

Chapter 2: Literature Review

2.1 Introduction

There is considerable potential for environmental design to impact the geriatric health-care system, especially treatments for adults with Alzheimer's disease and related dementias (ARD). Although Alzheimer's disease (AD) is the most common form of dementia, other conditions have symptoms similar to AD. According to research, Alzheimer's disease is an irreversible brain disorder that is and will continue to be a significant problem for the health-care professions. There is a need to look further into the gerontology and environmental design research to formulate an integrative approach for the treatment of ARD. Thus, I argue the importance of designing outdoor spaces that address the physical and psychological impacts of the disease. The literature review that follows discusses the implications of the disease; environmental factors that affect the users and vice versa; the different types of gardens that offer therapeutic benefits; theoretical frameworks based on health and environmental factors; and therapeutic approaches for increasing the person's quality of life.

2.2 Alzheimer's Disease

Dementia, specifically Alzheimer's disease, must be understood by landscape architects who wish to create landscape settings that foster positive relationships between those who suffer from the disease and the environment. "Dementia is a group of symptoms which may accompany certain diseases or physical conditions" (Alzheimer's Association, 1990, p. 6). Symptoms that affect older adults' daily life are the loss of memory, reason, judgment, and language (National Institute on Aging, 2003).

Alzheimer's disease, the most common cause of dementia, is a progressive, irreversible brain disease that results in significant memory loss, declines in intellectual functioning, and behavior changes (U.S. Department of Health and Human Services, 2004; Silverstein, Flaherty, & Tobin, 2002). The most typical behavioral and psychological signs and symptoms of dementia (BPSD) are categorized as agitation, psychosis, and mood disorders (Potkins, Myint, Bannister, Tadros, Chithramohan, Swann, et al., 2003). Studies show that between 70% and 90% of older adults with AD report disruptive, agitated behaviors (Teri, Logsdon, Weiner, Trimmer, Thal, Whall, et al., 1998).

Demographics. Approximately 4.5 million Americans have AD. Researchers estimate that the numbers will grow significantly because of the increase in life expectancy of older adults. (U.S. Department of Health and Human Services, 2004). The majority of older adults diagnosed with AD are between 75 and 89 years old, and the occurrence rates are higher for women than men, which may be explained by the longer life expectancy of women (Silverstein et. al., 2002). The prevalence of the disease increases with age and doubles every 5 years after the age of 65. The 85 year old age group is drastically increasing in population size and has the highest risk of acquiring AD (U.S. Department of Health and Human Services, 2004). Typically, older adults diagnosed with AD live for approximately 8 years, but can live up to 20. In the advanced stages of the disease, an institutional setting becomes necessary and living at home is no longer an option (Brawley, 2006). The majority of the population with AD acquires late-onset, which is characterized by the onset of symptoms around the age of 60. These statistics suggest that AD is and will continue to be a significant public health issue.

Physiology. Older adults with AD have brain abnormalities in the form of amyloid plaques and neurofibrillary tangles, which result in losses of connections between cells, and cell death. Plaques develop in the hippocampus, located in the temporal lobe, and affect the process of encoding (U.S. Department of Health and Human Services, 2004). Plaques are made of beta-amyloid, proteins, neurons, microglia, and glial cells. The clustering of the soluble beta-amyloid parts into insoluble fibrillar beta-amyloid aggregates leads to the formation of plaques that are found in large quantities around the neurons in the brain.

Abnormal protein threads inside nerve cells in the brain of older adults with AD are termed neurofibrillary tangles, which are mostly made up of a protein called tau (U.S. Department of Health and Human Services, 2004). In a normally functioning, healthy brain, tau stabilizes microtubules in the brain. Conversely, in the brain of a person with AD, tau does not bind to microtubules as it should, but instead binds with other threads of tau. This chemical reaction results in the formation of neurofibrillary tangles, which causes the failure of neurons to communicate. When the formation of plaques and tangles become significant, neurons become so damaged that they can no longer work properly, and cell death occurs (U.S. Department of Health and Human Services, 2004). As the disease progresses, brain atrophy or the shrinkage of brain tissue occurs. This physiological condition is believed to result in the development of the behavioral and physiological responses of dementia.

Stages of ADRD. There are a number of theories explaining the developmental stages of ADRD. For this portion of the literature review, I will focus on the Three Stage Theory, which consists of early, middle, and late developmental stages (Bowlby Sifton,

2004). This theory focuses on the symptoms of decline that persons' with ADRD experience. It is important for designers to understand these symptoms to accommodate their specific needs in the outdoor environment. Later in the literature review when addressing wander gardens, this thesis will focus on the Seven Stage Theory, which is more applicable when discussing the relationship between the senses and the developmental stages of ADRD (Reisburg, 1982).

The early stage of ADRD involves subtle changes (Bowlby Sifton, 2004). The older adult can still recollect places by relying on long-term memory, routines, and behaviors; however, complex hobbies or learning newly acquired skills become challenging (Bowlby Sifton, 2004; Silverstein et al., 2002). The early stage of ADRD usually varies from 1 to 3 years (Silverstein et al., 2002). See Table 1 for symptoms of decline.

Table 1

Symptoms of Decline – Early Stage

Short-term memory	Cognitive mapping
New learning	Fine motor skills and reaction time
Language	Work productivity
Planning and calculation	Complex tasks
Behavior	Understanding directions
Personality	Depression

The middle stage of ADRD is characterized by a loss in the ability to carry out routine tasks (Silverstein et al., 2002). In addition to a loss of short-term memory, difficulties with orientation to time, person, and place become more obvious. The typical duration of time in the middle stage is anywhere from 2 to 8 years. Symptoms of decline for middle stage are displayed in Table 2.

Table 2

Symptoms of Decline – Middle Stage

Judgment	Psychiatric health
Decision-making	Attention span
Expressing and understanding language	Wandering
Expressing emotions appropriately	Repetitive statements or movement
Recognizing familiar people	Impulse control
Personal safety	
Independence related to activities of daily living (ADLs)	

In the late stage of the disease, the care-recipient is unable to communicate and relies on sensory cues (Bowlby Sifton, 2004). Therefore, environmental factors that immediately stimulate the older adult become critical at this stage. Short-term and long-term memory typically declines and the older adult requires complete guidance (Silverstein et al., 2002). The late stage is typically 1 to 3 years. The final symptoms of decline are shown in Table 3.

Table 3

Symptoms of Decline – Late Stage

Mechanics of chewing and swallowing	Seizures and skin infections
Incontinence	Groaning, moaning, and grunting
Gross motor skills	Increased sleeping
Ambulation	
Major organs controlled by the autonomic nervous system	

2.3 The Environment

Environmental design can be of considerable therapeutic benefit to older adults. M. Powell Lawton (1999) argues that “basic human needs drive person-environment relationships” (p. 362). In order to design supportive settings, landscape architects must understand the specific needs of older adults with ADRD and their relationship to the environment. With a comprehensive understanding of the

disease, designers are more likely to structure the environment specially for persons with ADRD, and positive behavioral and psychological changes should result. Examples of approaches that suggest positive benefits for persons with ADRD are validation therapy, reminiscence therapy, and multi-sensory stimulation.

Environments for People. Stephen and Rachel Kaplan's (1978) definition of human evolution is for individuals to perceive, to recognize, and to comprehend the surrounding environment. The Kaplan's (1978) identify human actions that allow people to experience objects in a space. They define perception as receiving a "mental image of the external environment" (p. 25). This involves the recollection of memories and the integration of sensory stimulation. The Kaplan's argue that sensory stimulation is optimal for the mind since persons with ADRD often have an inability to recognize time, person, and place; therefore, incorporating sensory stimulation in the landscape should make an uncertain environment less difficult to comprehend; the greater the amount of stimulation, the greater the probability that the person will be aware of his or her surroundings. Care-recipients with ADRD strive for environmental stability through consistency, as catastrophic reactions are likely to occur when the environment surrounding the older adult distorts rapidly and does not remain constant. An environment for persons with ADRD should provide opportunities that allow them to seek familiar and identifiable objects to decrease the likelihood that a negative reaction may occur.

The experiences of the environment throughout life are stored in the mind as a set of mental constructs and take the form of cognitive maps (Kaplan & Kaplan, 1978). These cognitive maps associate human thought with the environment as a means to

understand the way a person responds to his or her experience in the environment. A person with ADRD needs to be able to rely on the environment for orientation and reminiscence. Kaplan and Kaplan (1978) postulate that gaps in the cognitive mapping process may account for despair in the individual. They have devised a broadly applicable set of design criteria for environmental form that relates to the needs of persons with ADRD. These guidelines are appropriate for every stage of the disease but are particularly effective in the early stages because they expose the older adults immediately to various forms of stimulation.

- Increase the exposure of people to a variety of environmental settings and potential interactions.
- Stimulate and facilitate exploration of the environment through easy access and interaction with the environment.
- Enhance the unique qualities of environmental settings.
- Increase the plasticity and manipulability of form to the actions of small groups.
- Facilitate a rhythm of behavioral and perceptual constraint and release in the organization of environmental settings.
- Adapt the form of environmental settings to facilitate the predominant plans being executed within them.

M. Powell Lawton's Theory of Environmental Press will be addressed further in the literature review; however, the Kaplan's "environment function fit" theory holds some similarities. It states that the environment should be congruent with the activities to be facilitated, and the presence of an improper fit suggests that the environment will become less manageable (Kaplan & Kaplan, 1978). When designing for older adults with ADRD, the designer must account for the needs of the individual, the demands of the environment, and the functions of the space. M. Powell Lawton's Theory of Environmental Press and the Kaplan's environment function fit theories are most relevant when integrating landscape architecture and gerontology.

Stephen and Rachel Kaplan (1989) suggest that spatial qualities, such as complexity, coherence, and legibility respond to basic human cognitive needs. Complexity refers to the number of visual elements in a space, whereas coherence pertains to the order of those elements. Legibility is a measure of ease of spatial orientation, which can be enhanced through the use of distinctive elements. These spatial qualities are important to the design of spaces for older adults with ADRD because they provide the person with stimuli, order, simplicity, and orientation; all of which are requirements of therapeutic design. The needs of persons with ADRD are extremely specific and visual, tactile, auditory, olfactory, and gustatory elements must be incorporated in the environment to assure, at least, a minimum level of stimulation.

An alternative model of the person-environment fit interaction is proposed by M.

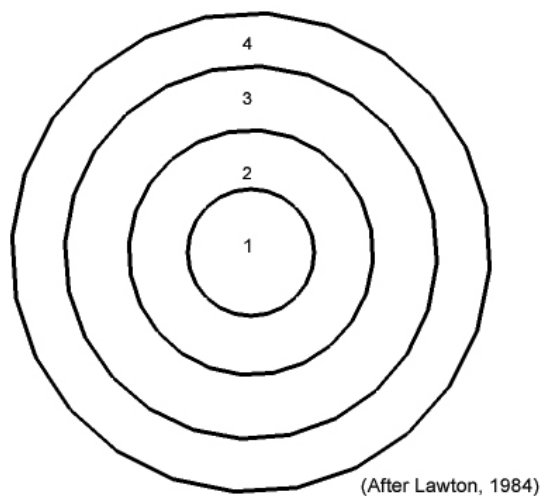


Figure 1. The Ecological Housing Model

Powell Lawton (1984). The Ecological Housing Model studies the person in several related environments. The basis of the model is to understand that the environment has the potential to “evoke, modify, or reinforce” the care-recipient’s behavior and psychological state (Eckert & Murrey, 1984). The model shown in Figure 1 includes the

individual (1), the microsystem (2), the exosystem (3), and the macrosystem (4).

At the most basic level, the individual is concerned with factors such as history, demographics, and physical and mental competencies. In this respect, the individual’s

main concern is what stage of the disease, what physical and psychological effects he or she is experiencing, and the resultant limitations. The microsystem is the environment that surrounds individuals. It is a system that places demands on the person, which result in positive or negative behavior and affect. The microsystem, in this case, is the garden; the outdoor environment that offers stimulation, reminiscence, exercise, and sunlight. The exosystem is at a community level. Lawton (1984) describes it as “a collection of institutions with physical, personal, and social components that provide life-supporting and life-enriching services to individuals” (p. 101). And the macrosystem is a global level which influences the other levels. While it has a strong impact on the social environment, it remains beyond the control of the individual.

It is important to differentiate among the levels of the environment as they relate to older adults with ADRD to understand how each level affects the individual. The microsystem and the exosystem will have the most influence on the person with ADRD because together they form personal and group environments that provide benefits to quality of life and structure relationships within the environment. This reiterates the importance of careful design of individual microsystem environments.

Culture in the Landscape. Incorporating items that elicit cultural identity is an aspect of design that is often overlooked for older adults with ADRD (Day & Cohen, 2000). Culture can be understood to include beliefs, ethnicity, and life experiences. Accordingly, an environment should be capable of maintaining users’ sense of identity through the incorporation of appropriate elements in the space. Researchers have shown that a well designed environment can improve the well-being of the individual by responding to declines in the cognitive functioning of older adults with ADRD. Cohen

and Weisman (1991) define therapeutic goals as “desired relationships between people with dementia and the environments they occupy, [which] provide direction for policy, programming, and design decisions” (p.368). Examples of therapeutic goals that can be enhanced by environments and can promote cultural identity are to:

- Promote sense of identity, self-esteem, and meaningful roles
- Provide healthy, homelike, and familiar environments
- Provide continuity with past
- Promote social interaction
- Sustain positive affect and reduce agitation
- Prompt appropriate behavior
- Maintain highest level of functional ability
- Prolong memory and facilitate reminiscence

It is important that landscape architects understand life experiences and the history of specific age cohorts that may elucidate persons’ emotions or actions in the landscape (Day & Cohen, 2000). Cultural meaning and its incorporation in the designed landscape is addressed in landscape architectural literature. Mark Treib (1995), questions, “Is it really possible to build landscape architecture, a semantic dimension that communicates the maker’s intention to the inhabitant? If so, how? In addition, should we try to reveal meaning in environments, and if so, why?” (p. 47). Treib responds by exploring the term “meaning” and its relationship to the landscape. He argues that meaning is essential to humans in encompassing their “ethics, values, history, and affect” (p. 48). He cites the work of Garrett Eckbo, who emphasizes the need for human presence in the landscape. In other words, a landscape is not whole without human expression, and in the case of a therapeutic garden, human expression is mandatory.

An alternative approach to incorporating meaning in the landscape can be represented through form; the landscape can tell a story about the history of the place or the users (Treib, 1995). Treib’s reflections on meaning and history in the landscape offer

health-care designers potential strategies for communicating the historical experiences of the specific age cohorts in their designs. Providing cues to the older adult's past in a design may reduce aggressive behaviors or the re-emergence of negative thoughts, and thereby promote positive affect.

An Interaction with Nature: The Garden. Charles Jencks (2003) believes that gardens create stories throughout time that provoke "the celebration of the senses and a heightening of the way we perceive the universe" (p. 34). The senses (vision, taste, touch, smell, and sound) have the potential to connect individuals to a higher universal level since sensory stimuli evoke emotional responses. The body responds to stimuli, transforming them into related emotions. Gardens provide opportunities for people to interact with the environment in ways which have the potential to enhance quality of life and physical and emotional well-being. In particular, researchers suggest that plants, sunlight, and stimuli in a garden afford benefits to the healing of older adults with ADRD (Burnett, 1998).

While his work is not based on empirical research, Mitchell (2000) speculates that the incorporation of the five senses in the garden affects individuals, especially older adults with ADRD, emotionally, mentally, and psychologically. He suggests that designers should choose elements that will enhance the well-being and positive feelings of individuals with ADRD, and he argues that the colors people surround themselves with will likely have an effect on their mental and physical health. For example, according to Mitchell, red is a warming, energizing color that conveys strength and energy. It is believed to help persons who are tired and depressed by supplying heat to the body, aiding in the production of additional red blood cells. Similarly, Mitchell speculates that

orange is the color of openness and self-confidence. He proposes that it fortifies the immune system and promotes the absorption of calcium. He identifies yellow as the color of the mind, a “left-brain” thinking stimulant with the effect of strengthening the nervous system, cleaning the liver, and removing nerves and fears. Accordingly, Mitchell indicates that red, orange, and yellow are the most valuable colors in environments for older adults. Besides promoting positive health outcomes, these colors are differentiated more easily than blues and greens because of the loss of visual acuity that accompanies the aging process (Carstens, 1998).

Sound, smell, touch, and taste are equally as important as the visualization of color in a garden. Water is a well-known element in a garden that promotes peace and well-being through its natural sound (Mitchell, 2000). Other successful natural sound creators are ornamental grasses and leaves, which create a rustling sound when blowing in the wind. Mitchell proposes that scent in a garden can evoke past feelings/memories or treat current issues. He cites examples, including the incorporation of chamomile to reduce anger; hyssop to lessen grief; and bergamot and lavender to stimulate the production of white blood cells. Touch can be integrated in the garden by providing plants of various textures. Mitchell also recognizes that hands are the most essential tools that humans can use to discover nature. As for taste, it is as simple as including herbs and non-poisonous, edible flowers in the garden. This is of particular importance when designing for persons with ADRD because some care-recipients have pica, which may cause them to attempt to eat ornamental plant materials.

Therapeutic Garden. The therapeutic garden has a specific architectural structure which provides the opportunity for direct contact with plants (Ousset, Nourhashemi,

Albarede, & Vellas, 1998). Two benefits of the therapeutic garden are the healing effects of being in the landscape and the benefits of mentally connecting to the environment through the senses (Milligan, Gatrell, & Bingley, 2004). The garden offers curved walkways, spaces for relaxation and social interaction, and horticultural therapy, while fostering an environment for exercise. Researchers document that therapeutic benefits for older adults with ADRD are obtained from gardens (Barnes & Marcus, 1996). The therapeutic environment for care-recipients' with ADRD should safely accommodate the physical and mental disabilities of the adult and compensate for his or her loss of sensory functions; the landscape should respond to the person's abilities that are still intact (Lovering, 1990; Grefsroed, 2001).

Pachana, McWha, and Arathoon (2003) have established two areas of inquiry on the therapeutic benefits of gardens. The first is the effects that the passive therapeutic environment has on older adults and the second is the benefits that involvement in the therapeutic garden has for persons with ADRD. Self-confidence, cooperation, and social interaction are attributes that are believed to improve through passive interactions in outdoor spaces. When actively participating in outdoor spaces, older adults with ADRD have the opportunity to improve their psychomotor skills, orientation, and physical and mental stimulation (Pachana, McWha, and Arathoon, 2003). Physical conditions that may improve are an increase in bone density and a reduction in heart failure. Researchers have also found a correlation between increased bone density, increased vitamin D absorption, and improved sleep cycles through contact with sunlight.

Outdoor spaces are noted to have positive influences on adults with ADRD. Exposure to plants has demonstrated improved coping strategies among older adults

(Pachana, McWha, & Arathoon, 2003). Mark Epstein (1997) suggests that plants have aesthetic, temporal, and spiritual qualities. Plants present aesthetic qualities through changes in seasonal appearance and temporal qualities by coming in and out of dormancy. Plants portray spiritual qualities through the connection of people and plants. Epstein argues that these qualities provide psychological and social benefits to persons with ADRD.

A study conducted in 1990 comparing health-care facilities with exterior environments and those without, confirmed the benefits of outdoor environments for older adults with ADRD. Incident reports for 4 months in 2 consecutive years were compared for five gardens (Mooney & Nicell, 1992). Incident reports depict unexpected events that demonstrate risk to the care-recipient. The results of the study indicate that there were few reports of violence and falls in the facilities with gardens; in fact, the rate of incidents fell by 3.5%. However, a 319% increase in incidents was found in facilities that did not have gardens in their outdoor spaces. This study confirms that environments for persons with ADRD can influence their affect, behavior, and quality of life in a positive way.

Horticultural Therapy. “Horticultural therapy is a process through which plants, gardening activities, and the innate closeness we all feel toward nature are used as vehicles in professionally conducted programs of therapy and rehabilitation” (Davis, 1998, p. 3). The first record of horticultural therapy benefiting people occurred in ancient Egypt where doctors prescribed that mentally ill care-recipients walk in the palace garden. In 1978, Dr. Benjamin Rush, the first psychiatrist and a professor at the Institute of Medicine and Clinical Practice in Philadelphia, Pennsylvania, initiated the use of

horticultural therapy to treat the mentally ill. Since then, the treatment of mental illness with horticultural therapy evolved to hospitals and educational programs.

Several theories explain the reasoning for the benefits of people-plant interactions (Relf, 1998). The theory of overload and arousal explains the constant noise and stress that surrounds people, especially in institutionalized settings, and the detrimental effects it is capable of having on older adults with ADRD. Incorporating plants in the environment has the potential to reduce anxiety and stress. The learning experiences that older adults have with plants throughout their lives prepare them to respond positively to interactions with plants. Furthermore, the theory of evolution explains that humans' positive psychological and physiological responses to plants originate from evolving in an environment consisting almost completely of plants. Other benefits of horticultural therapy include positive interaction, reminiscence, increased self-esteem, improved fine and gross motor skills, sensory stimulation, and improved problem-solving (Gigliotti, Jarrott, Gaines, Cook, Pecora, Predny, et al., 2002).

Horticultural therapy is a suitable form of therapy for persons with ADRD because the program accepts flexibility and allows for the varied interests, needs, and abilities of older adults (Gigliotti, et al., 2002). Previous study results demonstrate that appropriate horticultural therapy activities result in increased levels of participation and improved affect among older adults with ADRD. Heliker, Chadwick, and O'Connell conducted a study in 2001 researching the emotions that persons feel towards gardening (Gigliotti, Jarrott, & Yorgason, 2004). The results indicate that older adults believe gardening to connect them with nature. The outcomes of the study suggest that horticultural therapy is a purposeful activity which supports the person-environment fit

model for older adults with ADRD, and can be beneficial to care-recipients suffering a variety of ailments.

Horticultural therapy should occur in an outdoor space, which accommodates the needs of its users. The design of the garden should be as small as possible with an arrangement of raised beds permitting full accessibility; however, placing the raised beds in rows should be avoided for functionality as well as aesthetic appearance (Relf, 1995). The dimensions of the raised beds should be designed appropriately to facilitate use. The standard dimensions of the raised beds for wheelchair accessibility are as follows: the height should be 2-21/2', and the width (two-sided) should be 3-4'.

The Wander Garden. Wandering, an undirected, aimless movement, is one of the most common symptoms of persons with ADRD (Mather, 2001). Richards Hall, Buckwalter, Stolley, Gerdner, Garand, Ridgeway et al. (1995) describe the five types of wandering as tactile, environmentally cued, reminiscent/fantasy, recreational, and agitated purposeful. Tactile wanderers tend to use their hands for exploration of the environment in a calm manner as they have most likely lost the capability to communicate verbally. At this stage of wandering, stimulating the senses through touch of natural elements in the wander garden is purposeful and appropriate. Environmentally cued wandering involves older adults who wander regularly and appear to be searching for something (Richards Hall et al., 1995). These individuals follow environmental cues, such as a chair which cues them to sit or a pathway which cues them to continue walking. Reminiscent/fantasy wandering is caused from delusions or past memories, which persuade them to seek an alternative setting. Recreational wandering reminds the older adult of walking regularly in his or her past, which influences wandering behavior.

Agitated and confused persons who are preoccupied with leaving, display agitated purposeful wandering. However, by providing a sensory-rich environment with opportunities for stimulation and participation, wandering can potentially be reduced (Coons, 1988). The wander garden is a form of therapeutic garden that is specifically meant to be used by the person with ADRD (Detweiler, et al., 2002). The wander garden provides the older adult with an opportunity to “wander” outside safely while interacting with the environment.

Researchers estimate that wandering occurs in up to 40% of nursing home residents. Dan Dokken, vice president of Law/Kingdon, an architectural firm, does “not design to prevent wandering” but instead “design to accommodate it” (p. 2). His belief is that by eliminating frustrations in the confused care-recipient, a safe environment will foster a positive experience in the outdoor space. Diane Montgomery, RN (1996) argues that older adults with ADRD have a reason for wandering and it is important to not prevent them from doing so. If wandering behavior occurs, it most likely means that the person has needs that must be met. Consequently, an objective of the wander garden is to direct the care-recipient’s wandering behavior along a sensory-enriched looped pathway for additional stimulation.

Environmental cues that are helpful in orienting older adults with ADRD include paths, edges, districts, nodes, landmarks, views, furnishings, plantings, and symbolic cues (Mather, 2001). Edges are boundary lines; districts are areas with common characteristics; nodes are denoted as places of activity; and landmarks are critical features in the landscape. These elements, as suggested, can provide boundaries, places of activity, reference points, and cues for orientation in time and place.

Wander gardens can be particularly therapeutic in responding to the stages of ADRD. Reisberg (1982) describes the stages of ADRD in his Seven Cognitive Stages of Dementia. While the Stage Three Theory, addressed earlier, acknowledges early, middle, and late stages of dementia, Reisberg's stages are more applicable to incorporating sensory stimulation and environmental factors in outdoor environments for adults with ADRD. Stages 4 through 7 address the cognitive and behavioral problems associated with persons in wander gardens. Because attention span has decreased and learning is unusual in Stage 4, older adults should be encouraged to become involved in activities that are familiar. Visual cues are important sensory elements that promote "goal directed" activities in this stage of the disease.

In Stage 5, awareness of tactile cues becomes a priority. Wandering, agitation, and the loss of spatial orientation become significant problems. Touch provides pleasure to the person through interaction with various textures. At Stage 6, middle dementia, older adults with ADRD respond to positive stimuli, such as horticultural therapy or walking through a sensory rich garden. Symptoms related to this stage are a reduction in attention span, incontinence, and fear of being left alone. And at Stage 7, the terminal stage, the care-recipient can only respond to immediate cues. Aphasia and ambulation worsen at this stage and sensory stimulation becomes essential.

John Zeisel proposes a fascinating model for environmental design (Figure 2), based on Maslow's hierarchy of human needs construct. Zeisel's model relates the design of a wander garden to the various levels of needs that must be met to represent a high quality of life (Zeisel, 1999). The most basic needs that must be met for older adults with ADRD are physiological, which include safety, health, nourishment, and shelter.

Guidance for designing appropriate spaces in a wander garden for older adults with ADRD is based on needs assessment.

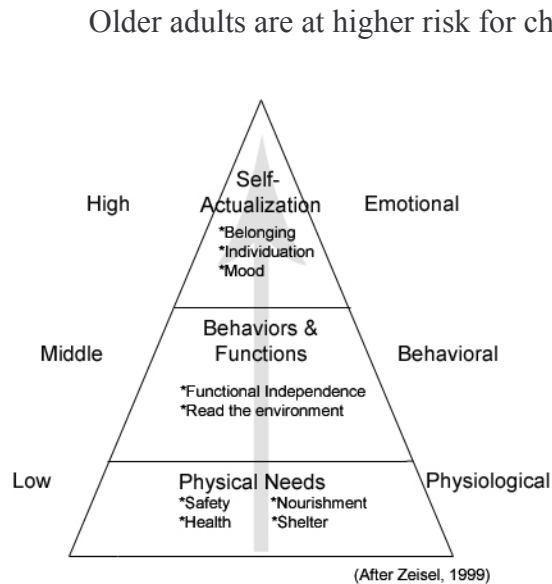


Figure 2. Quality of Life Model

plantings, trellises and awnings, shade trees, and umbrella tables should be incorporated in the design (Carstens, 1998). Resting spots, drinking fountains, and restroom accessibility also need to be considered to accommodate the individual's needs. Because of a normal loss of visual acuity and extreme visual

sensitivity that accompanies the aging process, lighting becomes an important factor when designing for older adults. To reduce glare, lights should be directed downward and should be placed at the periphery of a space for assistance in defining edges.

The next level of need is for functional independence and proper use of the environment. Weisman (1991) suggests that a primary design goal is to avoid open spaces to prevent confusion and disorientation in the wander garden. The design should consist of sub-spaces that provide small gathering spaces for private or public recreation. Landscape designers need to identify patterns and provide sensory cues and landmarks that will be easy for the person to recognize (Carstens, 1998). Providing spaces for recreation and the enjoyment of nature are equally as important as providing functional spaces. Offering a space for physical or music therapy creates the opportunity for the care-recipient to participate in a natural environment. Creating spaces for bird

watching/feeding and gardening also allows older adults to involve themselves in the natural setting.

A central feature in the wander garden is the looped pathway which promotes movement and exercise. The designer should offer choices in the pathway for persons with varied abilities. Although the Americans with Disabilities Act, ADA, requires a minimum 4 foot width pathway for two people to walk side by side or a person and a wheelchair side by side, and a 5 foot width for two wheelchairs to pass, a minimum of 6 feet is recommended (Carstens, 1998). This allows two wheelchairs enough space to pass side by side. The pathway should lead the person through the sensory-rich garden while periodically presenting nodes for rest and further stimulation. The surface of the pathway must be non-slip and non-glare for fall prevention. Changes in grade should be avoided and the slope cannot exceed 1:20. Changes in color and texture should only be used where a change or transition occurs, to aid in orientation. To prevent escape and to assure safety, the wander garden must be enclosed by a fence or a wall camouflaged by vegetation. If trees are near, high-branching varieties should be chosen to deter the person from escaping by climbing the tree.

Plants and garden accessories must be incorporated in the garden to create additional interest. When choosing the plant material for the garden, varieties should be chosen that attract birds and butterflies and create seasonal interest, such as monarda, lobelia, and buddleia (Carman, 2002). Herbs, such as rosemary, lemon balm, and lavender should also be included in the garden. Garden accessories that promote reminiscence and stimulate the senses are necessary elements of the wander garden. Birdbaths, wind chimes, a wheelbarrow, a water pump, and a bicycle are few examples of

components that can be included in the wander garden as they are everyday artifacts that elicit memories and thus support a higher quality of life for older adults with ADRD.

The highest level of quality of life is self-actualization, which incorporates belonging, individuation, and mood. A case study conducted by Mark Detweiler, MD, MS and Carlena Warf, RCNA at the Virginia Veteran's Care Center (VVCC) in Roanoke, Virginia confirms the benefits of providing a wander garden for persons with ADRD. The specific therapy utilized for the wander garden was post-stroke rehabilitation (Detweiler & Warf, 2005). The wander garden was created at the VVCC because care-recipients requested outdoor therapy and "felt handicapped and self-conscious" in the conventional indoor therapy spaces. The goals of the wander garden were to reduce anxiety and apathy and increase stimulation, which was expected to result in an increase in progress in post-stroke rehabilitation.

Detweiler and Warf (2005) explain that the wander garden accomplished Kaplan and Kaplan's (1989) principles for healing environments, which are: being away, extent, fascination, and compatibility. The care-recipients were removed from stress-inducing factors, such as higher-functioning individuals including staff, residents, and visitors; they moved through passageways from the facility to the garden; nature fascinated them; and they found congruence between themselves and the environment. These four factors gave the post-stroke care-recipients an opportunity to use the wander garden as a place to heal. Benefits observed in the wander garden were improved attention, self-esteem, and stress and mood reduction. The study results provide evidence that by performing restorative therapy sessions in the wander garden, a positive effect is likely.

A study conducted by Cohen-Mansfield and Werner (1999) analyzed the features of successful outdoor spaces for persons with ADRD. Three-hundred and twenty facilities with outdoor spaces were part of the study, with only 16% of the facilities defining their outdoor space as a “garden.” Staff who participated in the study considered lawn furniture, a gazebo, trees, picnic tables, flowers, raised gardens, bird feeders, and a fountain to be essential elements of outdoor spaces. Results of the study demonstrate that more than half of the participants agree that the spaces studied are not used as much as they could be. One-quarter of the respondents reported design problems, such as not including walkways and benches, as significant issues, and findings indicate that staff admitted to spending time in the garden only during the summer months. Nevertheless, 69% of the participants rated the outdoor spaces as extremely useful for older adults, while 26% rated them very useful, and only 5% rated the spaces as somewhat useful.

A Landscape Designer’s Perspective. “Gardens for people with Alzheimer’s disease present clients and designers with a very special set of opportunities and challenges” (Cooper Marcus, 2005, p. 36). Cooper Marcus agrees that landscape designers must familiarize themselves with the needs of ADRD care-recipients to result in successful environments. Innovation for health-care outdoor design is a specialty of Dirtworks, the landscape architecture firm of David Kamp, in New York City. Kamp explains that his experiences as a landscape architect have helped him understand how “design can affect the individual, inspire an emotional response, and enhance the essential human quality of identity” (Gerlach-Spriggs, 1999, p. 134). Through his practice, Kamp also discovered the isolation and vulnerability that individuals with

severe illnesses experience, and began to approach his designs by addressing the struggles persons have with the illness. Kamp describes therapeutic gardens as places to “preserve health and emotional well-being.” According to Kamp, a therapeutic garden should be a component of the therapeutic environment; the garden should be incorporated in the institution, not separated from it. He suggests that demands on the landscape designer increase in health-care settings (Gerlach-Spriggs, 1999).

Joanne Westphal (1999) is one of the few practicing landscape architects and licensed physicians in the U.S. who critiques the capability of landscape designers in designing health-care environments. She identifies important factors that designers must consider when designing for clients with ADRD, including: care-recipient types; the nature, prognosis, and progression of the disease; and treatment of the disease. Westphal (1999) argues that without a complete understanding of these issues, a successful therapeutic garden is unlikely. A need for quantitative data supporting the benefits of therapeutic outdoor environments for persons with ADRD is necessary, which should create credibility in design through the expansion of principles, guidelines, and theories, specifically for therapeutic gardens (Westphal, 1999). This should enable designers to discover which design elements will support health benefits for different illnesses and specifically, for the different types of dementia. Through the examination of case studies, Westphal (1999) concludes that successful designs “work” because the designers take the time to research and understand the disease; they base their designs on a theoretical framework, and have the ability to interpret the treatment, the symptoms, and the needs of older adults into programmed activities.

Roger Ulrich, an architecture and landscape architecture professor and director of health systems and design at Texas A& M University asks an important question as a criterion for quality of health-care designs. “Is the garden having beneficial influences on the patient’s health outcomes, and are negative reactions at an acceptably low rate?” (Thompson, 2000, p. 55). It is not acceptable for the designer to answer “no” to both parts of the question and label the garden a therapeutic environment. Ulrich stresses that when designers create therapeutic environments, they should not exercise their personal preferences but instead concentrate on the specific needs of the users.

Martha Tyson, a landscape architect, suggests that unqualified designers are creating unsuccessful therapeutic gardens (Thompson, 2000). Kamp, Tyson, and Gerlach-Spriggs suggest the following strategies for landscape designers to learn appropriate design techniques: read existing literature, visit existing health-care facility therapeutic gardens, learn about health and safety issues in designing for older adults with illnesses, connect with colleagues who design therapeutic gardens, attend conferences, and begin with pro bono work (Thompson, 2000).

This section of the literature review raises an important question regarding the type of landscape architectural literature that is currently available. While gathering the perspectives of practicing landscape architects is important to research, solid empirical evidence is necessary. This study confirms that empirical research in landscape architecture is rare, and additional peer-reviewed articles need to be written to obtain a research-based knowledge regarding environmental factors that affect persons with dementia in outdoor environments.

2.4 Theoretical Approaches to Design

The design of outdoor spaces for older adults with ADRD should be informed by an understanding of the theoretical approaches that have been developed in the fields of landscape architecture and gerontology in environment behavior studies. Scheidt and Windley (1998) propose five major facets of person-environment relations in old age: the autonomy-security dialectic, environmental docility, environmental proactivity, person-environment congruence, and the two-factor view of mental health.

The autonomy-security dialectic suggests that environments should have the capability to satisfy the needs of autonomy (independence) and security (dependence) even though the needs of older adults are in constant flux (Lawton, 1999). This dialectic primarily focuses on one's home; however, the outdoor environment is equally relevant. The progression of ADRD will cause the older adult to become increasingly dependent on the environment. This statement relates to Lawton and Simon's (1968) environmental docility hypothesis, which suggests that "as personal competence declines, the behavior and psychological well-being of the person become increasingly dependant on environmental factors" (p. 352). Disabilities in activities of daily living (ADL), cognitive and sensory functioning, communication, and social behaviors of older adults can be altered through environmental intervention. The potential to better the person's quality of life by designing environments that recognize the environmental docility hypothesis is considerable.

Environmental proactivity explains that the higher the competence of the older adult, the more likely he or she will be able to make the most of the environmental resources they need (Lawton, 1999). The greater the competency of the individual, the

broader the environmental space that is required, and the more skilled the person is at recognizing the resources needed. Although older adults with ADRD may be able to identify only a limited number of resources, they can still potentially gain benefits. An example of the environmental proactivity hypothesis is an older adult with ADRD locating him or herself purposefully where they can view or partake in the activities.

Autonomy-security, docility, and proactivity provide a framework for understanding the relationships between persons' needs and the congruence of the environment (Lawton, 1999). The person-environment congruence theory relates directly to Lawton and Nahemow's (1973) ecological model of aging, which will be discussed further shortly. The last facet of person-environment relations is the two-factor view of mental health, the outcome of the person-environment transaction which comprises positive and negative affect (Lawton, 1999). Positive environmental conditions provide the individual with positive affect but do not reduce negative affect. Therefore, though an environment may promote positive physical and psychological states, there is still opportunity for designers to manipulate negative aspects of the space. In improving older adults' mental health, environmental interventions that will enhance pleasure and reduce anxiety must be considered.

The Theory of Environmental Press. The primary theory related to the interaction between older adults with ADRD and the environment is Lawton and Nahemow's (1973) Theory of Environment Press (TEP). The TEP stresses the significance of finding a balance between persons' competence levels and the demands of the environment to improve persons' well-being. (Lawton & Nahemow, 1973).

Adaptation to the activity, the environment, and to achieving higher order benefits will assist in attaining the desired adaptation level.

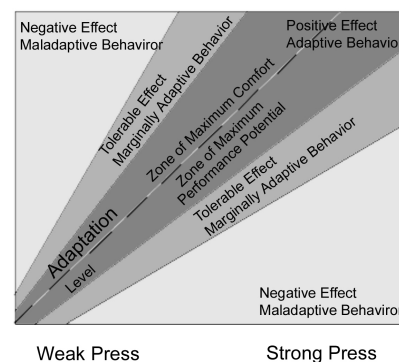
Prior to discussing the TEP further, it is important to clarify the foundation of the person-environment fit model. Lewin (1951) describes “behavior as a function of the person and the environment,” the person-environment (P-E) fit. P-E fit encompasses the personal components, including health, sensory and motor skills, and cognitive function. Lawton and Nahemow (1973) describe the environmental component as incorporating the physical environment, the personal environment, the small-group environment, the suprapersonal environment, and the social environment.

Lawton and Nahemow (1973) suggest that competence relates to the congruence between the older adult’s abilities and the demands (press) of the resources in the environment. Consequently, there must be congruence between the environmental press and the individual, which is expressed as the adaptation level. As shown in Figure 3, the adaptation level is considered neutral press,

which produces positive affect. To the right of the adaptation level is the zone of maximum performance potential where persons experience mild to moderate press, which results in positive affect. To the left of the adaptation

level is the zone of maximum comfort, where

individuals experience boredom and become underchallenged, resulting in a reduction of positive affect. If environmental demands are not balanced with the individual’s capability, he or she will act out inappropriately, causing negative affect. The impact of



(After Lawton & Nahemow, 1973)

Figure 3. Theory of Environmental Press

environmental factors is stronger for older adults with ADRD; therefore, by increasing their competencies, environmental press may decrease.

Researchers suggest that the environment has a significant role in providing persons with ADRD an improved well-being and competence (Gigliotti, Jarrott, & Relf, 2003). Landscape designers must adapt the environment to the TEP. This may be accomplished by creating environmental cues that will aid in the older adult's memory recollection. For example, an activity such as horticultural therapy utilized in the wander garden can meet the needs of older adults with ADRD through the TEP.

The purpose of horticultural therapy is to adapt the garden activity to meet the person's competency levels. This form of therapy strives to increase the older adult's competence level by improving his or her physical, social, and cognitive abilities (Gigliotti, Jarrott, & Relf, 2003). Bowlby Sifton (2000) argues that by providing recognizable materials to the individual, the activity may maximize his or her remaining memory. This may be incorporated in a horticultural therapy session by choosing tools that were once well-known to the adult, such as a watering can or trowel. Gardening in horticultural therapy sessions engages persons in activities which offer them opportunities to use their fine and gross motor skills, increase balance and coordination, and improve muscle strength (Gigliotti, Jarrott, & Relf, 2003). By integrating these skills in the horticultural therapy session, the older adult should experience a greater level of autonomy.

In adapting the horticultural therapy session to the TEP, therapists need to choose garden activities that comprise varying difficulty levels (Gigliotti, Jarrott, & Relf, 2003). Accordingly, horticultural therapy includes several tasks which involve a variety of

difficulty levels that must be completed from start to finish. In addition to therapists facilitating sessions appropriately, landscape designers must manipulate the environment to reduce environmental press. Additional therapeutic elements which assist in achieving the TEP and person-environment fit are stimulation and familiarity of the environment. Tools for stimulation include plants, signs, sculptures, and landmarks. Researchers emphasize that:

The combination of adaptive behavior, characterized by high levels of engagement in the presented activity, and high levels of positive affect support the conclusion that horticultural therapy activities could be used to achieve the desirable zone of maximum performance within the environmental press model. (Gigliotti, Jarrott, & Relf, 2003, p. 14)

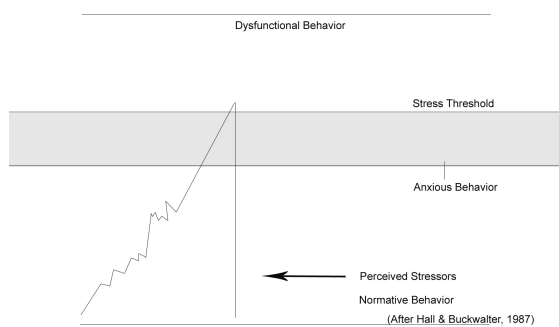
Horticultural therapy embraces the TEP by providing a balance between the environment and the impaired person.

Additional Person-Environment Theories. Although Lawton and Nahemow's Theory of Environmental Press most accurately represents the person-environment fit model, additional researchers have developed theories which deserve mention. Moos' (1974) description of a social ecological perspective "attempts to understand the impact of the environment from the perspective of the individual" as well as how "individuals adapt to the environment" (p. 28). The theorists also studied the physical and social environment as one, specifically for older adults with ADRD. Moos questions, "How can we organize environments in which such people can maximize their functioning..." (p. 31)? He argues that individuals with impairments, such as ADRD, restrict themselves from their surrounding environments, which results in withdrawal; people must be able to

exert control over their environments. This is possible by providing choices in the environment (Werezak & Morgan, 2003). Examples of choice in the landscape include the person's choice to occupy a social or private space or on which pathway they choose to walk. Achieving a sense of control in the environment may allow persons with ADRD to resolve negative feelings.

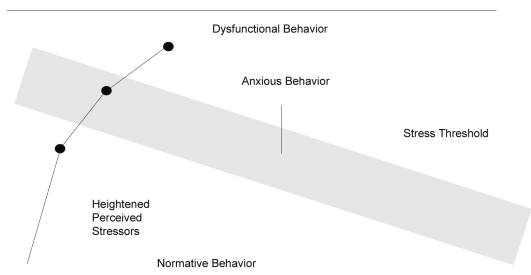
The next theoretical model, based on Moos' social ecological perspective and Lawton's TEP, is the Progressively Lowered Stress Threshold Model offered by Hall and Buckwalter (1987). The purpose of this model was to determine how much activity and stimulation the impaired person can tolerate. Thus, as the adult with ADRD responds to the stimuli, the environment is modified until the negative behavior decreases. Hall and Buckwalter (1987) postulate that when the person with ADRD exhibits dysfunctional behavior, they must rest to prevent excess stress. Therefore, landscape designers have a critical role in researching and designing appropriate spaces, which encompass specific guidelines and accurate levels of activity and stimulation for this particular user group.

Hall and Buckwalter (1987) recognize that the design of the environment affects the behaviors of older adults. They describe three types of behavior: baseline, anxious, and dysfunctional. Baseline behavior is a peaceful state where the adult is aware of his or her surroundings and has the ability to communicate by some means. In the therapeutic environment, communication can include verbal cues, as in validation therapy and reminiscence therapy, and tactile cues, as in sensory stimulation.

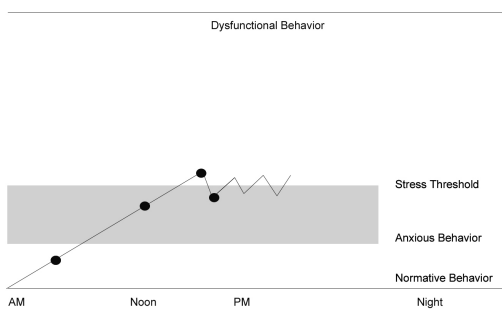


the behaviors of older adults. They describe three types of behavior: baseline, anxious, and dysfunctional. Baseline behavior is a peaceful state where the adult is aware of his or her surroundings and has the ability to

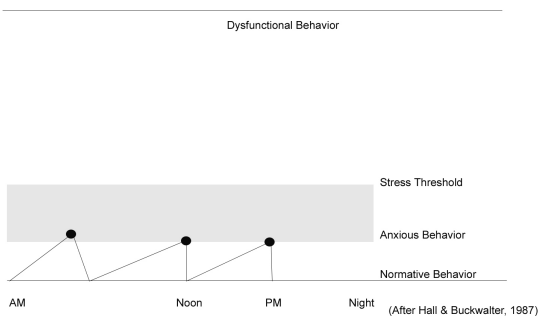
Figure 4 demonstrates how healthy persons respond to environmental stimulation and stress (Hall & Buckwalter, 1987). This model reveals how an increase in anxiety



(After Hall & Buckwalter, 1987)
 Figure 5. Progressively Lowered Stress Threshold in Adults with Progressive Degeneration of the Cerebral Cortex



(After Hall & Buckwalter, 1987)
 Figure 6. A Typical Day for an Adult with a Dementing Illness



(After Hall & Buckwalter, 1987)
 Figure 7. Planned Activity Levels for the Adult with a Dementing Illness

results in anxious behavior. Anxious behavior occurs when persons with ADRD experience stress in the environment. Healthy and cognitively intact individuals have the ability to behave anxiously, cross the stress threshold, demonstrate dysfunctional behavior, and return to normal behavior. In contrast, as the disease progresses, individuals with ADRD experience a lower stress threshold level and dysfunctional behaviors become increasingly recurrent, as illustrated in Figure 5 (Hall & Buckwalter, 1987). When an excess of stress occurs, such as excess stimulation or excess boredom, dysfunctional behaviors

become evident. If the older adult is repeatedly experiencing an excess of stress from the environment, they will be unable to return to baseline behavior, as shown in Figure 6. An understanding of this model should enable landscape designers to structure outdoor environments in ways which reduce environmental press by incorporating an appropriate

level of stimulation in the wander garden, as displayed in Figure 7 (Hall & Buckwalter, 1987). Landscape designers can fulfill these requirements by understanding the stages of the disease. Each figure of Hall and Buckwalter's (1987) model demonstrates the progression and symptoms of decline that persons with ADRD experience.

Researchers have clearly affirmed that the psychosocial environment has been neglected in ADRD research (Taft et al., 1993). Kitwood (1997) created the Theory of Personhood and Well-Being, which explains the loss of socialization and personhood that individuals with ADRD experience. Kitwood (1997) describes personhood as “a standing or status that is bestowed upon one human being, by others, in the context of relationships and social being” (p. 8). It implies “recognition, respect, and trust” (p. 8). This definition of personhood not only relates to person-person relationships but person-environment relationships as well. Landscape designers need to recognize the lack of socialization between persons with ADRD and address it to promote the creation of relationships in the environment. The physical environment facilitates safety, pleasure, and therapy for older adults with ADRD, and these facets of the environment become increasingly important for designers to consider as the disease progresses.

2.5 Emotion-Oriented Approaches

The development of psychosocial methods for the treatment of ADRD has been prevalent in the past few decades (Finnema, Droes, Ribbe, & Tilburg, 2000). The purpose of these treatments is to reduce psychosocial problems of persons with ADRD, resulting in improved well-being and a reduction in maladaptive behavior. A primary goal of psychosocial treatment is that a greater amount of attention is given to the memories, experiences, and perceptions of older adults with ADRD. This treatment is

characterized by the emotion-oriented approach introduced by Verdult in The Netherlands and Belgium. His intention with emotion-oriented approaches is to make the treatment match the feelings and needs of the individual with ADRD. Drees defines emotion-oriented care as:

Care aimed at improving emotional and social functioning, and ultimately the quality of life, of persons suffering from dementia by supporting them in the process of coping with the cognitive, emotional, and social consequences of the disease and by linking up with individual functional possibilities and the subjective experience of the person in question. (p. 142)

Validation therapy, reminiscence therapy, and multi-sensory stimulation, also known as, Snoezelen, are examples of emotion-oriented approaches. Whichever treatment is chosen, the standard of treatment for persons with ADRD should relate the adult's needs to the environment (Finnema, Drees, Ribbe, & Tilburg, 2000). Finnema, Drees, Ettema, Ooms, Ader, Ribbe et al. (2005) suggest that emotion-oriented care, as opposed to pharmaceutical care, has resulted in greater positive affect among individuals with ADRD.

Validation Therapy. Validation therapy was developed as a commonly used but minimally effective response to reality orientation, which is used with older adults who cannot orient themselves to person, place or time (Fine & Rouse-Bane, 1995). Rarely were attempts to improve the person's orientation successful. The outcomes of this method of treatment often resulted in withdrawal, a vegetative state, and an increase in hostility. Despite the fact that research shows reality orientation to be an ineffective treatment, it is still frequently used. In contrast, validation therapy has been deemed

successful. In 1963, Naomi Feil created validation therapy as a technique to communicate with persons with ADRD (Barbaranne, 1995). Feil argues that “individuals who have not reached their life goals and who have unresolved conflicts from the past must resolve these conflicts in old age” (p. 68). As older adults experience failing senses and functioning, they begin to focus on past memories and become less in tune with the present. The primary purpose of validation therapy is to understand, address, and verify the person’s feelings by communicating with them in a therapeutic way. Studies of the effectiveness of validation therapy have shown that individuals improve in speech content and eye contact, and in reduced pacing and crying (Feil, 1992).

Feil describes four stages of disorientation in persons with ADRD (Feil, 1992). They are as follows: 1) malorientation, which addresses the adults resistance to touch, the experience of memory lapses, and the accusation of others; 2) time confusion refers to people who are typically incontinent, confused, and have a reduction in sensory function; 3) the repetitive motion state applies to older adults who pace, sing, and rock; and 4) vegetation refers to persons who are extremely disoriented and show minimal movement. According to Feil (1992), with stimulation of the senses, people may discover feelings and an inclination to communicate. They might also be encouraged to reflect upon memories of the past, i.e. reminiscence. With validation of a person’s needs, he or she may be able to briefly orient themselves in an outdoor space due to a decrease in pacing and emotional outbursts, and improved communication.

Despite many nursing homes utilizing validation therapy, little examination of the therapy has been completed (Toseland, Diehl, Freeman, Manzanares, Naleppa, & McCallion, 1997). Toseland et al. (1997) reveals that a limited number of studies have

been completed regarding validation therapy, and many of these were flawed by small sample sizes and uncontrolled research designs. Although the results indicate that validation therapy may affect older adults with ADRD positively, studies confirm that additional research is necessary.

Toseland et al. (1997) conducted a study which examined the short and long-term effects of validation therapy. The authors predicted that validation therapy would reduce maladaptive behaviors, the use of restraints, and psychotropic medication. They also assumed that increases in social interaction and overall well-being would occur. Eighty-eight nursing home residents who experienced at least a moderate level of dementia and exhibited behaviors, such as aggression, verbal abusiveness, and restlessness, were recruited for the study. Results of the study unfortunately present minimal support for the value of validation therapy, and do not support the assumption that validation therapy decreases medication or restraint use (Toseland et al., 1997). Nonetheless, the nursing staff reported fewer aggressive behaviors in the residents involved in validation therapy. Overall, it appears to be an effective treatment, albeit one that would benefit by additional research.

Validation therapy is an important component to emotion-oriented approaches, and the technique should be coordinated with other forms of therapy for persons with ADRD. However, research has only been conducted indoors and validation therapy should be researched in outdoor environments to confirm the beneficial effects of implementing this therapy outdoors. Feil (1992) argues that by providing stimulation of the senses through validation therapy, the adult may be encouraged to communicate. By providing validation therapy in outdoor settings, the opportunity to stimulate the care-

recipient's senses is considerable. The outdoor environment has many components that may potentially support stimulation and reminiscence and promote positive communication. Researching the implementation of validation therapy outdoors may provide beneficial opportunities for researchers, staff, and residents alike.

Life Review. Life review is defined as “a naturally occurring, universal mental process characterized by the progressive return to consciousness of past experiences, and particularly, the resurgence of unresolved conflicts” (Butler, 1963, p. 66). Life review is not synonymous with reminiscence therapy but reminiscence therapy includes it. Butler (1963) views reminiscence therapy as aimless, fatuous wandering of the mind. In contrast, he views life review as a systematic process that plays a significant role in the psychology and psychopathology of older adults. A differentiating factor in life review and reminiscence is that life review is an evaluative process, whereas reminiscence is a therapeutic technique (Kunz, 1998). Ryden (1981) relates the life review process to coping with Erikson's eighth developmental stage of Ego Integrity vs. Despair, which he describes as:

The acceptance of one's one and only life cycle as something that had to be and that, by necessity, permitted no substitutions...an experience which conveys some world order and spiritual sense, no matter how dearly paid for. The lack or loss of the accrued ego integration is signified by fear of death: the one and only life cycle is not accepted as the ultimate of life. Despair expresses the feeling that the time is now short, too short for the attempt to start another life and try out alternate roads to integrity. (Erikson, 1950)

In agreement with Erikson, Butler (1963) describes life review as a potential emotionally painful intervention. Nevertheless, this process may allow the older adult to resolve the final stage of ego integrity vs. despair and achieve a sense of integrity about his or her life (Kunz, 1998).

The chance of reliving negative memories may be reduced if the designer incorporates elements in the landscape that stimulate positive memory. Life review is an important precursor to reminiscence therapy and sensory stimulation because it is another emotion-oriented approach that may affect older adults' behavior. However, reminiscence therapy may provide better services to older adults with ADRD in outdoor environments since it is a therapeutic approach. Butler (1963) suggests a rationale against applying the technique of reminiscence therapy; however, other researchers have found reminiscence therapy to be beneficial to individuals with ADRD.

Reminiscence Therapy. Butler (1963) describes reminiscence as “a part of the normal life review process brought about by the realization of death and viewed the use of the past as a mechanism that aids individuals in preparing for death by mitigating fear and anxiety” (p. 66). When reminiscence therapy became known as a therapeutic technique, Woods (1992) defined reminiscence therapy as a “vocal or silent recall of events in a person's life, either alone or with another person or group of people” (p. 1). The session typically includes group meetings where care-recipients are encouraged to speak of past life events while assisted by aids (Spector, Orrell, Davies, & Woods, 2005). Aids that are appropriate in outdoor settings may include common tools, such as a wheelbarrow or a water pump that provides memories from the specific age cohort of the

care-recipients. These aids may evoke positive memories of their childhood, occupation or children, which may perhaps improve their overall quality of life.

Hamilton (1985) perceives reminiscence therapy to have three elements: memory, experience, and social interaction. Memory recalls past experiences, thoughts, and feelings of older adults that assist in satisfying their needs and helps find a connection from the past to the present. Experience aids individuals in finding meaning in their feelings through memory recall. And social interaction is the process of sharing memories with others, which provides opportunities for engagement and connection. Each of these components of reminiscence therapy can occur outdoors in therapeutic gardens through the use of environmental memory aids.

Lieberman and Tobin (1983) suggest three functions of reminiscence therapy: “to maintain self-concept in the midst of change, to serve as a resource of consolation and gratification, and to resolve past conflicts and achieve meaning.” Reminiscence therapy has the ability to assist persons with ADRD in achieving ego integrity, autonomy, the resolve of problems of the past, and enabling them to discover positive meaning in their lives. Researchers indicate that reminiscence therapy increases self-esteem, autonomy, life satisfaction, and social interaction, and decreases the possibility of depression, uncertainty, and disorientation among older adults with ADRD (Haight & Hendrix, 1995).

Reminiscence therapy sessions must occur in therapeutic environments where the older adult is most comfortable (Sellers & Burrus Stork, 1997). Open-ended questions regarding the persons past are asked, accompanied by the presentation of “memory triggers.” Sellers and Burrus Stock (1997) describe memory triggers as photographs,

pets, music, or scrapbooks. In an outdoor setting, plants, water, sounds, and sculpture may be incorporated in the reminiscence therapy session as memory triggers.

Researchers warn that although reminiscence therapy offers positive outcomes and therapeutic benefits, memories may provoke negative behavior problems, which Butler (1963) cautions (Harwood, 1989).

A noteworthy study conducted after Butler's description of life review as a therapeutic approach involved a 92 year old female care-recipient who was diagnosed in 1937 with schizophrenia (Harwood, 1989). The researchers predicted that reminiscence therapy would increase the care-recipient's spontaneous verbalizations, interactions with other persons, the frequency of times the care-recipient laughed or smiled, the frequency of positive verbalizations, and the number of memories shared. Positive interactions are considered interactions which reveal "satisfaction, happiness, fondness, confidence, and/or statements of affirmation and support" (p. 48). The care-recipient was withdrawn, had limited interactions with others, and was not reported to reminisce about her life before RT (Harwood, 1989). Activities included in the reminiscence therapy session consisted of the presentation of multi-sensory materials combined with a corresponding task. Upon completion of the study, the care-recipient was observed smiling and laughing at relevant times during the sessions, acting spontaneously, and offering information about her life experiences.

This reminiscence therapy study supports the prediction that the care-recipient improved in spontaneous verbalizations, memories shared, and constant laughter; however, in the course of the study, auditory deficiencies were revealed, which did not permit the care-recipient to interact with other persons (Harwood, 1989). This study

demonstrates the benefits of reminiscence therapy for older adults with AD/DRD but confirms limitations, such as specific illnesses of individual persons. However, the benefits of reminiscence therapy outweigh the negative outcomes identified in this study.

Another study conducted in Taiwan on the effects of reminiscence added a variable which affects a high percentage of the aged population: depression. The occurrence of depressive symptoms in individuals 65 and older is 34% to 56% (Wang, 2005). Reminiscence therapy is believed by researchers to alleviate some of the psychological problems that older adults experience (Butler, 1963). A significant number of researchers agree that reminiscence therapy reduces depression. The study thus examined the effects of reminiscence on institutionalized older adults in reducing depressive symptoms and improving their overall well-being. The theoretical framework for the study drew on Butler's (1963) life review process and Erikson's (1963) developmental theory. In the study, Wang (2005) questions whether reminiscence therapy can reduce depressive symptoms and improve the mood of the older adult. He defines depressive symptoms as "sadness, low mood, pessimism, self-criticism and self-blame, retardation or agitation, slow thinking, poor concentration, and appetite and sleep disturbances" (p. 58). The reminiscence therapy sessions occurred weekly for 30 to 45 minutes for 4 months. The persons involved were expected to recall past events, such as childhood, marriage, family, war, and job experiences. The results of the study are consistent with the hypothesis, that they reveal a significant decrease in depressive symptoms and an increase in positive mood state (Wang, 2005). However, there are some problems apparent within the study. The sample size was too small and communication issues between the control and experimental groups may have occurred.

Participation in reminiscence therapy sessions is overwhelmingly found to be a worthwhile form of treatment for older adults with ADRD. Nevertheless, Wang (2005) argues that many health-care facilities lack psychological care in assisting older adults, and therapeutic interventions are needed to improve residents' quality of life. Furthermore, Hsieh and Wang (2003) suggest that different approaches of evaluating the effect of reminiscence therapy on depression in older adults are needed, such as a qualitative approach, the contribution of personality on the effects of reminiscence therapy, and a clear definition of which aspects of reminiscence therapy affect depression. Conducting reminiscence therapy sessions outdoors in a therapeutic garden is a probable solution since outdoor spaces provide opportunities for seeking memories, sensory stimulation, and interaction.

The impetus of these studies was a desire to confirm emotion-oriented approaches, and in this case, reminiscence therapy, as valuable forms of therapy for persons with ADRD.

Multi-Sensory Stimulation. In addition to validation and reminiscence therapies, multi-sensory stimulation, also known as Snoezelen, presents a therapeutic strategy that can be conducted in outdoor environments. Snoezelen was originally developed in the Netherlands in the 1960's for persons with learning disabilities, and to provide multi-sensory stimulation in a therapeutic environment for care-recipients with behavior and emotional problems (Lee, 2002). Hulsegge and Verheul (1987) explain that Snoezelen is based on the assumption that "the world in which we live is a mixture of light, sound, smells, tastes, and tactile sensations which we access through our sensory organs: eyes,

ears, nose, mouth, and skin” (p. 120). The outdoor environment has considerable potential to maximize the senses.

Researchers demonstrate that a lack of stimulation has detrimental effects on a healthy person, and that sensory stimulation is needed by all individuals if brain functioning is to remain healthy (Solomon et al., 1967; Loew & Silverstone, 1971).

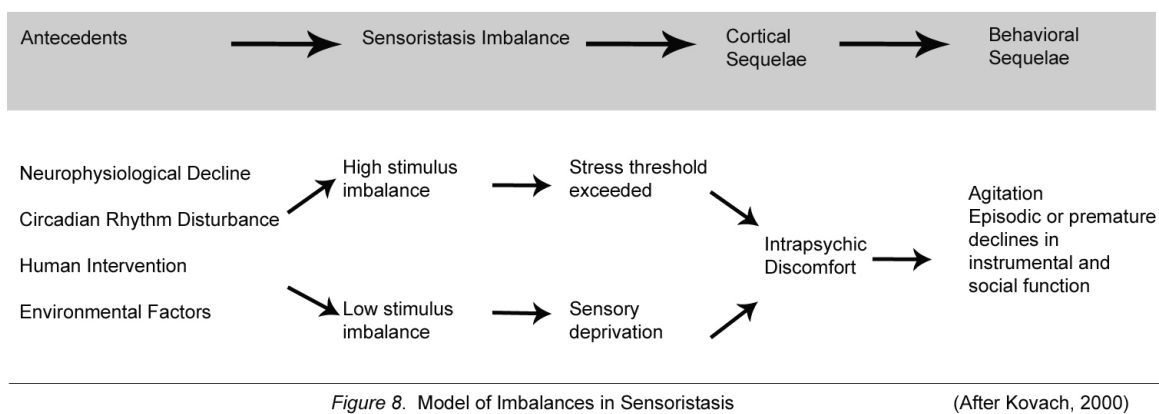
Older adults with ADRD have a higher risk of sensory deprivation than healthy adults, and therefore, a decline in the senses is probable (Baker, Holloway, Holtkamp, Larsson, Hartman, Pearce, et al., 2003). Kovach (2000) created a model, shown in Figure 8, which shows the state of imbalance, and lack of sensoristasis, of older adults with ADRD.

Kovach (2000) defines sensoristasis as “an equilibrium of the sensory state of the person with dementia that is maintained by pacing of sensory-stimulating and sensory-calming activities, while controlling for the pleasantness or noxiousness of the activity” (p. 381).

Persons with ADRD experience distress because of imbalances in sensory stimulating activities. Principles of the model include (Kovach, 2000):

- Adults with irreversible dementing illness experience imbalances in sensoristasis.
- Imbalances in sensoristasis may be caused by disturbances in circadian rhythm, neurophysiological decline, human intervention or environmental factors.
- Too much high-stimulus activity in a given time can result in exceeding one’s stress threshold. The effects of this imbalance will be worse and will occur at a lower level of stimulation when the activity is unpleasant.
- Prolonged lack of stimuli can create a state of sensory deprivation.
- States of sensory deprivation or of exceeded stress threshold can result in intrapsychic discomfort, a perception of affective unpleasantness that is associated with an actual or potential stimulus or threat, in persons with irreversible dementia.
- Intrapsychic discomfort can result in agitated behavior and episodic or premature decline in instrumental and social function.
- Pacing of activities must include interventions that facilitate sensoristasis. Pacing of activities will often require adjustment during stress and environmental change. People need longer periods of sensory-calming activity between shortened periods of sensory-stimulating activity as the illness progresses.

- In situations in which activity is inadequately paced, interventions can ameliorate some of the negative consequences of imbalances.



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This model outlines the implications of sensoristasis that should assist landscape designers in understanding the specifics of the disease and in enhancing the design of a therapeutic garden.

According to Hall and Buckwalter's (1987) Progressively Lowered Stress Threshold Model, the stress threshold of older adults with ADRD will increase with a lack or excess of stimulation, in contrast with healthy individuals. Experiencing a lack of stimulation results in negative and null behavior, which is defined as physical inactivity and having no focus with eyes open (Kovach, 2000). Researchers suggest that an increase in negative and null behavior is not only a consequence of the progression of the disease but is also due to a lack of sensory stimulation. Several studies conducted with healthy individuals indicate that sensory deprivation results in delusions, disorientation, impaired concentration and motor skills, and decreased motivation. If deleterious effects are outcomes of sensory deprivation for healthy persons, the effects for older adults with

¹ Dementia sequelae- Negative conditions following and resulting from the symptoms of dementia or the management of these symptoms, which include intrapsychic discomfort, agitated behavior, and declines in social and instrumental function.

ADRD are much more significant. Other theorists have outlined the impact of sensory deprivation for persons with ADRD. Zuckerman (1964) explains that boring and ordinary environments may be stressful and consequently may impact the individual negatively. Examples of mundane outdoor environments include those that lack color, variety, variation in vertical and horizontal elements, and texture.

Researchers reveal that sensory stimulation is a healthier treatment than pharmaceuticals since it will likely increase the adult's responsiveness, and the application of sensory stimulation may aid in facilitating a successful environment (Baseley & MacNeil, 2004). A common effect of ADRD is impaired olfactory ability. Aromatherapy and plants are elements that can be incorporated in a treatment which will assist in stimulating the sense of smell. Researchers indicate that scents can influence an individual's mood and behavior. Thus, certain scents may reduce stress, anxiety, and depression. Useful oils include lavender, which produces a calming, uplifting effect; chamomile, which reduces depression, insomnia, irritability, and mood swings; and lemon balm, which reduces insomnia and mental stress (Baseley & MacNeil, 2004). Table 4 displays a list of fragrant plants divided by season and type.

Table 4

Fragrant Garden Plants

Spring Perennials	Summer Perennials
Daffodils Magnolia blossoms Hyacinths Apple blossoms Viburnum Lilacs Mock Orange	Peonies Honeysuckle Old roses, <i>rugosa</i> roses Asiatic/oriental lilies Dianthus Tall Phlox Bee Balm Lavender Butterfly Bushes
Fall Perennials	Herbs
Sweet Autumn Clematis Concord Grapes Sedum <i>Autumn Joy</i>	Mint Chives, Garlic Thyme Rosemary
Annuals/Tropicals	Sage Basil Anise Cilantro Parsley Oregano
Jasmine Sweet Alyssum Citrus blossoms Gardenia	

Aromatherapy can be incorporated in the therapeutic garden by spreading fragrant oils throughout the air with a diffuser or by dispersing the oils in a water feature. Non-toxic plants integrated in the garden may stimulate memory and reduce anxiety for older adults with ADRD. Several edible flowers that landscape designers should consider including in the garden are shown in Table 5 (Baseley & MacNeil, 2004).

Table 5

Edible Flowers

FLOWER	COLOR	FLAVOR
Violas, Pansies	Purple, Blue, White, Multi	Slightly sweet green or grassy flavor
Nasturtiums	Sunset colors	Peppery
Bachelor's Button/Cornflower	Intense Blue	Lightly sweet to spicy, clove-like flavor
Calendula	Orange, Yellow, Gold	Range from spicy to bitter, tangy to peppery; sharp taste resembles saffron
Chives, Garlic, Leeks	Purple, White, Pink	Tastes like the leaves of the plant only stronger, but milder than the bulb
Daylilies	Orange, Yellow, Gold, Red	Slightly sweet with a mild vegetable flavor, like sweet lettuce or melon
Clover	Pink, Purple, White	Sweet, anise-like, licorice
Mint	Mauve	Minty, different overtones depending on the variety
Basil	Bright White, Pale Pink, or Lavender	Like the leaves, only milder

Although the normal aging process results in a decrease in visual acuity, visual stimulation may still be an appropriate therapy since it can minimize confusion and improve well-being (Baseley & MacNeil, 2004). In the outdoor environment, visual stimulation may be achieved by incorporating signs at eye level, by using non-glare surfaces, and by offering a variety of colors. Care-recipients with ADRD commonly misinterpret sounds. By reducing background noise and offering pleasant sounds, the person with ADRD may become more aware of his or her surroundings. Noise reduction is more relevant in indoor settings rather than outdoor environments due to paging systems, tiled floors, and thin walls. Nevertheless, locating a therapeutic garden away

from a highway or an active space will provide a safer environment for older adults. Pleasant outdoor sounds may include birds, water, and wind chimes. Touch is an important feeling that can assist in building a connection between the older adult with ADRD and the environment (Baseley & MacNeil, 2004). Touch may be incorporated in the garden through plants with various textures, sand, water, sculpture, murals, and a variety of materials.

Responses to sensory stimulation of older adults with ADRD in the late stages include: eye contact, blinking, a turn of the head either away or toward stimuli, reaching out for the stimuli, changes in facial expressions or verbalizing (Lucero, 2002). Researchers suggest that sensory stimulation has a high probability of compensating for losses in sensory functioning (Baseley & MacNeil, 2004). Accordingly, incorporating sensory stimulation in an outdoor environment has the ability to provide older adults with the opportunity to experience nature in every aspect of the senses, and may therefore improve their quality of life.

A study conducted by Weert, Dulmen, Spreeuwenberg, Ribbe, and Bensing (2005) observed the behavioral and mood effects of Snoezelen. They predicted that the study would lead to significant changes in the well-being, adaptive, and maladaptive behaviors of residents with ADRD at the chosen nursing homes. Well-being of the adult is defined through his or her happiness and mood state. Adaptive behavior is a measure of the attentiveness and responsiveness the person has to the environment, his or her initiative and relationships, whereas maladaptive behavior involves demonstrating antisocial, apathetic, and anxious behaviors, agitation, aggression, depression, and disorientation (Weert et al., 2005).

The study was performed in six Dutch nursing homes with 125 residents who experienced moderate to severe dementia, moderate to severe ADL dependency, and a partial or complete hearing and vision impairment (Weert et al., 2005). The effectiveness of Snoezelen was studied by observing the residents involved in the study on a video tape, and the effectiveness was measured by participants' agitation, depression, and mood. The results of the study are positive and congruent with the hypothesis. Residents in the experimental Snoezelen group displayed a decrease in apathetic and aggressive behavior, and depression. They were also observed to be happier, more responsive to verbalization, and exhibited less boredom and sadness. Researchers indicate few reports of negative outcomes of Snoezelen studies. Thus, the overwhelming positive results of this study suggest Snoezelen to be a worthwhile treatment for ADRD.

Another interesting study conducted was a comparison of the effects of Snoezelen and reminiscence therapy on the agitated behavior of ADRD care-recipients. Twenty persons diagnosed with dementia who were observed to display maladaptive behavior were involved in the study (Baillon, Diepen, Prettyman, Redman, Rooke, & Campbell, 2004). The results of the study do not show significant differences between Snoezelen and reminiscence therapy treatments or that one intervention is more beneficial than the other, but they indicate that Snoezelen and reminiscence therapy have positive effects on persons' with ADRD. Many treatments are inappropriate for individuals with ADRD; however Snoezelen and reminiscence therapy are interventions from which care-recipients derive pleasure and happiness and thus are appropriate for these people.

2.6 Synthesis/Conclusion

Gardens can support interactions between people and the environment by responding to individuals' physical and mental disabilities and by compensating for their loss of sensory functions (Jencks, 2003; Lovering, 1990; Grefsroed, 2001). By incorporating therapeutic elements in the garden that promote stimulation of the senses, the person with ADRD may gain positive benefits from the environment. The landscape architectural literature related to the physical environment is the basis for formulation of the preliminary design guidelines created in this study. The literature applies the design guidelines to therapeutic outdoor environments, including wander gardens.

Using psychosocial forms of treatment as an alternative to pharmaceutical treatment may be an effective approach in improving the quality of life of older adults with ADRD. Results of numerous studies conducted on validation therapy, reminiscence therapy, and multi-sensory stimulation indicate benefits for people with ADRD. However, many studies reveal limitations and potential for improvement. In particular, there is a need for landscape designers to research and understand the physiology, stages, and symptoms of decline of the disease in order to design successful therapeutic gardens. In the future, landscape designers should pay close attention to incorporating therapeutic elements in their design that will promote greater quality of life for older adults with ADRD.

Frameworks that combine theories from the disciplines of gerontology and landscape architecture can assist designers in understanding the needs of persons with ADRD. It is important to note however, an effective framework will consist of a number of theories. Prior to initiating their designs, landscape architects should review scholarly

research that addressed effective therapies. The Social Ecological Perspective, the Progressively Lowered Stress Threshold Model, and the Theory of Personhood and Well-Being are useful in understanding the person-environment fit interaction, but the theory that is of most relevance to the design of therapeutic gardens is M. Powell Lawton's Theory of Environmental Press. This theory targets sensory stimulation as being the most beneficial of the emotion-oriented approaches.

There is a need to design better therapeutic outdoor environments for people with dementia. The gap between existing knowledge and its availability to and application by landscape designers, results in unqualified landscape designers creating unsuccessful landscapes that are misunderstood and underused (Thompson, 2000). Landscape designers must design spaces to reduce environmental demands placed on persons with ADRD. They should also give greater attention to the memories, experiences, and perceptions of the individual (Lawton, 1999).

Environmental design has significant potential to be of therapeutic benefit to older adults, but landscape designers must understand the disease to foster positive relationships between older adults and the environment. Environmental design also presents opportunities to manipulate the environment, which researchers suggest, may have positive effects on persons with ADRD. Although ADRD is an irreversible disease and a growing problem, landscape designers have opportunities to make positive impacts on the lives of the people who experience this disease.