doi.org/10.1177/0013916586182006

Eiser, C. (1985). *The psychology of childhood illness*. Springer-Verlag.

Erikson, E. H. (1982). *The life cycle completed: A review* (1st ed). Norton.

Evans, G. W. (2006). Child Development and the Physical Environment. *Annual Review of Psychology*,

    57(1), Article 1. https://doi.org/10.1146/annurev.psych.57.102904.190057

Faber Taylor, A., & Kuo, F. E. (2009). Children With Attention Deficits Concentrate Better After Walk in the Park. *Journal of Attention Disorders*, *12*(5), 402–409. https://doi.org/10.1177/1087054708323000

Falkenberg, H. K., Kvikstad, T. M., & Eilertsen, G. (2019). Improved indoor lighting improved healthy aging at home – an intervention study in 77-year-old Norwegians. *Journal of Multidisciplinary Healthcare*, *Volume 12*, 315–324. https://doi.org/10.2147/JMDH.S198763

Femia, E. E., Zarit, S. H., Blair, C., Jarrott, S. E., & Bruno, K. (2008). Intergenerational preschool experiences and the young child: Potential benefits to development. *Early Childhood Research Quarterly*, *23*(2), Article 2. https://doi.org/10.1016/j.ecresq.2007.05.001

Fjørtoft, I. (2004). Landscape as Playscape: The Effects of Natural Environments on Children's Play and Motor Development. *Children, Youth and Environments*, *14*(2), Article 2. https://doi.org/10.1353/cye.2004.0054

Forsyth, A. (2020). What is a healthy place? Models for cities and neighbourhoods. *Journal of Urban Design*, *25*(2), 186–202. https://doi.org/10.1080/13574809.2019.1662718

Fujiwara, Y., Sakuma, N., Ohba, H., Nishi, M., Lee, S., Watanabe, N., Kousa, Y., Yoshida, H., Fukaya, T., Yajima, S., Amano, H., Kureta, Y., Ishii, K., Uchida, H., & Shinkai, S. (2009). REPRINTS: Effects of an Intergenerational Health Promotion Program for Older Adults in Japan. *Journal of Intergenerational Relationships*, *7*(1), 17–39. https://doi.org/10.1080/15350770802628901

Fuller-Thomson, E., Minkler, M., & Driver, D. (1997). A Profile Of Grandparents Raising Grandchildren In The United States. *The Gerontologist*, *37*(3), Article 3. https://doi.org/10.1093/geront/37.3.406

Gaminiesfahani, H., Lozanovska, M., & Tucker, R. (2020). A Scoping Review of the Impact on Children of the Built Environment Design Characteristics of Healing Spaces. *HERD: Health Environments Research & Design Journal*, *13*(4), Article 4. https://doi.org/10.1177/1937586720903845

Gans, D., Putney, N. M., Bengtson, V. L., & Silverstein, M. (2009). The future of theories of aging. In V. L. Bengtson, M. Silverstein, N. M. Putney, & D. Gans (Eds.), *Handbook of theories of aging* (2nd ed, pp. 723–737). Springer.

Garin, N., Olaya, B., Miret, M., Ayuso-Mateos, J. L., Power, M., Bucciarelli, P., & Haro, J. M. (2014). Built Environment and Elderly Population Health: A Comprehensive Literature Review. *Clinical Practice & Epidemiology in Mental Health*, *10*(1), Article 1. https://doi.org/10.2174/1745017901410010103

Gauderman, W. J., Avol, E., Gilliland, F., Vora, H., Thomas, D., Berhane, K., McConnell, R., Kuenzli, N., Lurmann, F., Rappaport, E., Margolis, H., Bates, D., & Peters, J. (2004). The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age. *New England Journal of Medicine*, *351*(11), Article 11. https://doi.org/10.1056/NEJMoa040610

Haider, J. (2007). Inclusive Design: Planning Public Urban Spaces for Children. *Proceedings of the Institution of Civil Engineers - Municipal Engineer*, 160: 83-8.

Haider, J., & Kaplan, M. (2004). Reclaiming Open Space For The Young: An Intergenerational Perspective On Design. *Open Space, People Space 2004*. an International Conference on Inclusive Environments (Edinburgh, Scotland).

Hayslip, B., & Kaminski, P. L. (2005). Grandparents Raising Their Grandchildren: A Review of the Literature and Suggestions for Practice. *The Gerontologist*, *45*(2), Article 2. https://doi.org/10.1093/geront/45.2.262

Heiting, G. (2014). *Contact Lenses That Enhance Sports Performance*. http://www.allaboutvision.com/sportsvision/sport-contact-lenses.htm

Heyman, J. C., & Gutheil, I. A. (2008). "They Touch Our Hearts": The Experiences of Shared Site Intergenerational Program Participants. *Journal of Intergenerational Relationships*, *6*(4), Article 4. https://doi.org/10.1080/15350770802470726

Hirsh-Pasek, K., Michnick Golinkoff, R., Berk, L. E., & Singer, D. (2008). *A Mandate for Playful Learning in Preschool*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195382716.001.0001

Holmes, C. L. (2009). An Intergenerational Program with Benefits. *Early Childhood Education Journal*, *37*(2), Article 2. https://doi.org/10.1007/s10643-009-0329-9

Howes, C., & Aikins, J. W. (2002). Peer relations in the transition to adolescence. In *Advances in Child Development and Behavior* (Vol. 29, pp. 195–230). Elsevier. https://doi.org/10.1016/S0065-2407(02)80055-6

Huisman, E. R. C. M., Morales, E., Van Hoof, J., & Kort, H. S. M. (2012). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment*, *58*, 70–80. https://doi.org/10.1016/j.buildenv.2012.06.016

Hung, L., Au-Yeung, A., Helmer, C., Ip, A., Elijah, L., Wilkins-Ho, M., & Chaudhury, H. (2018). Feasibility and acceptability of an iPad intervention to support dementia care in the hospital setting. *Contemporary Nurse*, *54*(4–5), Article 4–5. https://doi.org/10.1080/10376178.2018.1505436

Imrie, R., & Luck, R. (2014). Designing inclusive environments: Rehabilitating the body and the relevance of universal design. *Disability and Rehabilitation*, *36*(16), Article 16. https://doi.org/10.3109/09638288.2014.936191

Iwasaki, Y., Coyle, C. P., & Shank, J. W. (2010). Leisure as a context for active living, recovery, health and life quality for persons with mental illness in a global context. *Health Promotion International*, *25*(4), Article 4. https://doi.org/10.1093/heapro/daq037

Jarrott, S. (2011). Where Have We Been and Where are We Going? Content Analysis of Evaluation Research of Intergenerational Programs. *Journal of Intergenerational Relationships*, *9*(1), Article 1. https://doi.org/10.1080/15350770.2011.544594

Jiang, S. (2020). Positive Distractions and Play in the Public Spaces of Pediatric Healthcare Environments: A Literature Review. *HERD: Health Environments Research & Design Journal*, *13*(3), Article 3. https://doi.org/10.1177/1937586720901707

Jones, P. H. (2013). *Design for care: Innovating healthcare experience*. Rosenfeld Media.

Kaplan, M., Haider, J., Cohen, U., & Turner, D. (2007). Environmental Design Perspectives on Intergenerational Programs and Practices: An Emergent Conceptual Framework. *Journal of Intergenerational Relationships*, *5*(2), 81–110. https://doi.org/10.1300/J194v05n02_06

Kaplan, M., & Kaplan, M. S. (Eds.). (2002). *Linking lifetimes: A global view of intergenerational exchange*. Univ. Press of America.

Keen, J. (1989). Interiors: Architecture in the lives of people with dementia. *International Journal of Geriatric Psychiatry*, *4*(5), Article 5. https://doi.org/10.1002/gps.930040504

Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. William Collins.

King, V., & Elder, G. H. (1997). The Legacy of Grandparenting: Childhood Experiences with Grandparents and Current Involvement with Grandchildren. *Journal of Marriage and the Family*, *59*(4), 848. https://doi.org/10.2307/353787

Kreuter, M. W., Lukwago, S. N., Bucholtz, D. C., Clark, E. M., & Sanders-Thompson, V. (2003). Achieving Cultural Appropriateness in Health Promotion Programs: Targeted and Tailored Approaches. *Health Education & Behavior*, *30*(2), Article 2. https://doi.org/10.1177/1090198102251021

Kuo, M. (2015). How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.01093

Kuo, M., Browning, M. H. E. M., Sachdeva, S., Lee, K., & Westphal, L. (2018). Might School Performance Grow on Trees? Examining the Link Between "Greenness" and Academic Achievement in Urban, High-Poverty Schools. *Frontiers in Psychology*, *9*, 1669. https://doi.org/10.3389/fpsyg.2018.01669

Larkin, E., Kaplan, M. S., & Rushton, S. (2010). Designing Brain Healthy Environments for Intergenerational Programs. *Journal of Intergenerational Relationships*, *8*(2), Article 2. https://doi.org/10.1080/15350771003741956

Larson, N. I., Story, M. T., & Nelson, M. C. (2009). Neighborhood Environments. *American Journal of Preventive Medicine*, *36*(1), Article 1. https://doi.org/10.1016/j.amepre.2008.09.025

Laver, K. E., Lange, B., George, S., Deutsch, J. E., Saposnik, G., & Crotty, M. (2017). Virtual reality for stroke rehabilitation. *Cochrane Database of Systematic Reviews*, *2018*(1). https://doi.org/10.1002/14651858.CD008349.pub4

Lawton, M. P., & Nahemow, L. (1973). Ecology and the aging process. In C. Eisdorfer & M. P. Lawton (Eds.), *The psychology of adult development and aging.* (pp. 619–674). American Psychological Association. https://doi.org/10.1037/10044-020

Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*, *126*(2), Article 2. https://doi.org/10.1037/0033-2909.126.2.309

Machover, K. (1949). *Personality projection in the drawing of the human figure: A method of personality investigation.* Charles C Thomas Publisher. https://doi.org/10.1037/11147-000

McAdams, D. P., Diamond, A., De St. Aubin, E., & Mansfield, E. (1997). Stories of commitment: The psychosocial construction of generative lives. *Journal of Personality and Social Psychology*, *72*(3), Article 3. https://doi.org/10.1037/0022-3514.72.3.678

McDonald, N. C., Yang, Y., Abbott, S. M., & Bullock, A. N. (2013). Impact of the Safe Routes to School program on walking and biking: Eugene, Oregon study. *Transport Policy*, *29*, 243–248. https://doi.org/10.1016/j.tranpol.2013.06.007

Mendes De Leon, C. F. (2003). Social Engagement and Disability in a Community Population of Older Adults: The New Haven EPESE. *American Journal of Epidemiology*, *157*(7), Article 7. https://doi.org/10.1093/aje/kwg028

Mendes De Leon, C. F., Berkman, L. F., & Glass, T. A. (2003). Social Engagement and Disability in a Community Population of Older Adults: The New Haven EPESE. *American Journal of Epidemiology*, *157*(7), 633–642. https://doi.org/10.1093/aje/kwg028

Morgan, D. G., & Stewart, N. J. (1998). Multiple Occupancy Versus Private Rooms on Dementia Care Units. *Environment and Behavior*, *30*(4), Article 4. https://doi.org/10.1177/001391659803000404

Mueller, M. M., & Elder, G. H. (2003). Family Contingencies Across the Generations: Grandparent-Grandchild Relationships in Holistic Perspective. *Journal of Marriage and Family*, *65*(2), 404–417. https://doi.org/10.1111/j.1741-3737.2003.00404.x

Mulsant, B. H., & Ganguli, M. (1999). Epidemiology and diagnosis of depression in late life. *The Journal of Clinical Psychiatry*, *60 Suppl 20*, 9–15.

Nelischer, C., & Loukaitou-Sideris, A. (2022). Intergenerationa l Public Space Design and Policy: A Review o f the Literature. *Journal of Planning Literature*, 1–14.

Netten, A. (1989). The effect of design of residential homes in creating dependency among confused elderly residents: A study of elderly demented residents and their ability to find their way around homes for the elderly. *International Journal of Geriatric Psychiatry*, *4*(3), Article 3. https://doi.org/10.1002/gps.930040305

Newman, S. (2014). *Intergenerational Programs* (0 ed.). Taylor & Francis. https://doi.org/10.4324/9781315783451

Norman, D. A. (2008). *The design of everyday things* (First Basic paperback, [Nachdr.]). Basic Books.

Norouzi, N. (2016). *Intergenerational Facilities: Designing Intergenerational Space through a Human Development Lens*. Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy In Architecture and Design Research.

Norouzi, N., Chen, J.-C., & Jarrott, S. E. (2015). Intergenerational Explorations: Where Everyone Has a Purpose. *Journal of Intergenerational Relationships*, *13*(3), 260–265. https://doi.org/10.1080/15350770.2015.1058282

Palazzolo, J. (2015). Depression, Anxiety and Elderly. *Annals of Depression and Anxiety*, *2*(3), Article 3.

Pearson, M., Gaines, K., Pati, D., Colwell, M., Motheral, L., & Adams, N. G. (2019). The Physiological Impact of Window Murals on Pediatric Patients. *HERD: Health Environments Research & Design Journal*, *12*(2), 116–129. https://doi.org/10.1177/1937586718800483

Peel, N., Bartlett, H., & McClure, R. (2004). Healthy ageing: How is it defined and measured? *Australasian Journal on Ageing*, *23*(3), Article 3. https://doi.org/10.1111/j.1741-6612.2004.00035.x

Physical Activity Guidelines Advisory Committee. (2018). *2018 Physical Activity Guidelines Advisory Committee Scientific Report*. U.S. Department of Health and Human Services.

Polat, S., Okçu, Y., & Çelik, Ç. (2019). Creating and utilizing spaces to enhance intergenerational learning at schools and results. *International Journal of Evaluation and Research in Education (IJERE)*, *8*(1), 1. https://doi.org/10.11591/ijere.v8i1.15914

Pressman, S. D., Matthews, K. A., Cohen, S., Martire, L. M., Scheier, M., Baum, A., & Schulz, R. (2009). Association of Enjoyable Leisure Activities With Psychological and Physical Well-Being. *Psychosomatic Medicine*, *71*(7), Article 7. https://doi.org/10.1097/PSY.0b013e3181ad7978

Regnier, V. (2002). *Design for assisted living: Guidelines for housing the physically and mentally frail*. J. Wiley.

Rico-Uribe, L. A., Caballero, F. F., Olaya, B., Tobiasz-Adamczyk, B., Koskinen, S., Leonardi, M., Haro, J. M., Chatterji, S., Ayuso-Mateos, J. L., & Miret, M. (2016). Loneliness, Social Networks, and Health: A Cross-Sectional Study in Three Countries. *PLOS ONE*, *11*(1), e0145264. https://doi.org/10.1371/journal.pone.0145264

Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses* (First edition). Crown Business.

Robinson, L. E., Stodden, D. F., Barnett, L. M., Lopes, V. P., Logan, S. W., Rodrigues, L. P., & D'Hondt, E. (2015). Motor Competence and its Effect on Positive Developmental Trajectories of Health. *Sports Medicine*, *45*(9), 1273–1284. https://doi.org/10.1007/s40279-015-0351-6

Rose, G. (2001). *Visual methodologies: An introduction to the interpretation of visual materials*. Sage.

Russ, S. W. (2003). *Play in Child Development and Psychotherapy: Toward Empirically Supported Practice* (0 ed.). Routledge. https://doi.org/10.4324/9781410609397

S. Bales, Susan J. Eklund, Catherin, S. (2000). CHILDREN'S PERCEPTIONS OF ELDERS BEFORE AND AFTER A SCHOOL-BASED INTERGENERATIONAL PROGRAM. *Educational Gerontology*, *26*(7), Article 7. https://doi.org/10.1080/03601270050200662

Sanoff, H. (1991). *Visual research methods in design*. New York: Van Nostrand Reinhold.

Shanahan, D. F., Bush, R., Gaston, K. J., Lin, B. B., Dean, J., Barber, E., & Fuller, R. A. (2016). Health Benefits from Nature Experiences Depend on Dose. *Scientific Reports*, *6*(1), 28551. https://doi.org/10.1038/srep28551

Silverstein, M., & Marenco, A. (2001). How Americans Enact the Grandparent Role Across the Family Life Course. *Journal of Family Issues*, *22*(4), Article 4. https://doi.org/10.1177/019251301022004006

Smith, K. E. (2002). *Who's minding the kids?: Child care arrangements, spring 1997*. [Washington, D.C.] : U.S. Dept. of Commerce, Economics and Statistics Administration, U.S. Census Bureau, [2002].

Strong-Wilson, T., & Ellis, J. (2007). Children and Place: Reggio Emilia's Environment As Third Teacher. *Theory Into Practice*, *46*(1), Article 1. https://doi.org/10.1080/00405840709336547

Tim Gill. (2014). The Benefits of Children's Engagement with Nature: A Systematic Literature Review. *Children, Youth and Environments*, *24*(2), 10. https://doi.org/10.7721/chilyoutenvi.24.2.0010

Tracy, S. J. (2010). Qualitative Quality: Eight "Big-Tent" Criteria for Excellent Qualitative Research. *Qualitative Inquiry*, *16*(10), Article 10. https://doi.org/10.1177/1077800410383121

Tremblay, M. S., Carson, V., Chaput, J.-P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., LeBlanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., … Zehr, L. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 (Suppl. 3)), S311–S327. https://doi.org/10.1139/apnm-2016-0151

Tzivian, L., Winkler, A., Dlugaj, M., Schikowski, T., Vossoughi, M., Fuks, K., Weinmayr, G., & Hoffmann, B. (2015). Effect of long-term outdoor air pollution and noise on cognitive and psychological functions in adults. *International Journal of Hygiene and Environmental Health*, *218*(1), Article 1. https://doi.org/10.1016/j.ijheh.2014.08.002

Ulrich, R. S. (1984). View Through a Window May Influence Recovery from Surgery. *Science*, *224*(4647), Article 4647. https://doi.org/10.1126/science.6143402

Ulrich, R. S. (1991). Effects of interior design on wellness: Theory and recent scientific research. *Journal of Health Care Interior Design*, 3, 97-109.

Umberson, D., & Karas Montez, J. (2010). Social Relationships and Health: A Flashpoint for Health Policy. *Journal of Health and Social Behavior*, *51*(1_suppl), Article 1_suppl. https://doi.org/10.1177/0022146510383501

Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & Place*, *12*(4), Article 4. https://doi.org/10.1016/j.healthplace.2005.02.009

Wang, C., & Burris, M. A. (1997). Photovoice: Concept, Methodology, and Use for Participatory Needs Assessment. *Health Education & Behavior*, *24*(3), Article 3. https://doi.org/10.1177/109019819702400309

Wenger, G. C. (2017). Intergenerational programs in schools: Design and outcomes. *International Journal of Aging & Human Development*, *85*(4), Article 4.

White, M., Smith, A., Humphryes, K., Pahl, S., Snelling, D., & Depledge, M. (2010). Blue space: The importance of water for preference, affect, and restorativeness ratings of natural and built scenes. *Journal of Environmental Psychology*, *30*(4), Article 4. https://doi.org/10.1016/j.jenvp.2010.04.004

Willcocks, D., Kellaher, L., & Peace, S. (1987). *Private Lives in Public Places*. Taylor & Francis.

Windley, P. G., & Scheidt, R. J. (1980). Person-environment dialectics: Implications for competent

    functioning in old age. In L. W. Poon (Ed.), *Aging in the 1980s: Psychological issues.* (pp. 407–

    423). American Psychological Association. https://doi.org/10.1037/10050-030

Zammit, P., & Fiorini, A. (2015). *Depressive illness in institutionalised older people in Malta.*