Housing Considerations for the Aged

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When designing for the aged, it is vital to both consider, understand, and implement the needs, challenges, and creative solutions necessary to promote the wellbeing of the older population through simultaneously utilizing design strategies that not only effective, but beautiful as well. Within this age demographic, the unique needs of memory care, ambulatory issues, and diminished vision are three categories that should be met by and improved upon by good design. Wholistic design for the aged includes considerations for finishes, furnishings, materials, and spatial design strategies to mitigate challenges posed by these categories. Good design solutions are not only necessary and well-needed for elderly populations, but they are also biblical displays of Godly compassion as well. Knowledge, research, and implementation of these strategies can powerfully impact the health and wellbeing of the elderly population through creating spaces that encourage healing, safety, and joy.

Memory Care

Key Factors: The Reality of Dementia & Alzheimer's

According to the United States Census Bureau, "the nation's 65-and-older population has grown rapidly since 2010, driven by the aging of the Baby Boomers born between 1946 and 1964" with the 65-and-older population growing by 34.2% in the past decade" (see Figure 1A, Appendix A) (US Census Bureau, 2020). Additionally, in relation to the growing older population is the rising reality of diseases like dementia and Alzheimer's. In fact, "projections are that by 2050, the number of sufferers of Alzheimer's will triple to approximately 16 million, or 18.5 percent of the over 65 population" (Fine, 2015, p. 5). Along with Alzheimer's, dementia is also "associated with long-term care placement, high health care costs, functional dependency, serious behavioral problems, mortality, and reduced quality of life" (Ferdous, 2020). Not only is

Alzheimer's the "sixth leading cause of death in the United States," but it also is the most expensive condition in the nation with "over 214 billion dollars of direct costs, including 150 billion in Medicare and Medicaid" (Fine, 2015, p. 5). There is no defined cure for this disease yet. In terms of care for these diseases, "42% and 40% of people with dementia (PwD) in the United States and in the United Kingdom, respectively, live in assisted living facilities (limited assistance with daily activities), long-term care facilities (LTCFs; skilled nursing care with daily activities), and residential care facilities (nonmedical care in home-based setting)" (Ferdous, 2020).

Oftentimes, when one spouse is diagnosed with a debilitating memory related disease, the other spouse becomes the primary caretaker and "non-institutionalized caregiving often results in an emotional and financial burden that heavily tolls the caregiver's quality of life" (see Table 1A, Appendix A) (Fine, 2015, p. 13). In the cases where "caregivers are unable to take care of a family member who is suffering from dementia, it is common to transfer the patient from home to a care institution" (Ferdous, 2020). This transition can be difficult due to changes in social, physical, and environmental surroundings. It is imperative that these spaces be designed to adequately meet the needs and challenges of these memory related diseases.

Introduction to Memory Care Design Considerations

The physical design and environment of memory care facilities can greatly impact the social interaction, mental cognition, and overall wellbeing of the residents living within these spaces. When considering spatial design needs, "features such as ambience in the environment, the use of familiar objects, furniture type and arrangement, inclusion of kitchen and residential scaled dining room, white noise, connection to nature, access to outdoor areas, privacy, use of bright light, color, temperature, wayfinding, use of smaller spaces or landmarks with simple

decision-making points, and, above all, homeliness can significantly affect a patient's mood and behavior" (Ferdous, 2020).

Those suffering from Alzheimer's or dementia are often prone to confusion, agitation, and anxiety due to the nature of their condition and the conditions of the spaces around them. As described in one systematic review on dining locations within these facilities, "a supportive dining environment can foster functional ability, maximize orientation, provide a sense of safety and security, create familiarity and homeliness, provide optimal sensory stimulation, provide opportunities for social interaction, and support privacy and personal control" (Ferdous, 2020). Both the interior and exterior environments of memory care facilities are important aspects to the health of its residents.

Interior Considerations for Memory Care

Wayfinding

Within the interior space of a memory care facility, proper wayfinding is essential to enabling the residents to find their way more easily, thus reducing agitation and distress. According to a study completed on the relationship between wayfinding and resident wellbeing, "older adult residential environments (e.g., independent living, assisted living, nursing home residences) are often especially difficult for wayfinding, with long, non-distinctive hallways and poorly differentiated routes (see Figure 2A, Appendix A) (Davis & Weisbeck 2016, p. 36). Wayfinding problems can cause anxiety, distress, and decreased interaction in individuals with dementia" (Davis & Weisbeck 2016, p. 36). Several key factors for successful wayfinding distinctiveness, color and familiarity, as well as "salient visual cues placed at key decision areas (i.e., hallway intersections, personal areas, and end of hallways" (Davis & Weisbeck 2016, p. 43). For those suffering from a memory related condition, "the ability to learn, remember, and

navigate spatial environments is an important function related to every aspect of life. Yet, in diseases such as AD, the ability to navigate through and successfully find one's way from one place to another is often impaired" (Davis & Weisbeck 2016, p. 43). Studies have shown that "it is possible to make environments more memorable-and thus more supportive of wayfinding-by using bold, colorful, familiar, meaningful, and distinctive cues" (Davis & Weisbeck 2016, p. 43).

Homelike Spaces & Spatial Planning

In a research study completed on the relationship between facility size and patient improvement, it was indicated that "small-scale facilities have positive effects on health and behavior of residents in long-term care facilities in demonstrating a higher level of positive mood, social engagement, physical functioning, and better health status compared with residents with dementia living in the traditional large-scale unit" (Lee et al., 2015 p. 90). Additionally, furniture arrangement and décor have an important role in promoting socialization. Design recommendations for creating these homelike spaces include "adequate lighting, and a layout that minimizes ambient noise to ensure congruence between the physical and social environments" as well as the "presence of meaningful objects and visual stimuli such as colors, carpet, wall decorations, photographs, fish tanks, mood lamps, walking paths, and other occupational stimuli such as books, papers, magazines, games, or stuffed animals" (Ferdous, 2020). Arrangement of furniture to promote social interactions (while also taking into consideration privacy needs) between residents can improve residents' overall mood and wellbeing.

Snoezelen Therapy

One particular integration for dementia patients for reducing agitation is the use of Snoezelen therapy. This particular form of therapy, also called controlled multisensory

environment therapy, provides patients with dementia with a unique multisensory experience that promotes sensory stimulation while simultaneously reducing mental burden" (Berkheimer et al., 2017, p. 1098). Within the Snoezelen room, a patient can "interact with sensory equipment in a supervised manner" to combat agitation often caused by sundowning, a condition in which the person suffering from dementia or Alzheimer's experiences a state of confusion usually around the late afternoon and early evening (Berkheimer et al., 2017, p. 1098).

Exterior Considerations for Memory Care

Outdoor Spaces & Biophilic Design

Access to outdoor spaces and "the opportunity to exercise helps reduce stress, which is one of the main contributors to 'challenging' behavior for people with dementia, such as anxiety, agitation and sleeplessness" (Trueland, 2017, p. 26). Not only do these outdoor spaces reduce levels of agitation, but they also have the potential to improve the feeling of independence. The design of these "outdoor therapeutic environments can provide an opportunity for multisensory stimulation through reminiscence and/or social interaction, thus proving perceived competence and improving self-esteem and relaxation" (Ferdous, 2017).

A study done on the relationship between biophilic design and ageing states that "The application of nature in space, natural analogs, and nature of the space biophilic concepts in designing housing and surrounding environment can, at the same time, strengthen social, psychological, and ecological aspects of sustainable aging" (see Figure 3A, Appendix A) (Grazuleviciute-Vileniske et al., 2020, p. 9). Access and involvement in outdoor spaces can have the potential to create meaningful and positive engagement for memory care residents. Designing for memory care considerations requires unique solutions that consider the wholistic health and wellbeing of those experiencing various forms of memory loss.

Diminished Vision

Introduction to Vision Accommodations & Current Needs

Another important aspect for consideration in caring for the elderly includes designing for diminished vision and making appropriate modifications through design decisions to meet these needs. As individuals age, there is a greater propensity for increased vision issues related to age. According to the National Eye Institute, age-related macular degeneration (AMD) "is a leading cause of vision loss in the U.S. It destroys the macula, the part of the eye that provides sharp, central vision needed for seeing objects clearly" (National Eye Institute, 2019). Additionally, the National Eye Institute projects that "By 2050, the estimated number of people with AMD is expected to more than double from 2.07 million to 5.44 million" (see Table 1B, Appendix B) (National Eye Institute, 2019).

In conjunction with AMD, there are "approximately 325,000 people with visual acuity of bare light perception or less in the United States, but about 6.5 million people with low vision, so low-vision accessibility is clearly an important priority" (Arditi, 2017, p. 8). While the needs of those with low vision are different than those experiencing blindness, both categories should not be an afterthought in terms of designing for diminished vision accessibility. A solution to these needs is not a one-size fits all approach. For example, purely braille signage is not effective to someone who has low vision issues and has never learned braille. Other vision related issues to aging include cataracts, glaucoma, retinitis pigmentosa, and diabetic retinopathy (see Figure 1B, Appendix B) (Schambureck & Parkinson, 2018, p. 34)

Not only is proper signage, lighting, and color usage vital for accessibility needs of those experiencing any kind of vision loss, but it is also an essential ethical consideration as well to be able to design in a way that allows for easy identification, navigation, and safety.

Key Issues & Considerations for Diminished Vision Design

Signage & Wayfinding for Vision Issues

One of the primary senses for mobility and ability to perceive the visual world is sight. Due to age, decreased visual inputs greatly impact a person's ability to navigate the built environment. For those with low vision issues, "not only is it difficult for them to accomplish daily tasks, it is unsafe and often frightening for them to navigate space; fear and resultant injury are often seen in their processes of wayfinding" (see Figure 2B, Appendix B) (Schambureck & Parkinson, 2018, p. 36).

Several suggestions for improved signage and wayfinding for low vision includes "tactile and visual graphics (e.g., maps), limited visual input, auditory cues, and other assistive measures to develop a mental map of their limited environments" (Schambureck & Parkinson, 2018, p. 36). Furthermore, the usage of auditory wayfinding such as verbal description, sound, and haptic feedback can prove to be beneficial as well (Schambureck & Parkinson, 2018, p. 36). The study conducted in this article discovered that "step-by step directions given while wayfinding are more helpful than being asked to memorize an entire set of directions in advance" (Schambureck & Parkinson, 2018, p. 36).

Additionally, the use of "strong color contrast for signage, avoidance of luminance glare, definition of the main circulation routes with visual and tactile cues, and the pairing of visual and nonvisual sensory information" as well as landmarks proved to be helpful for navigation by visually impaired people (Schambureck & Parkinson, 2018, p. 37). Everything from color contrast, font style, sign illumination, and height requirements for signage, should be considered in designing more accessible signage. Ultimately, the "goal of accessible signage in general is to

remove barriers for all of those with vision loss, including those who are blind and those with impaired but functional vision" (Arditi, 2017).

Lighting & Low Vision

Lighting is an essential consideration in designing environments that are safe and able to be navigated easily for older populations. For people with age-related vision loss, "by the age of 60 years, the eye needs 3 to 10 times as much light to see clearly as a 20-year-old, and this continues to accelerate with increasing age" (Butler et.al., 2019, p. 190). Proper lighting "is one of the simplest and most efficient ways to improve daily function and overall quality of life" (Butler et.al., 2019, p. 190). Although there are significant variations in lighting needs due to various vision-related disabilities, the solutions required for better lighting are personal to the user.

In one New Zealand study conducted on this issue of proper lighting for age-related vision loss, it was found that "Several participants described the gradual dimming of visual and occupational capacity because they did not have enough lighting. One by one they faced the loss of precious activities" (Butler et.al., 2019, p. 194). Additionally, participants of this study also mentioned there were "problems with insufficient ambient lighting, which led to the possibility of trips, slips, and falls" and noticed disorientation at night due to the lack of sufficient lighting" (Butler et.al., 2019, p. 195). For older adults, "impaired vision can manifest as visual field loss, decreased visual acuity, and/or decreased contrast sensitivity, and each is associated with fall risk" (Swenor et al., 2016, p. 2). Adequate lighting designed to fit individual needs can improve quality of life, injury risk, and give a greater independence for those struggling to live with vision loss.

Color Application in The Built Environment

In addition to low vision requirements and needs for the elderly, visual sensitivity is another area of consideration in terms of color perception in the built environment. Two aspects of the impact of color on vision include the "role of color for visual comfort in aged people" and "the impact of color on elderly spatial comprehension" (Delcampo-Carda et al., 2019, p. 387). Color is a useful tool for communication as it "has the function of creating contrasts, attracting attention, identifying, helping objects to be recognized and memorized. Color transmits messages, informs, focuses attention, and stimulates our perception of what surrounds us" (see Figure 3B, Appendix B) (Delcampo-Carda et al., 2019, p. 387).

In a study conducted on differences of color and contrast, it was concluded "that older participants needed much more contrast in the built environment" and it was recommended that easily recognizable primary colors were helpful in providing contrast and orientation for communicating visual information, where the "use of dark colors are not advisable because they increase the darkness perception and generate a sensation of confinement" when paired with low light levels (Delcampo-Carda et al., 2019, p. 388). Color perception has a profound impact on the way that the elderly and vision-impaired experience the built environment. Designing with these considerations in mind for diminished vision will help create environments that support those with vision issues rather than cause additional confusion.

Ambulatory Care

Ambulatory Hazards for the Elderly

A primary safety concern for ambulatory needs is slips and falls for elderly patients. Studies evaluating patient falls in healthcare systems showed that "about 80% of patient falls occurred in the patient rooms; 11% occurred in patient bathrooms; and 9% occurred in hallways, exam, or treatment rooms or near the nursing stations" (Harris, 2017, p. 87). As older adults

experience physical and cognitive limitations typically associated with aging, severe injuries related to falling can result in disability or even death in some cases hazards (Kim & Portillo, 2018, p. 68).

In a research study comprised of a "retrospective analysis of 449 fall incident reports and "in the homes of 88 older adults residing in independent living" observations were made that "falls that occurred in the bathroom were significantly associated with hospitalization due to environmental hazards (Kim & Portillo, 2018, p. 68). Several issues with these bathroom related hazards include "poor access to the shower, slippery floor conditions, the lack of a night light, and no appropriate places to install grab bars in the bathroom due to poor layout" (Kim & Portillo, 2018, p. 69). To create an effective safety strategy, it is important to maintain "perceived and actual safety" to "design flexible environments that can be easily modified to support changing needs" (Kim & Portillo, 2018, p. 81). One of the best solutions for mitigating falls is prevention by good design.

Aging Safely--Modifications for Senior Living

Structural Changes

The elderly population is a specific group that in addition to memory and vision issues, may also experience limited mobility due to these age-related changes. Functional issues relating to mobility may not be a reason for one to relocate to an assisted living facility, but significant changes to the home environment may be necessary to allow an individual to age in place successfully and safely. According to a study called the CAPABLE program (Community Aging in Place, Advancing Better Living for Elders), the main goal was to empower elderly persons to live self-sufficient lives based on design environmental modifications to promote independence and mobility (Granbom et al., 2018, p. 11). In this study, one of the most common modifications

included “structural adaptations such as installing new rails and banisters or adding a second banister to support safe mobility on stairs. It was also common to put up grab bars in bathrooms and hallways” (Granbom et al., 2018, p. 11). Other structural adaptations included intercom systems, counter heights for wheelchair pullup, elevated washing machine, securing cords and loose rugs, and installing more lighting in high traffic areas of the home (Granbom et al., 2018, p. 11).

Fixture & Finish Changes

Another area described in the study on senior mobility included repairs to fixtures or hardware that were difficult for participants to turn on or off due to problems such as arthritis (Granbom et al., 2018, p. 11). Furthermore, modifications were made to toilets such as raised seats, and changes to showers such as benches for safer and less strenuous use (Granbom et al., 2018, p. 11). Other assistive measures included basic home repairs like stapling down loose wall-to-wall carpet, fixing holes in the floor, and bedside lamps for safe transfers from the bed to the bathroom at night (Granbom et al., 2018, p. 11). These assistive devices both increase quality of life and also promote safety within the built environment for senior living.

Flooring Changes

Since one of the primary issues of safety in the elderly population include injuries related to falls, appropriate flooring choices are also necessary safety measures to implement as well. Flooring specification can play an important role in minimization of injury in terms of slip coefficient, impact forces, and balance. Several flooring materials commonly found in patient rooms include “rubber, linoleum, sheet vinyl, vinyl composition tile (VCT), and luxury vinyl tile (LVT)” (Harris, 2017, p. 86). In studies evaluating the participants’ response to various flooring choices, it was found that “soft flooring did not have a negative effect on postural sway or static

balance; gait speed and step length were significantly greater on carpet than on vinyl," and "patients indicated a fear of walking on vinyl but were more confident on carpet" (Harris, 2017, p. 87). However, both vinyl and carpet have benefits as "carpet tile benefits from slip resistance, impact for mitigation, and comfort" whereas vinyl flooring was associated with cleanliness and lack of contaminants possibly present in carpeted flooring (Harris, 2017, p. 99).

In addition to the physical realities of flooring options, perception of these design choices especially in terms of those with dementia, is another equally as important consideration. For example, a mosaic style floor made from carpet tiles could be perceived as broken glass, preventing a person with dementia from walking upon the surface out of fear (see Figure 1C, Appendix C) (Hertz, 2017). Furthermore, flooring with high gloss or shine could be perceived as a wet floor, discouraging a patient from maneuvering across the surface (Hertz, 2017). All of these considerations are crucial when designing a space for memory issues, diminished vision, or ambulatory needs.

Conclusion: Biblical Compassion Through Good Design

Designing from research-based effective strategies to meet the needs of the aged through considerations relating to memory care, diminished vision, and ambulatory care is not only the mark of a good designer, but also a display of biblical compassion. Research based design for the aged goes beyond simply possessing aesthetic value; it combines functional performance with beautiful, seamless, and intentional strategies to combat age-related physical and mental deficits. Designing for the elderly should not be an afterthought, but rather an intentional choice to show respect, care, and dignity.

Matthew 25 illustrates this principle in verse 44, "Then they also will answer, saying, 'Lord, when did we see you hungry or thirsty or a stranger or naked or sick or in prison, and did

not minister to you?' Then he will answer them, saying, 'Truly I say to you, as you did not do it to one of the least of these, you did not do it to me" (*English Standard Version Bible*, 2001, Matthew 25:44-45). Care for the aged through suitable and sustainable design is not only beneficial, it is vital. Various forms of this kind of care include designing for a wide range of memory care issues related to dementia and Alzheimer's; supporting vision needs through signage, wayfinding, and lighting; and considering hazards of the built environment for ambulatory needs. Implementation of these strategies can simultaneously prevent harm and also promote increased wellbeing in the health of those impacted by age-related conditions.

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Appendix A

Memory Care

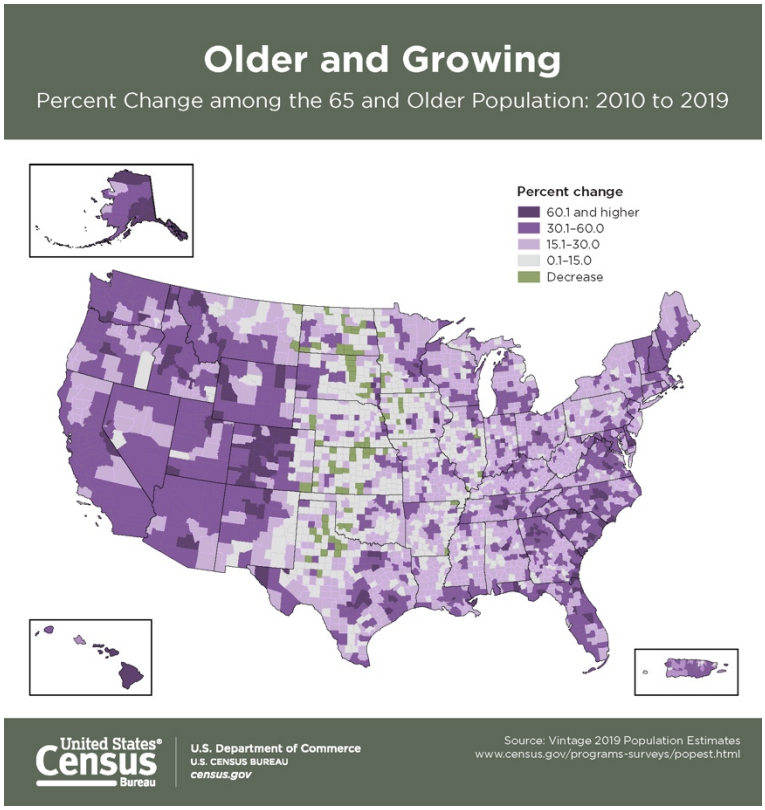

Figure 1A. Demographic information. US Census Bureau, 2020.

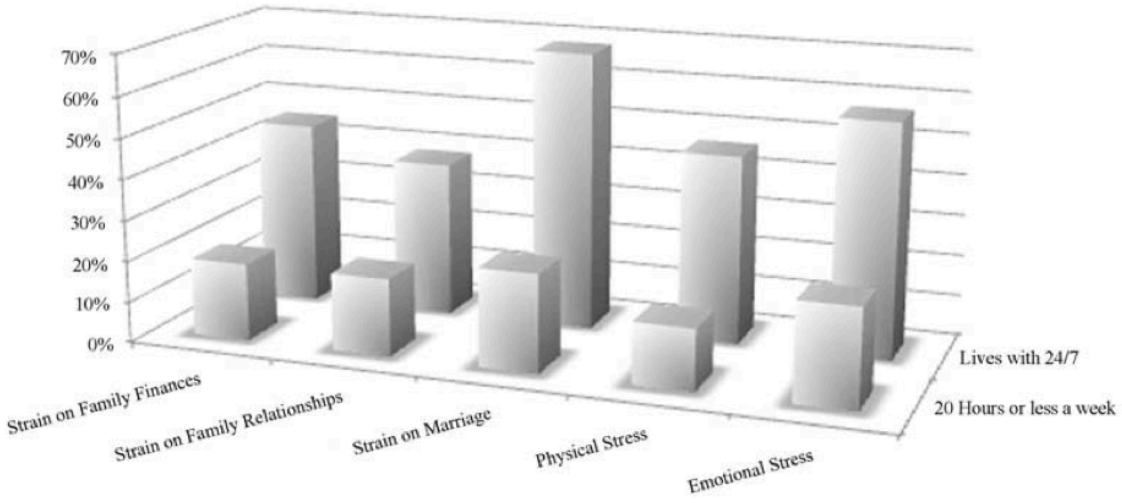

Table 1A. Effects on caregivers when caring for a relative with Alzheimer's. Fine, 2015, p. 13.

Figure 2A. Problems of non-distinctive wayfinding in complex environments. Davis & Weisbeck, 2016, p. 42.

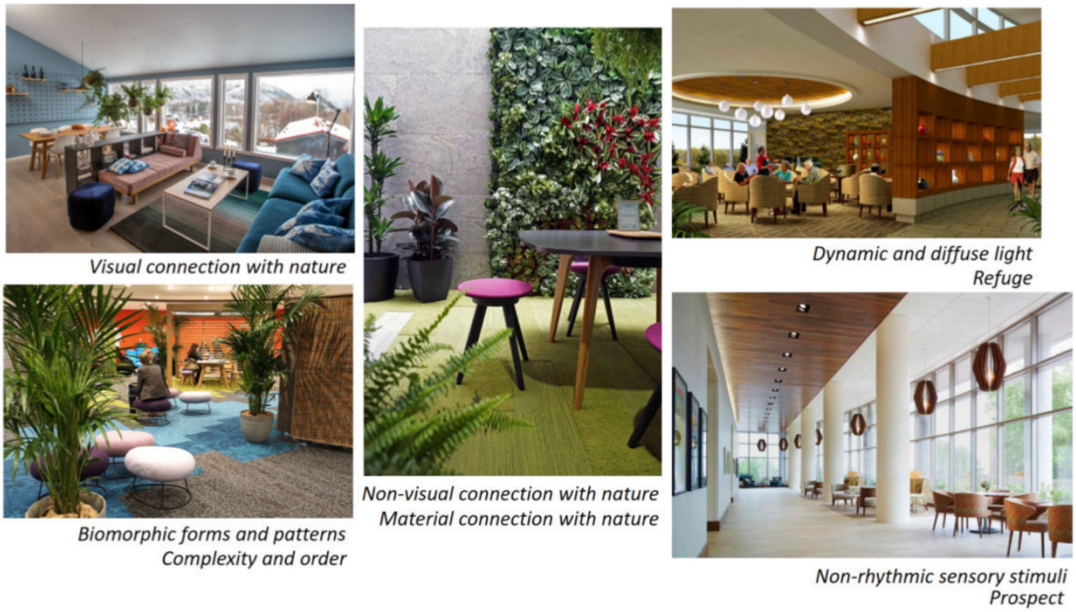

Figure 3A. Examples of biophilic design applications for elderly care institutes. Grazuleviciute-Vileniske et al., 2020, p. 8.

Appendix B

Diminished Vision

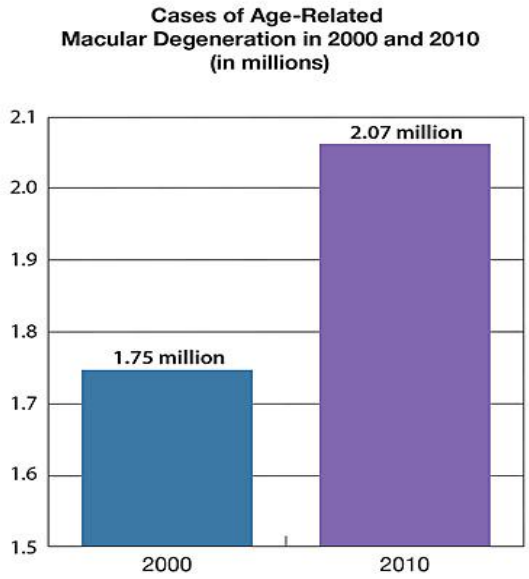

Table 1B. Rising cases of AMD. National Eye Institute, 2019.

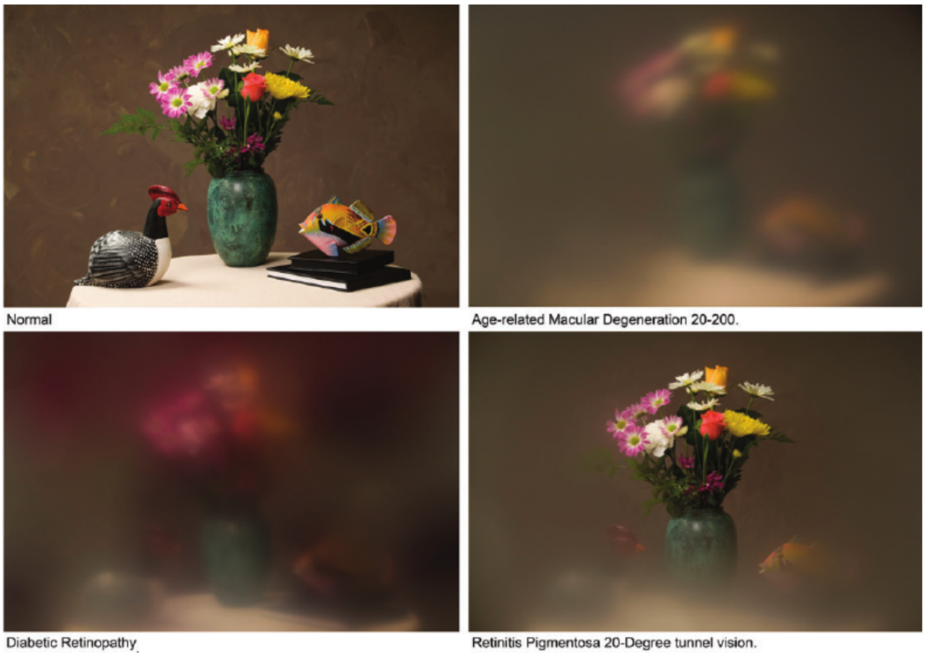

Figure 1B. “Clockwise from top left: Normal Vision, age-related macular degeneration 20/400 acuity, diabetic retinopathy, and tunnel vision with 10-degree field of vision.” Schambureck, & Parkinson, 2018, p. 39.

Figure 2B. Pictured above, positive stair contrast (top), followed by several design issues for those with visual issues. Schambureck, & Parkinson, 2018, p. 42.

Appendix C

Ambulatory Care

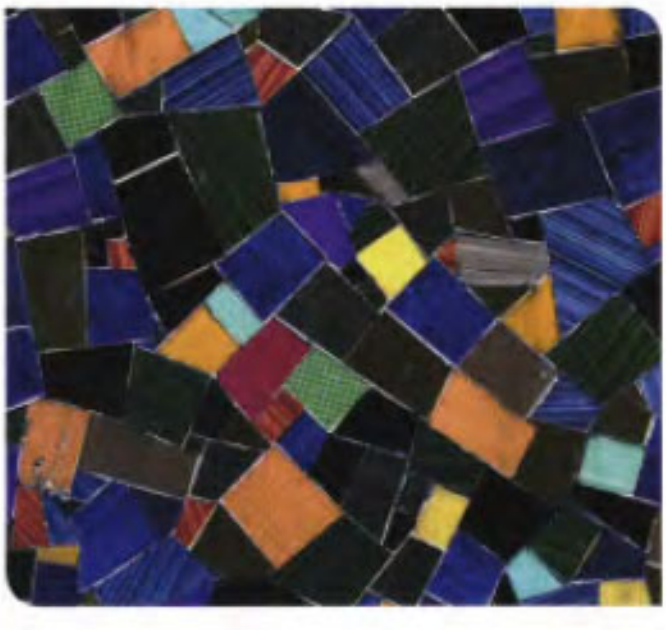

Figure 1C. Flooring design to be perceived as broken glass. Hertz, 2017.