The Impact of Outdoor Environments on Health and Well-being of Residents in Long-term Care Facilities: A Review of the Literature

by

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Abstract

This capstone project entails a literature review focusing on the influence of outdoor nature settings on health and well-being for residents in long-term care facilities. This review identifies key evidence-based benefits and barriers to garden use for residents and design guidelines for outdoor spaces in the empirical and descriptive literature. In recent years, there is a growing recognition of the importance to shift from the medical model-of-care to a holistic person-centered care approach. Well-designed outdoor environments can play an important role in creation of a person-centered care environment. Empirical evidence supports a wide range of health and well-being benefits from nature environment exposure. These include improvements to residents’ agitation, stress, depression, pain, psychosocial well-being, sleep and circadian rhythm, attention restoration, social interaction, independence, sense of purpose, wandering behaviour, reminiscence, and sensory stimulation.

Keywords: outdoor design; nature; long-term care; dementia; well-being benefits; health benefits
Dedication

I offer a heartfelt thank you to my mother who said my potential had no ceiling; to my father who believed in my determination; and to my grandfather for his unwavering and generous support. This work I dedicate to my sister who has shown exceptional strength, courage, and happiness despite a lifetime of seemingly insurmountable adversity. The lessons I have learned through being a part of her life I consider the greatest and most important education of mine. She compels me to be compassionate and fight for the well-being of those who face vulnerabilities. I dedicate this work to her, for her presence has immeasurably shaped my life course.
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Chapter 1.

Introduction

1.1. Background

Life expectancy is rising globally (World Health Organization, 2014) and as the baby-boomer cohort grows older, there will be an increased need for various levels of care and services, including long term care. The World Health Organization (2002) indicates that the number of people who require support due to illness and disability is rising. In Canada, the Canadian Healthcare Association (2009) reports that the age of residents entering long-term care facilities is increasing due to the community-based support services and care options for older adults to obtain mild/moderate care. As a result, residents possess increasingly complex health needs (Canadian Healthcare Association, 2009). Medical advances have prolonged life and compressed morbidity attributing to society’s oldest adults enduring multiple complex and chronic illnesses (Baltes & Smith, 2003). These changes prompt the need for appropriate long-term care services and amenities to meet this increased demand, while providing an enhanced level of care for optimal health and well-being.

The term ‘long-term care facility’ can refer to numerous different types of living environments depending on the state or province in which the facility is located. In the context of this review, long-term care facilities refer to settings with dedicated 24-hour nursing and personal care for individuals with chronic health conditions and for those who need assistance with Activities of Daily Living (ADLs). In the United States, this type of care facility is referred to as a ‘Skilled Nursing Facility’. The long-term care facilities discussed in this review may contain special care environments, i.e., a floor or unit dedicated to residents with dementia who require a living environment that is secure, restricts overwhelming stimulation, and addresses challenging behavioural symptoms.
The long term care facility examined in this review does not include assisted-living facilities. Assisted-living facilities typically offer support with personal care and hospitality services (e.g. meals, housekeeping) for residents who maintain independent decision-making abilities.

In the last two decades, the approach to long-term care in institutional settings has undergone a paradigm shift from the medical model-of-care to a person-centered holistic model-of-care. The medical model primarily addressed the medical and physical needs of residents (Rowles & Teaster, 2016). The person-centered model entails addressing the whole resident by meeting their psychological, social, spiritual and physical needs (Clarke, Hanson, & Ross, 2003; Edvardsson, Winblad & Sandman, 2008; Nolan, Davies, Brown, Keady, & Nolan, 2004). The person-centered approach has redirected attention from the negative aspects of aging (e.g. disability, frailty) and refocused attention on residents’ remaining abilities, capacities, interests, and biographical histories (Bernard & Rowles, 2013). In this way, the long-term care facility becomes more akin to a home-like living environment instead of a hospital-like institution.

A large proportion of older adults residing in long-term care facilities have been diagnosed with Alzheimer’s Disease or another type of dementia (referred to herein as ‘dementia’). A Canadian study found that 64% of facility residents in the sample had been diagnosed with dementia (Canadian Institute for Health Information, 2006). In the United States, 49% of the long-term care facility sample had a diagnosis of dementia (Harris-Kojetin, Sengupta, Park-Lee and Valverde, 2013). Many residents express symptoms as a result of dementia, such as agitation (Cohen-Mansfield, 2001; Hoover, 1995; Padilla, 2011) and wandering behaviour (Algase, Beattie, Antonakos, Beel-Bates, & Yao, 2010; Detweiler, Murphy, Myers, & Kim, 2008; Kwack, Relf, & Rudolph, 2005). Some of these symptoms are difficult for care staff to manage. For residents, dementia related symptoms, without appropriate management, present barriers to obtaining optimal health and well-being. Symptoms and stereotypic behaviour such as aggression have historically been managed through restraints and psychotropic medications, known to have questionable effectiveness and potentially detrimental repercussions for residents (Voyer et al., 2005). There are other approaches to managing dementia symptomatology based on social and environmental solutions.
The physical design of a long-term care facility impacts its person-centered care approach. An environment that resembles a familiar lifestyle and home-like setting (Koren, 2010; McBride, 1999) maintains an atmosphere akin to the resident’s familiar homelike living arrangements. It is important to consider the design of outdoor spaces within facilities for their impact on resident behaviour, health, and well-being. Outdoor settings (also referred to herein as ‘garden’ spaces) in long-term care facilities can manifest in a variety of forms, e.g. gardens, patios, entryways. In addition to their natural esthetic beauty, these environments have the potential to influence resident health and well-being. Theories have described the unique relationship between humans and nature, presenting an intrinsic bond that connects humans and nature together (Ulrich, 1993; Wilson, 1984; Wilson, 1993). In this paper, the term ‘nature’ can be defined as biotic living elements of the earth (e.g. trees, flowers, birds, sun) considered positive and non-threatening (e.g. not tornadoes, spiders, etc.) (Chalfont, 2008). From an evolutionary basis, humans have ample history interacting and relying on nature for survival (Ulrich, 1993). A seminal article by Ulrich (1984) was one of the first to empirically study the benefits of nature for human beings. Ulrich (1984) compared window views of post-surgery acute care patients and achieved significantly positive findings. Since, the study of nature’s influence on behaviour, health, and well-being have received significantly more attention.

After a lifelong relationship interacting with the natural environment in some capacity, residents in long-term care facilities spend a significant amount of their remaining time confined to a facility. Older adults in long-term care facilities quite often have limited access to the outdoors. Outdoor spaces may not be offered, properly designed for users, or be accessible to all residents (Cooper Marcus & Sachs, 2013). In fact, there is substantial variability regarding outdoor spaces in long-term care facilities (Cutler & Kane, 2006). Access is often restricted where safety is not ensured (Cohen-Mansfield, 2007; Cutler & Kane, 2006; Zeisel, 2007).

The interior environment of long-term care facilities has received considerable attention directed towards safety and security. There are stringent requirements for interior environments (e.g. Illinois Joint Committee on Administrative Rules Administrative Code [IJCARAC], 2006; Kansas Department for Aging and Disability Services [KDADS], n.d; New Brunswick Department of Social Development [NBDSD],
2012). These standards provide the basic requirements for facilities and typically include the physical environment, safety needs, and specific room and size requirements (Mor, 2014). There is a considerable scarcity of similar regulations for the exterior environment apart from the requirement for outdoor space in facilities licensed after a certain year (e.g. IJCARAC, 2006; KDADS, n.d.; NBDSD, 2012). Outdoor environments in long-term care facilities are currently not beholden to any detailed regulations or design standards (Cutler & Kane, 2006; Hernandez, 2007). This lack of guidance has led to substantial variation in the prevalence, contents and usability of outdoor areas. An overwhelming number of studies reveal that access barriers are the greatest hurdles to resident benefit in the outdoor environment (Cutler and Kane, 2006; Grant & Wineman, 2007; Heath, 2004; Mather, Nemecek, & Oliver, 1997; Murphy, Miyazaki, Detweiler, & Kim, 2010; Rappe & Kivelä, 2005). This is unfortunate, as the last few decades of literature has revealed important advantages of spending time in nature. The safety and enjoyment of outdoor space cannot be ensured in environments that are not designed to support resident needs and promote positive health and well-being.

1.2. Purpose of Study

This literature review and synthesis covers the health and well-being benefits associated with nature for long-term care facility residents, both with and without dementia. This review topic was chosen with the intent of: contributing to the understanding of outdoor spaces in long-term care facilities, precipitating standards for outdoor space, developing more societal awareness of outdoor benefits, and initiating high quality outdoor design in long-term care facilities. First, this review examines theories and conceptual work of environment-behaviour, affinity for nature, and nature benefits for residents in long-term care facilities. Second, the empirical research findings with respect to nature benefits are divided into subsections addressing health and well-being. Consolidation and elucidation of the key findings will clarify the current support for the benefit of outdoor environments. Third, access barriers are discussed in detail as they present the most significant obstacle to garden use. Fourth, both the empirical and descriptive literature is examined to highlight key design guidelines. The design guidelines outline the most prevalent considerations in the creation of outdoor space in long-term care facilities. Fifth, a discussion of the key findings and a critical analysis are
presented along with identified gaps in the literature. This final discussion includes the conceptual literature, the empirical support for benefit areas, and the descriptive literature on design guidelines.

1.3. Methods

The purpose of this literature review and synthesis was to systematically review relevant empirical and descriptive literature guided by research questions and related selection criteria. The two research questions that guided the research project were:

1. What is the role of the outdoor environment in supporting resident health and well-being in long-term care facilities?

2. What descriptive literature and empirical findings can inform environmental design guidelines for outdoor environments in long-term care facilities?

The first step in conducting the literature search was creating suitable search terms. All searches used long-term care, residential care, or nursing home as a base. These were then used in various permutations with additional terms as follows: outdoor, outside, well-being, garden, horticulture, nature, environment, sensory, stimulation, and multi-sensory. Source parameters included English language sources between the years 1990 and 2015, in addition to seminal resources. Second, databases were selected to search for relevant literature. Purposeful selection of diverse databases was conducted to choose databases that were considered most likely to pertain to the chosen field. The databases chosen were: AGELINE, Avery Index to Architectural Periodicals, CINAHL, Google Scholar, PsychINFO, PubMed, and Web of Science. In addition, two special issues of the Journal of Housing for the Elderly and the video series Access to Nature were identified as containing subject matter that was pertinent to the topic.

The terms identified were searched in the chosen databases with mixed results. AGELINE produced the greatest number of relevant findings whereas Avery Index to Architectural Periodicals returned none. As this field is relatively understudied, reference lists of articles chosen were searched for additional sources. Following the initial search terms, additional filters were added to reduce the number of total articles. These filters
generally included additional terms from the list of chosen key words. This was especially necessary in cases where the searches revealed articles that were unrelated to the topic.

Literature selected for the review was considered if it focused on long-term care facility environments. If a study’s focus included numerous types of residential housing environments, the studies were only chosen if the findings could be separated based on applicability to long-term care facilities. A few sources were included that did not refer to long-term care if they were seminal pieces. If the type of care described was different from long-term care but the scope was within the guidelines of this study, then that article may have been included for its applicability to long-term care. Unlike other topics, this field is relatively understudied. As a result, the focus of the literature search had to be constructive as opposed to reductive.

A final number of 37 empirical sources were included in the review. Twelve of these came from AGELINE, three from PubMed, three from the Journal of Housing for the Elderly, three from Google Scholar, three from PsychINFO, one from CINAHL, eleven were harvested from existing articles, and one was a chapter from a book. There were numerous article duplications found in several databases. Of the articles used, empirical sources were summarized in the Appendix titled *Summary Review Table*.

Many interpretations of ‘long-term care’ were discovered while searching for resources. There were several instances where the living environment of the residents could not be identified as pertaining to long-term care or assisted living facilities. The best estimate was made in this case, typically based on dementia progression and described need for assistance with ADLs. In several instances, the described level of resident cognition and health was ambiguous. There were articles that did not clearly describe or assess resident health or cognition; therefore the resident characteristics were unclear. As the range of conditions and health of long-term care facility residents varies significantly, the uncertain health and cognitive status of residents was not considered problematic. This variation reflects the diverse long-term care resident population. The discussion and conclusion section presents two concerns in the existing literature: poorly defined living environments and unclear resident health and dementia prognosis.
Chapter 2.

Conceptual Work

As a field, environmental gerontology remains relatively poorly theorized (Birren, 1999; Wahl & Weisman, 2003). This notable dearth or “dust bowl empiricism” of few theoretical underpinnings has led to a patchwork understanding of environmental gerontology based primarily in empirical findings (Birren, 1999). Yet, there are broader theoretical approaches and concepts that bridge across other fields and are relevant to the study of outdoor space in long-term care facilities. These concepts provide insight to the well-documented interaction between environment and behaviour. Some theories ascertain that positive benefits acquired from natural elements are inherent, deep-seeded connections or psychologically beneficial (Wilson, 1993; Ulrich, 1993). Others dissect the relationship between humans and the environment (Barker, 1968; Gibson, 1979), and a few specific theories indicate the benefit of natural elements on well-being outcomes (Kaplan, 1995; Ulrich, Simons, Losito, Fiorito, Miles, & Zelson, 1991). The following paragraphs describe theories and concepts related to outdoor environments and are compiled in three distinct sections: Inclination towards Nature; Nature as Restoration; and Environment-Behaviour Perspectives.

2.1. Inclination Towards Nature

It is common for people to enjoy spending time outdoors; the expansive and varied terrain provides variety and challenge for individuals and the accompanying beauty elicits positive sentiments. However, in this day and age when urban lifestyles are predominant and technology use is widespread, humans are less reliant on the earth than their ancestors. Although human beings may not interact with nature on a daily basis in order to survive, there is an unabated tie between nature and humans. Notable
among the theoretical perspectives that address the relationship between behaviour and the environment is the field of ecological psychology (Roszak, 1995).

There are four important distinctions in the field of ecological psychology that merit attention, i.e. an inherent connection to nature; history and preference-shaped behaviour; intuition-based environment usage and; individual assessment of the objective environment. First, ecological psychology theorist Wilson (1993) contended that at a basic evolutionary level, the human condition is inherently linked to the environment, and as a result, people are naturally drawn to it. Throughout evolution, man has needed the earth for shelter, food, and all the basic necessities of life, creating a persistent tie (Ulrich, 1993). Therefore, it is natural and even beneficial for humans to be outdoors due to this inherent propensity to be among natural elements. A strong case for inherent and learned nature appreciation is derived from the biophilia and biophobia hypotheses. The biophilia hypothesis supports a positive response and connection to nature (Ulrich, 1993; Wilson, 1984). Wilson (1984) defined the hypothesis as the “innate tendency to focus on life and lifelike processes” (p. 1). The notion Wilson (1984) described was the natural propensity of beings to relate to other systems in nature due to an animate bond. These animate bonds have developed because humans are beings of nature and have evolved from more rudimentary times, reliant on the earth to provide everything from nutrition to shelter (Ulrich, 1993). The human connection to natural environments originates, at least in part, from basic survival needs throughout time, denoting a hereditary, evolutionary component (Ulrich, 1993). This means that instead of a simple and straightforward enjoyment of natural elements, humans may have a more complex, embedded connection towards nature. Rodiek and Schwarz (2007) echo the biophilia hypothesis view and express that interaction with the natural environment is a “fundamental genetically based need” (p. 5). This ‘idealistic’ biophilia hypothesis appears infrequently in the literature (Depledge, Stone, & Bird, 2011; Rodiek & Schwarz, 2007) and requires more research, yet numerous studies indirectly support its claim of a positive connection to nature through health and well-being findings, discussed later in the paper.

Not all aspects of nature are associated with positive sentiments, warranting further discussion to delve into this differentiation. Biophilia’s opposite reaction to nature, biophobia helps to explain why people fear certain natural elements whereas they feel a
natural affinity towards others. Human predecessors had a natural propensity to flock to life-sustaining nature and had a natural avoidance of predators and situations that could cause them harm (Ulrich, 1993). According to Ulrich (1993), human fears, such as phobias of spiders and snakes, may be a result of hereditary inclination, as these animals represented a deadly threat for human ancestors living among nature. The Canadian Psychological Association (2009) defines four main types of phobias: animals (e.g. spiders); nature-related (e.g. storms); blood-related (e.g. needles); and locational (e.g. small spaces). Each of these categories relate to threats that could have gravely injured ancestors due to, for example, a lack of sanitation or exposure in the wilderness. Therefore, people may have an affinity towards nature because of its life-sustaining survival benefits as well as the opposite reaction to certain elements in nature because of its ability to cause destruction and personal harm.

The second distinction within ecological psychology is the cause of behaviour. Ecological psychology theorists have two divergent behaviour approaches that can ultimately provide insight into the relationship between residents and an outdoor environment. The molar behaviour paradigm refers to the bigger picture of behaviour as opposed to the specific breakdown of the immediate behaviour taking place (Barker, 1968). As stated by Barker (1968), this approach is one that studies “the behavior of persons as undivided entities; we are not interested in the behavior of eyelids or glands.” (p. 10). A person’s behaviour is a result of his or her history and many factors that have led up to that particular behaviour (Barker, 1968). An immediate behaviour cannot be understood by piecing it apart, but through study of a person throughout time to understand the complexity of relevant factors (Barker, 1968). An example given by Skinner (1981) is that the act of loving someone cannot be determined at one point in time. It is through a history of behaviour - of reinforcement over time - and not due to a current proximal rationale, that love develops (Skinner, 1981). Its opposing behavioural paradigm, molecular behaviour, can be dissected to the biological, behavioural and sometimes cultural/social customs in the particular context prompting the present behaviour (Skinner, 1981). The behaviour is pieced apart to understand the reasoning behind each specific action (Barker, 1968). Therefore, whether the behaviour paradigm in any given situation can be deduced to molar or molecular approaches, both indicate that the immediate behaviour is a result of more than simplistic decision making of the
individual. The behaviour is a result of influential factors that either entails historical reinforcement or present-day relevance (e.g., biographical, social, cultural, environmental). If an objective outdoor environment in a long-term care facility supports residents by providing a responsive setting with supportive environmental features, it can provide opportunities for activities, such as walking on a safe path with opportunities for rest, and environmental features that serve as prompts to participate in activities that the residents may have done in their past (e.g., watering plants).

Gibson (1979) provides a different approach specific to environment-enabled behaviour. Gibson developed the theory of affordances, which describes how an environment or an object provides cues for its usage (Doorey, 2015). According to this theory, the perceiver evaluates the qualities and characteristics of an object or an environment and it, in turn, affects that individual's behaviour in their environment (Gibson, 1979). For instance, a thick wooden chair indicates stability and plush cushions indicate comfort (Doorey, 2015). This concept is important as it relays how significant it is for an environment to clearly illustrate its purpose to the individual within the space, especially for residents experiencing various sensory, cognitive, and physical impairments. In an outdoor environment for residents, it is important to incorporate features that have easy-to-follow cues for residents with impairments, such as distinct walking paths, and uncomplicated interactive features. This way, residents can get the most out of trips outdoors, reduce stress and increase benefit within a unique and uncomplicated outdoor environment.

The third important distinction in ecological psychology is between the psychological environment of the individual and the surrounding ecological environment (Barker, 1968). Theorists describe behaviour as a two-fold consequence of objective factors in the unbiased environment and of the subjective characteristics and perception of the individual (Barker, 1968; Field theory, 2015). When evaluating an environment, this concept takes into account the individual, the experiences they have had, are currently having, and will have, as it affects their here and now in that environment (Field theory, 2015). For instance, a resident may be within an environment that offers various cues, but the perceiver interprets them another way due to cognitive impairment or because of a history in spaces such as these. Accordingly, the objective purpose of an environment should not be presumed to correspond with the subjective user's
experience; each person’s experience of a space is unique. This is the view of field theory first introduced by Lewin in the 1940s. Especially for long-term care facility residents with cognitive impairment, their perception of the environment may be quite dissimilar from the intended use of the space. For example, sensory impairments from dementia can result in residents being incapable of recognizing objects (Hof & Bouras, 1991). The visual cues considered automatic for people without dementia might cause distress for an individual who has lost those cues (Adelstein, Kesner & Strassberg, 1992; Hof, Bouras, Constantinidis & Morrison, 1989), creating visual “clutter” instead (Jackson & Owsley, 2003). Consequently, resident perception is an important consideration in an outdoor setting.

Based on the ecological psychology perspective, human behaviour and the surrounding environment are undoubtedly linked. To list what is stated above, ecological theorists contend that humans are inherently connected to the environment, the environment over time influences behaviour, and the physical environment provides clues for its usage. This being said, the physical design of an environment (built or natural) does not necessarily appropriately respond to the user’s physical abilities, cognitive status, preferences, life history, etc. Outdoor environments should be designed with careful attention for a long-term care facility community in order to enable simple operation, variation in usage, and interesting and familiar elements.

2.2. Nature as Restoration

In long-term care settings, nature elements provide restorative and stress-reducing benefits for residents (Detweiler et al., 2012; Kaplan, 1995) and offer a setting uniquely different from the indoor care environment. The first two theories discussed here, attention restoration theory and stress recovery theory, describe features of the environment that can improve lethargy and provide distinctly positive stimulation, thereby reducing negative psychological strain. The final relevant theory to restoration, the supportive garden theory, provides a descriptive approach to creating a stress-reduced environment for older adults.
Kaplan (1995) developed *attention restoration theory*, which is aligned with the conceptualization of nature as expressed in the *biophilia hypothesis*, but focuses more specifically on the measurable benefits of improving attention and reducing fatigue. In *attention restoration theory*, as described in a review by Berto (2014), humans carry a natural appreciation and attentiveness towards natural elements. Residents in a long-term care facility setting often do not visit the outdoors regularly. Many residents resultanty experience the daily commotion of a care home, which includes monotonous and repetitious sounds created by fellow residents and staff, and from objects such as medication carts and televisions. In response to these attention reducing indoor features, numerous studies have produced findings in support of nature as a restorative tool in long-term care facilities to combat attention loss (e.g. Kearney & Winterbottom, 2006; Ottosson & Grahn, 2006) and these will be explored in further sections.

Kaplan (1995) defines four restorative qualities to *attention restoration theory*: being away, fascination, extent, and compatibility, as integral to the ability to restore attention. The first quality, *being away*, refers to leaving the confines of the usual environment either physically or psychologically (Kaplan, 1995). This can be achieved through distinctly unique environments and stimulation or through reducing the amount of stimulation present (Diaz Moore, 2007). The second, *fascination*, involves a sense of intrigue through variation and opposition in features (e.g. colour, size), or through introducing “soft’ fascination” of natural elements (e.g. clouds, wind-swept tree branches), providing patterns and uniformity invoking interest and thought (Kaplan, 1995). The third, *extent*, requires a sense of expanse often within a small space (Kaplan, 1995). This can be achieved through miniature features such as trees that make the space seem larger or through historical and generationally significant artefacts that evoke memories (Kaplan, 1995). The fourth, *compatibility*, is easier to achieve in a natural setting than in an urban one. *Compatibility* has the greatest likelihood for success when the space is versatile towards meeting the needs of a range of users (Kaplan, 1995). Other scholars have used these four qualities and developed corresponding design strategies that provide a practical guide for real world implementation. Diaz Moore (2007) describes that in a dementia care setting, attention restoration can be realized through distinct garden spaces with many sensory elements, a clear orientation,
and reminiscence cues (Diaz Moore, 2007). Specific design features will be described in Chapter four.

A theory of evolutionary inclination towards nature, Ulrich’s (1983) stress recovery theory, is similar to Kaplan’s attention restoration theory, but contains subtle differences according to Berto (2014). Stress recovery theory focuses on psycho-evolutionary stress responses and posits that nature has the capacity to recharge and reinvigorate (Berto, 2014). Attention restoration theory, on the other hand, is described as a psycho-functionalist response of mental fatigue (Berto, 2014). According to Berto (2014), both psychological stress and mental fatigue do not necessarily occur together, but can lead to each other if left untreated. Stress recovery theory is described as an evolutionary concept where humans have a natural proclivity towards nature and have become accustomed and programed towards nature to a greater extent than an urban environment (Ulrich et al., 1991). Berto (2014) states that attention restoration theory focuses its benefits primarily on the appreciation towards nature, whereas stress recovery theory posits that its benefits are a result of the historical benefits of reliance on nature for survival. Restorative benefits of nature are found within the empirical literature and those findings will be discussed in a future section.

A narrowly focused and scarcely mentioned theory specific to garden environments in care facilities is the theory of supportive garden design. This theory, proposed by Ulrich (1999), describes the purpose and benefit of outdoor space for reducing stress and promoting healing in a health care environment. Although not empirically studied, this theory is the most relevant and specific to this topic of research. The theory is still in its infancy, but contends that there are four integral aspects to reducing stress in this type of environment: autonomy and privacy; social support; physical activity; and immersion in nature with unique stimulation (Ulrich, 1999). Long-term care facility residents typically operate under a highly scheduled daily life and live among many other people, sometimes sharing even their bedroom. The first condition of the theory for reducing stress is autonomy and privacy, described as an environment that affords residents the independence and privacy they may not have in the interior environment in which they now live (Ulrich, 1999). These outdoor conditions provide residents a sense of control and access to private space to reduce stress (Ulrich, 1999).
The second condition, social support, is relevant for residents in long-term care facilities as it incites new opportunities for social interaction among the unique outdoor elements. Ulrich (1999) states that numerous studies point to higher health status for individuals who have more social connections as it reduces their stress due to their ability to receive support (Ulrich, 1999). An outdoor environment is adorned with unique stimuli that can prompt new topics of conversations about nature and the features within the space.

Depression is a common condition in long-term care facilities (Rappe & Kivelä, 2005). The third stress-reducing component, physical activity, has been shown to reduce stress and depression symptoms (Ulrich, 1999). What's more, exercise can improve a resident's general psychological and emotional well-being (Ulrich, 1999). Finally a unique and immersed nature experience provides residents in long-term care facilities with a venue completely distinct from their typical living conditions with pleasing and distracting elements (Ulrich, 1999). Ulrich (1999) describes how restoration occurs within outdoor nature space and that these effects may have an evolutionary basis. The unique sensory stimulation of natural outdoor elements (e.g. water) reduces stress and—as nature offers more calming and less prominent stimuli—creates a restorative environment (Ulrich et al., 1991; Ulrich, 1999). These four conditions promote stress restoration and buffering for residents (Ulrich, 1999). It is further stipulated within the theory of supportive design that in addition to these stress-reducing factors, an outdoor space must include a high level of security (Ulrich, 1999). This necessitates a contained environment in long-term care facilities to retain vulnerable residents, prevent elopement, and reassure staff of resident well-being while outdoors.

2.3. Environment-Behaviour Perspectives

Within the older adult population there exists a wide spectrum of health prognoses and functional abilities. The first theory discussed here, the ecological theory of aging, addresses the individual variation of older adults by describing how the physical environment can either enable or hinder behaviour and affect. The second conceptual work, the prosentia hypothesis, focuses on ideal components for outdoor facility space in order to improve resident well-being.
The *ecological theory of aging* is well established and entails the person-environment fit model by Lawton and Nahemow (1973). This seminal work provides one of the only substantive (Wahl & Weisman, 2003) and surely one of the most influential theories in environmental gerontology. Lawton and Nahemow’s (1973) dynamic model describes the interaction between the physical press of the environment and an individual’s competency, resulting in adaptive or maladaptive behaviour and affect. As individual competency decreases, either the older adult must adapt, or the environment must be modified to support the individual. With a maintained amount of competency and an optimal amount of environmental press, the individual will be in a zone of comfort (i.e. will have positive affect and adaptive behaviour) (Lawton & Nahemow, 1973). For the same individual, if their competency remains the same and the environmental press is increased slightly, the individual will be in a zone of maximum performance potential and experience positive stimulation (Lawton & Nahemow, 1973). If the individual is in an incongruent environment, they experience maladaptive behaviour (Lawton & Nahemow, 1973). If an individual has too little competency in an arena of high environmental press, it can lead to *environmental docility*, where abilities cannot meet demand (Lawton, 1986). According to *environmental docility*, abilities could even reduce as a result of ability disuse in a challenging environment (Lawton, 1986). *Environmental proactivity*, as described by Lawton (1989; 1990), is an appropriately stimulating environment resulting in improved competency. This person-environment fit model accurately represents the ever-shifting reality for long-term care facility residents as physical or cognitive competencies alter in old age and residents become more reliant on the environment to support their daily needs. The typical long-term care facility environment has high environmental press for many residents with a low stress threshold, which can lead to anxiety, stress and agitation, especially for residents with dementia. An outdoor space with natural elements can provide a lowered and appropriate level of environmental press if designed correctly for this target group.

Among the concepts that elucidate the relationship between humans and their environment is the *prosentia hypothesis* for people with dementia, which describes an improved sense of self and personhood through interaction with trusted others in a nature-based setting (Chalfont, 2006; Sabat & Harré, 1992). Chalfont (2006) created the *prosentia hypothesis* from a study on environmental stimulation. The hypothesis
contends that people derive their sense of self—at least in part—through social interaction with others (Chalfont, 2006). This social constructivist approach also posits that the social support component, along with immersion in a natural environment, provides appropriate and beneficial sensory stimulation (Chalfont, 2006; Sabat & Harré, 1992). Therefore, the prosentia dynamic is a triad between the main individual and their social partner in a nature-immersed setting (Chalfont, 2006). This trifecta stimulates the individual through nature and positive interaction resulting in feelings of improved sense of self (Chalfont, 2006). Though the concept captures the benefits of an outdoor environment, it requires testing to prove its merit as a demonstrably valid concept. The prosentia hypothesis is a relatively new approach to understanding the relationship between environment and behaviour and is not yet a pervasive concept found in the literature.

2.4. Conclusion

Though there is limited theoretical work focused on outdoor environments in long-term care settings, many concepts address the interrelationship between individuals and the natural environment. The theories and concepts discussed above provide the rationale for the goal of this current literature review and synthesis, i.e. to understand the role of the outdoor environment in impacting the quality of life of older adult residents in long-term care facilities. It reveals the human biological inclination towards the natural environment and the potential impact of a long-term care facility outdoor space on residents' health and well being.
Chapter 3.

Nature/Outdoor Environments and Residents in Long-Term Care Facilities

Nature has a powerful effect on humans. Interaction with nature impacts the well-being and health of people from as remote a level as a window view of nature (Ulrich, 1984) or single plant in a hospital room (Park, 2006). Ulrich (1979) was one of the first to empirically study the valuable relationship humans have with nature by comparing the psychological effects of nature and urban scenes on well-being outcomes. Ulrich (1983) later hypothesized that exposure to nature’s features prompted behavioural and emotional responses. In 1984, Ulrich found a physiological advantage in participants who had a window view of nature and found that they experienced an accelerated recovery time post-surgery, had fewer complications, and required less pain medication than those without a nature view. These seminal works were accompanied by a succession of studies beginning in the late 1970s focused on the relationship between people and the natural environment. Such works include Kaplan and Kaplan’s (1989) *The Experience of Nature*, Kellert and Wilson’s (1993) *The Biophilia Hypothesis*, and Lawton’s (1986) *Environment and Aging*. The field of nature/human interaction has expanded to numerous settings since that time, reaching long-term care residential environments in the 1990s.

Exposure to nature provides a myriad of benefits that are particularly consequential for older adults requiring long-term care facilities. While residing in a long-term care environment, residents incapable of leaving the building spend a significant amount of time indoors. As a result, the design of indoor spaces has received greater attention. Outdoor resident environments are often included as an afterthought (Barnes & DCESG, 2002). As a result, the opportunity to plan a well thought-out outdoor space may be ignored. The literature increasingly indicates that if designed properly, nature
can enhance both well-being and health for residents with and without dementia. For older adults in residential care settings who live in a world of rules and schedules, autonomy is restricted. Residents may be incapable of indicating desires and needs. Access to a natural setting can greatly reduce the institutional and medical feel of residential care.

Nature has the ability to reduce the common symptoms and psychological discontent among long-term care facility residents. Pain (Rappe & Kivelä, 2005), Depression (Rappe & Kivelä, 2005), and stress (Ottosson & Grahn, 2006) can all be mitigated in a natural environment. This is evident in the behavioural (Connell, Sanford, & Lewis, 2007; Murphy et al., 2010) and physiological (Ottosson & Grahn, 2006) symptoms that improve following meaningful time spent outdoors. Family members, staff, and residents themselves, report well-being and health benefits following time spent outdoors (Cooper Marcus & Barnes, 1995; Detweiler et al., 2008; Raske, 2010). There are numerous restorative properties of nature discussed and empirically studied in the literature. These restorative benefits have become a prevalent and widely examined topic since the 1990s (see Hartig, Mang, & Evans, 1991; Kaplan, 1995; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; van den Berg, Koole, & van der Wulp, 2003). Restoration, referred to in Kaplan’s (1995) attention restoration theory and Ulrich’s (1983) stress recovery theory, combat symptoms of fatigue, attention loss, psychological strain and lethargy.

There has been a surge in the amount of literature on outdoor environments in health care settings. This can likely be equated to the aging population and the shift away from the medical model-of-care towards the person-centered model-of-care. Despite the increased popularity in this area of research, the extant material is primarily descriptive, warranting more empirical research. Thus far, research focusing on healthcare facility gardens primarily addresses aspects of health and well-being through the lens of symptom reduction (Cooper Marcus & Sachs, 2013; Detweiler et al., 2008; Mather et al., 1997; Rappe & Kivelä, 2005), and overall well-being indicators (Cooper Marcus & Sachs, 2013; Detweiler et al., 2008; Kaplan & Kaplan, 1989; Rappe & Kivelä, 2005; Raske, 2010). Some studies focus on specific aspects of the outdoors, on decreasing resident symptomology (e.g. bright light for sleep, sensory stimulation for agitation), while others focus on the benefits of specific outdoor programs (e.g.
horticulture, multi-sensory therapy). Many studies use intervention and control groups to compare the benefit of outdoor strategies for residents and a select few complete pre- and post-occupancy evaluations of outdoor space on residents. The following sections describe the health and well-being benefits associated with exposure to nature, as well as the access barriers that prevent optimal use and benefit of outdoor space.

3.1. Impact of Nature/Outdoors on Residents’ Health

Historically, negative health symptomology and behaviour have been treated using physical or chemical restraints (Feng et al., 2009; Voyer et al., 2005); however, research into the benefits of nature provides a more pleasant, holistic option. Access to nature can improve resident health symptomology through both direct (i.e. immersion) and indirect (i.e. view) exposure. The primary areas of health addressed within the outdoor environment literature are behavioural, physiological, and psychological symptoms. These three aspects of resident health are addressed through the following paragraphs, which focus on agitation, depression, stress, and pain. While there are overlapping characteristics among some of these areas (e.g. depression and stress), they are kept distinct to present a clear representation of each.

3.1.1. Agitation

Agitation can be associated with various environmental and individual health-related factors (e.g. medication, functional and sleep difficulties, psychological conditions) (Voyer et al., 2005). Agitation is also a common symptom of people with dementia, exhibited in an incongruent environment or as the result of an unmet need (Cohen-Mansfield, 2001; Hoover, 1995; Padilla, 2011). Residents become distressed for many reasons. McMinn and Hinton (2000) conducted a small study using an intake dementia and psychogeriatric unit. They determined that residents unable to leave the locked unit to visit outdoor space exhibited more verbal and physical agitation than if they were able to visit the outdoors unobstructed (McMinn & Hinton, 2000). Voyer et al. (2005) determined that common medications used in long-term care facilities could result in agitation repercussions. Neuroleptic drug use among residents in long-term care facilities was greatly associated with incidence of verbal and physically aggression.
and benzodiazepine was associated with verbal aggression (Voyer et al., 2005). Pain is sometimes expressed through agitated behaviour (Achterberg et al., 2013). Agitation can also be caused by overstimulation for residents with dementia as described in the attention restoration theory as fatigue and loss of concentration resulting in the potential for adverse behaviour (Kaplan, 1995). The literature points to specific environmental approaches to combat these behaviours. While some amount of agitation may be inescapable, especially among those with dementia, the extent can be curtailed for their benefit and for the benefit of their caregivers.

Sensory stimulation is one method to address agitation. Inappropriate quality and quantity of stimulation can be overwhelming or deficient; but if an environment is designed appropriately for residents, it can have beneficial effects. Studies to do with sensory stimulation do not focus solely on the outdoor environment, but also address indoor and various specialized sensory methods. These other sensory methods merit attention, as their strategies have potential transferability to the outdoor environment. Sensory environments involve incorporating many or chosen sensory stimuli to enhance positive stimulation. These measures either help the resident calm down or enables them to function/perform a task with more ease. In one example, Chung, Chan, and Lee (2007) found that multi-sensory environments improved agitated behaviour among residents with dementia through empowering their abilities and by focusing on enablement as opposed to impairment. Though Chung et al.’s (2007) study was small and rudimentary and did not focus on the outdoor environment; the concept of an enabling environment is used in the exterior environment in long-term care facilities (see Chalfont, 2005; Raske, 2010). Outdoor natural environments are considered multi-sensory in nature because they encompass the entire sensory scope through pleasant, familiar means (Cox, Burns & Savage, 2004). In a review by Padilla (2011), tactile sensory stimulation activities were the most beneficial for residents with dementia exhibiting agitated behaviour.

Snoezelen rooms are a form of multi-sensory therapy originally for persons with special needs that have received traction for residents with dementia in long-term care facilities (Draper, 2013). Snoezelen is typically a dedicated room in a care setting that is equipped with many sensory items that can be engaged to fit the sensory stimulation needs and desires of different individuals (Baker, Dowling, Wareing, Dawson, & Assey,
Their design entails sensory tools that can be initiated alone or together in an otherwise visually simple room (Draper, 2013). The effectiveness of Snoezelen, however, is not assured. The Snoezelen Approach has been found to be moderately beneficial for residents (Baillon et al., 2004; Padilla, 2011) and is discussed occasionally among the literature on outdoor stimulation. Baillon et al. (2004) found that the benefits were not consistent among all participants. The outdoor findings by Baillon et al. (2004) were similar to their comparison group who experienced reminiscence therapy. Reminiscence is a successful and commonly used approach for people with dementia (Bruce & Schweitzer, 2008) that can be incorporated in an outdoor environment. A reminiscence experience incorporates personal history and interests, generational factors, and cognitive state, to create different sensory experiences and sensations that can bring forth memories, prompt conversations and extract emotions (Bender, Bauckham & Norris, 1999). The findings by Baillon et al. (2004) and a review by Padilla (2011) indicate short-term benefit for residents. Long-term benefits of sensory stimulation have not yet been explored in the literature.

Among studies that have focused directly on outdoor garden areas for people with dementia, results have not consistently reduced agitation. The garden spaces in each study are unique, and given the small number of studies available, it is clear that these studies do not shed light on the true potential for outdoor affect. Some of the concerns in the literature include measurement issues leading to inconclusive results (Calkins, Szmerekovsky, & Biddle, 2007) and small-scale studies limiting the ability to make generalizations (Mather et al., 1997; McMinn & Hinton, 2000; Lyketsos, Lindell Veiel, Baker, & Steele, 1999). These studies provide a brief overview, but do not paint an overall picture of agitation’s response to nature.

Despite the limited research on agitation, a systematic review by Whear et al. (2014) found that agitation was one of the most studied outcomes associated with dementia gardens. Especially for residents with dementia, nature settings can have a significant impact on resident health. If designed for the specific needs of residents with dementia in long-term care facilities, outdoor space has been shown to reduce agitation, leading to less ‘as needed’ medication to manage behaviour (Detweiler et al., 2008). Three studies by Raske (2010), Murphy et al. (2010) and Detweiler et al. (2008), found that agitation decreased in residents with dementia as a result of visiting outdoor space.
Connell et al. (2007) more specifically found that verbal agitation was reduced in a comparison between outdoor and indoor activity programs. Murphy et al. (2010) and Detweiler et al. (2008) found significant variation in benefit that can be attributed to inconsistencies in garden visitation time. The more often residents visit the garden, the greater the potential to reduce agitated behaviour (Detweiler, Murphy, Kim, Myers, & Ashai, 2009; Mather et al., 1997; Murphy et al., 2010).

There are contrasting literature findings that require further study with respect to agitation. In one case, Murphy et al. (2010) found that the greater the level of ambulation, the greater the benefit, even if the visitation amount was similar to less ambulatory residents. This could be because resident needs within the space were not met or that access was difficult or impossible to acquire without help (Murphy et al., 2010). Perhaps the garden was not built for the capabilities of less ambulatory residents to wander. Alternately, these findings could be a result of less ambulatory residents having more advanced cognitive impairment. Detweiler et al. (2008) found negative agitation repercussions from time spent in the garden that were contributed to unfavourable weather resulting in locked doors and physical barriers in the environment. Yet, resident family members stated that residents exhibited better mood after visiting the wander garden (Detweiler et al., 2008). Mather et al.’s (1997) small study found that while more use was associated with less negative behaviour, overall participant agitation increased over the summer months and never reduced. Raske (2010) found that agitation decreased through an enabling garden and the effect was particularly evident in the late afternoon for residents with dementia, a time when residents typically become more agitated due to “sundowning". Sundown syndrome occurs in the late afternoon and evening when people who have dementia become agitated (Khachiyants, Trinkle, Son, & Kim, 2011). Some causes for this condition include disruption of the circadian rhythm, an unsuitable environment, and a drop in melatonin levels (Khachiyants et al., 2011).

Overall, decreased agitation is one of the most studied benefits of outdoor nature exposure, yet study limitations and conflicting findings necessitate further study to determine the true value of nature on agitation reduction potential for long-term care facility residents. Of the relevant findings, there are verbal and physical agitation benefits that can be accrued from nature, especially for residents with greater access. For residents with dementia, agitation is a common behavioural finding. Many of the reasons
why residents become agitated can be addressed through sensory stimulation, more frequent use of outdoor space, and the design of a calm outdoor setting.

3.1.2. Stress

Stress relief is likely the most expected advantage of spending time outdoors. Many people accept nature settings as calming environments. In the literature reviewed, stress is evaluated in numerous different ways. For this paper, stress is referred to as a physical or psychological response to either an environmental or physical stressor. This section describes ways in which a natural environment can alleviate stress. Stress differs from depression in that stress is one component that can lead to depression. Many studies focus on either stress or depression. The following paragraphs describe the stress-reducing benefits of nature.

Studies not specific to older adults have shown that exposure to nature boasts not only restorative stress reducing advantages (van den Berg & Custers, 2011), but also preventative ones (Hartig et al., 1991; Mayer et al., 2009; van den Berg, Maas, Verheij, & Groenewegen, 2010). Preventative benefits found in nature include a buffering effect against health impacts during a stressful life event (van den Berg et al., 2010). Prevention may provide a higher benchmark to more successfully reflect on and tackle daily life stressors (Mayer et al., 2009). Both self-reported and physiological findings indicate that nature exposure reduces stress. In a large study of five outdoor healthcare gardens, Cooper Marcus and Barnes (1995) interviewed garden visitors. Over 75% of respondents expressed reduced stress and felt more at ease, with a greater sense of calm, and a more positive sentiment (Cooper Marcus & Barnes, 1995). Over 20% said they felt rejuvenated and had shifted to a more positive outlook, and 60% of the patients reported feeling calmer (Cooper Marcus & Barnes, 1995). For clinical measures of stress reduction, Orsega-Smith, Mowen, Payne, and Godbey (2004) found that blood pressure rates reduced among community-dwelling older adults following park visits for longer periods of time. In Park’s (2006) study of ornamental plants in post-surgery recovery rooms, the experimental group experienced better physiological health (e.g. heart rate) than those in the control group without a plant. Tang and Brown’s (2006) sample of residents experienced improved blood pressure and heart rate measures from
window views of nature. Similarly, Ottosson and Grahn (2006) found that following a stressful test, long-term care facility residents’ blood pressure and heart rate variables were more improved after an hour in a garden space than after an hour in an indoor space.

The most successful theory that comprises the stress-reducing benefits of nature is attention restoration theory by Kaplan (1995). The four restorative qualities, as defined by Kaplan (1995), refer to the sense of ‘being away’, providing fascination, incorporating the feeling of extent, and creating a well-suited environment. The directed attention that is required to remain engaged in the present causes mental fatigue over time (Berto, 2014). For residents with dementia who have a low threshold to process information, sensory overload can occur, necessitating a lower or more appropriate method of sensory stimulation (Chung et al., 2007). Natural environments serve as a way to provide sensory intervention, reduce stress, increase comfort, and provide a more appropriate information transfer system for residents with cognitive decline (Chung et al., 2007). Sensory environments can be successfully established outdoors because nature produces less-overwhelming stimulation than what is available in many indoor settings. Residents who have dementia and experience behavioural reactions can reduce the effects of attention fatigue in a nature environment (Bossen, 2010).

Although research on stress and nature in long-term care settings are few, there are significant findings with respect to achieving stress reduction. Restorative measures amassed from the empirical literature indicate three distinct findings in support of nature in long-term care facilities. First, nature is more restorative than other relaxation approaches. Second, true nature immersion is more beneficial than simulated or artificial nature exposure. Third, persons most in need of stress-alleviation weigh nature as more important than those with less need for stress reduction. The stress related findings discussed herein include studies of older adults in long-term care facilities, as well as research with other population groups.

One major finding is that nature conditions exceed the restorative benefits of other stress-recovery activities. The previously mentioned stress recovery theory (Ulrich, 1983), is a psycho-evolutionary stress response theory, and describes a natural proclivity towards nature’s elements as a way to restore balance and reduce stress.
(Ulrich et al., 1991). Ulrich and colleagues (1991) found that following induced stress, nature videos were more successful than urban videos at inciting positive mood and improving physiological stress response among undergraduate participants. Both Hartig and colleagues (1991) and van den Berg and Custers (2011) studied the effects of nature versus other methods to decrease stressful mood among adults. Hartig and colleagues (1991) used an approach of a passive nature activity, and van den Berg and Custers (2011) used an engaging environmental stress reducing activity, yet both studies produced similar findings. Hartig et al. (1991) found that nature walks achieved greater restoration than urban walking or listening to music. van den Berg and Custers (2011), on the other hand, found that outdoor gardening was more influential than reading at decreasing cortisol levels and improving mood. Both of these studies indicated that active and passive time spent in nature was more beneficial than urban or active indoor activities in decreasing stress. Results with respect to older adults in long-term care facilities also positively support nature environments for stress reduction. In a study comparing window views of nature and urban settings, Tang and Brown (2006) found consistent and substantial stress reduction from the nature view among female participants living in a care facility. In addition, Jarrott and Gigliotti (2010) found that outdoor horticultural activities were more successful than indoor traditional activities in prompting engagement and improved behaviour among people with dementia.

Even among nature activities, outdoor immersion may be more beneficial than other types of nature experiences. The second restorative finding is that direct immersion in a natural environment has been found to provide more restorative qualities than other nature settings (Hartig et al., 1991; Mayer et al., 2009; van den Berg & Custers, 2011). Mayer et al. (2009) tested the contrast between the experience of nature in-person versus on-screen among university students. Participants were able to reflect on a life problem more successfully and gained greater psychological benefit in actual nature compared to watching a video of nature (Mayer et al., 2009). Among the long-term care facility population, a small number of studies have found that full immersion in nature is more beneficial than experiencing it through other means (Hernandez, 2007; Ottosson & Grahn, 2006; Rodiek, 2002). For residents with dementia, outdoor exposure provides a distinct, calming environment and incorporates unique characteristics that can be more beneficial than others. Ottosson and Grahn (2006) found that outdoor
settings were more beneficial than indoor settings at increasing feelings of rest measured through concentration and stress indicators. In a qualitative study on special-care unit gardens for dementia, Hernandez (2007) found that the garden space was used as a way to distract from stressors and direct attention to something more calming. The study mentioned that gardens can serve as therapeutic resources to reduce stress in order to help residents perform important activities, such as calming down to consume a meal (Hernandez, 2007). In a pilot study, Rodiek (2002) found that completing outdoor recreational activities reduced cortisol levels to a greater degree than groups who performed the same activities indoors, indicating a reduction in stress (Rodiek, 2002).

The third restorative finding is that those in need of stress alleviation ultimately indicate its benefit by placing greater importance on nature. The intensity of a persons’ stress may greatly affect their potential for restorative transformation. Van den Berg and colleagues (2003) found that among college student participants, those exposed to more stressful conditions before experiencing natural conditions rated natural scenery as more beautiful and valuable than those exposed to less stress (van den Berg et al., 2003). These individuals also rated urban settings as lower than those who were not under as much stress (van den Berg et al., 2003). Therefore, a person in need of stress-relief may demonstrate a greater appreciation of nature. To that point, Ottosson and Grahn (2006) found that residents in a long-term care home most in need of restoration achieved the most benefit. The residents with poor psycho-physiological balance were most vulnerable to stress and fatigue and achieved the most relief and recuperation from access to the outdoors (Ottosson & Grahn, 2006). Psycho-physiological balance is defined by Ottosson and Grahn (2006) as a combined measure of hospital visits, problematic interactions with other residents, and poor group activity cooperation. Detweiler and colleagues (2012) describe issues of resident balance in their review. Detweiler et al. (2012) discuss over-stimulation accrued in urban settings as described in Ulrich and Parsons’ (1992) overload and arousal theory. Detweiler et al. (2012) assert that green settings provide a more stimulating balance for individuals. The multi-sensory aspects to the natural environment can help reduce long- and short-term stress associated with modern environments through minimizing the intensity on the central nervous system (Ulrich & Parsons, 1992). Their review found that residents with and
without dementia who used the garden environments ultimately experienced reduced amounts of stress (Detweiler et al., 2012).

One additional restorative finding for stress reduction merits attention for its attempt to further the theoretical progression of garden spaces for people with dementia. Hoover (1995) introduced the fast forward reverse hypothesis to promote distinct garden spaces for different levels of dementia. The hypothesis is based on Reisberg’s (1986) work on the normal stages of human growth and disease stages. Hoover (1995) asserts that for people with dementia, while human growth progresses with age, disease stages traverse backwards. With dementia, emotions regress over time, imitating a younger age that contradicts the actual age of the individual (Hoover, 1995). Hoover (1995), in following the disease stage regression, asserts that the more progressed the dementia, the lower the emotional age of the individual. In other words, the cognitive capacity of someone with mild dementia would be equivalent to ages fourteen-to-adult. Moderate dementia would equate to ages eight-to-thirteen, and those with severe dementia would fall under zero-to-seven years. Hoover (1995) explained that garden spaces could correspond with this hypothesis through design for particular age groups with remembrance therapy. In one instance where a space was designed for residents with severe dementia (ages zero-to-seven), key components cited were safety, enclosure, way-finding, and intimacy; all important to a young child (Hoover, 1995). Though proposed in 1995, the literature search revealed that the hypothesis has not gained traction in academia or in residential care environments.

To conclude, stress is a common experience for residents with and without dementia in long-term care facilities. Although many strategies have been created to reduce stress, true nature settings may present the most suitable and beneficial solution to reduce stress and increase restoration. Residents describe restorative feelings and family members indicate better mood among their family members from garden use. Some of the benefits include psychological and physiological improvements, especially important and appreciated by those in most need of stress-relief.
3.1.3. Depression

Many of the symptoms of stress that residents experience contribute to depression. Depression is pervasive in long-term care facilities and carries health and well-being repercussions for residents. Psychological distress, characterized as depression or anxiety, can result in residents exhibiting verbal and physical aggression (Voyer et al., 2005). Aggression and other maladaptive symptoms have historically been treated using physical or chemical restraints (Feng et al., 2009; Voyer et al., 2005). Medication is frequently used to combat depressive symptoms, psychotic conditions (Detweiler et al., 2009), maladaptive behaviour, and cognition issues (Rojas-Fernandez, Mikhail, & Brown, 2014). While in many cases medication has a beneficial effect, residents sometimes remain on medications for longer than the suggested period of time without periodic checks to reduce or remove a medication from regular administration (Rojas-Fernandez et al., 2014). What’s more, medication to combat residents’ issues may have unintended results. Prescription drugs have been attributed to an increase in falls (Detweiler et al., 2009, 2012) and can put residents at risk of polypharmacy and cause high medication expenses (Detweiler et al., 2008). Use of outdoor space, as opposed to medication, does not serve the function of suppressing or sedating residents. Outdoor gardens completely transform a person’s surrounding environment and improves their condition and mood through natural means. As a staff member in the study by Hernandez (2007) stated, “The fact that it [the outdoor space] might help not medicate somebody, that it means putting someone in a better mood when you’re not in the mood to eat... that means feeling better about themselves and eating” (p. 136). As the person-centered model-of-care becomes a more pervasive approach in residential care settings, outdoor green spaces provide a more pleasant, holistic option to reduce depression symptoms.

There are a small number of empirical studies that focus specifically on long-term care facility garden usage and depressive symptoms. These studies have found marginal support for garden use. Detweiler et al. (2009) found that those taking high doses of antipsychotics were able to decrease their usage through garden visits, but were unable to reduce antidepressant use. McMinn and Hinton (2000) similarly found that allowing residents to visit the outdoors decreased as-needed medication administration by nursing staff. A study by Rappe and Kivelä (2005) found that among
long-term care facility residents with depressive and non-depressive symptoms, those with depression realized greater benefit from the outdoor settings compared to residents without depressive symptoms. Benefits included improved sleep, mood, concentration, and restoration (Rappe & Kivelä, 2005). In addition, well-being factors improved among both groups (Rappe & Kivelä, 2005). Residents who used the garden obtained greater emotional regulation and those with depression had visibly more significant affective response with 92% claiming they felt more cheerful and alert (Rappe & Kivelä, 2005). Yet, half the participants with depression stated that visiting the garden was burdensome, leading Rappe and Kivelä (2005) to suggest that the benefits for depressed residents may be temporary in nature. In a study of depressed adults, Gonzalez, Hartig, Patil, Martinsen and Kirkevold (2010) found that nature exposure decreased depressive symptoms for up to three months following the period of study. The garden environment increased sense of psychological relief from stressors and diverted attention to something pleasant (Gonzalez et al., 2010). Therefore, there are depression reduction benefits found within the literature, however, there are various inconsistencies as well as an unclear duration of benefit. More research is needed to better understand how the natural environment can reduce medication use and decrease depressive feelings for residents with depression in long-term care settings.

Two specific aspects of gardens that have the potential to reduce depressive feelings are multi-sensory elements and bright light exposure. Gardens are versatile in that they can be shaped to fit a desired aesthetic and sensory strategy. Multi-sensory environments can be designed for different stress levels, which is important because a stressful environment for someone in an early stage of dementia would be different from a stressful environment for someone in a late stage of dementia (Hoover, 1995). The versatility of outdoor space provides a method to foster familiar sensations, reintroduce well-known activities, and uniquely address each sensory area (Brawley, 2001). While these features may reduce symptoms that contribute to depression, Brawley (2001) points to a lack of empirical research on nature benefits for depression. Among community dwelling residents, Verkaik, van Weert, and Francke (2005) conducted a review of sensory approaches and other environmental strategies to improve dementia behaviour and well-being. They found that multi-sensory therapy did not influence depressive symptoms among community dwelling people with dementia (Verkaik et al.,
Another multi-sensory approach, Snoezelen, has been found to significantly reduced depressive behaviour and mood compared to control groups (van Weert, van Dulmen, Spreeuwenberg, Ribbe, & Bensing, 2005). Multi-sensory environments can be effective in depression reduction; however, design specific to long-term care facility residents with and without dementia needs to be carefully thought out to meet the needs of resident with an array of cognitive capacities.

Vitamin D deficiency may increase the likelihood for experiencing depressive symptoms among residents in long-term care facilities. Sources have demonstrated an association between a lack of light and depression among older adults (Brawley, 2001). Among older adults, vitamin D exposure is lowest for long-term care facility residents (Brawley, 2001). However, studies have not shown a positive correlation between bright light and depression. Lyketsos et al. (1999) did not find that bright light therapy was significant in decreasing depression scores for residents with dementia in their small study. Likewise, a review by Padilla (2011) indicated studies where depression was influenced by bright light, but stated that contradictions were found and that more research is needed to support positive findings for reducing depression.

To summarize, depression is pervasive among long-term care facility residents as is medication to curb its symptoms. Using a natural environment instead of medication can reduce the adverse effects of medicating residents. This can be achieved through multi-sensory environments and perhaps bright light exposure; however, the benefits may be short-term and further study is required.

### 3.1.4. Pain

A seminal article by Ulrich (1984) was one of the first to establish the benefit of nature on recovery and health by means of studying the post-surgery outcome of patients with a window view of nature compared to those with a window view of a brick wall. Pain is often a consideration in long-term care facilities because residents have multiple morbidities and chronic pain associated with illnesses more pervasive among older adults, such as arthritis (Covinsky, 2006), atherosclerosis, and age-related inflammation (Vasto et al., 2007). Pain can also be experienced by and undertreated in persons with dementia (Scherder et al., 2005). Residents with dementia may not be able
to inform staff they are experiencing pain and may exhibit those symptoms through agitation akin to maladaptive behaviour (Achterberg et al., 2013). Therefore, symptoms identified as behavioural outcomes of dementia may in fact be a response to pain or another unmet human need. Studies on this topic have shown that pain is generally associated with age-related illnesses, not dementia itself. A study by Corbett and colleagues (2012) reviewed literature on prevalence of pain in people with dementia and determined that around 50% of people with dementia experienced regular pain, which is comparable to the number of people without dementia who experience pain. Therefore, pain is similar among older adults with and without dementia, yet those with advanced dementia often experience additional conditions resulting in pain. These conditions include pressure ulcers, urogenital infections, and gastrointestinal and cardiac conditions (Corbett et al., 2012).

Nature has primarily been shown to relieve pain symptoms for post-surgery adult patients in hospital (Kline, 2009; Park, 2006). Studies of hospital recovery times indicate that as little as a plant within a recovery room can improve recovery outcomes. In a post-surgery environment, Park (2006) found that experience of pain was lower for post-surgery patients with ornamental plants in their rooms compared to the control group. For residents who are unable or unwilling to visit the outdoors, even a window view of nature may be beneficial. Recently, a review by Kline (2009) examined four articles on the effect of a window view of nature on pain in adult hospital patients. Kline (2009) found that a multi-sensory approach, such as listening to nature sounds, combined with a nature view, was more successful in reducing pain than only one sensory approach. Therefore, an environment with multiple sensory capacities may be more beneficial. The Snoezelen approach to multi-sensory interventions may also reduce pain symptoms for people through relaxation. Schofield (2002) studied patients of a pain clinic. Patients who participated in the Snoezelen group experienced reduced pain that was comparable or marginally better than traditional relaxation approaches for pain (Schofield, 2002).

Studies have begun to show multi-sensory benefits on pain for those in long-term care facilities (Rappe & Kivelä, 2005). Any sensory environment must have options and consider residents’ life histories to determine which type of stimulation is beneficial for each individual. Rappe and Kivelä (2005) studied pain indicators within a garden space and found that 50% of the long-term care facility participants experienced a reduction in
their pain. Other such studies have found reduced perception of pain following time spent in a garden space (Detweiler, et al., 2012).

Hospital recovery outcomes have thus far been the most successful in promoting the benefits of nature on pain reduction. Health care garden environments are similar to long-term care facility environments in that they share the goal of health and well-being for the people using the space. Older adults with and without dementia experience a similar amount of pain from age-related conditions, and residents with dementia may not be able to vocalize their pain (Corbett et al., 2012). Multi-sensory approaches are becoming more common for the study of pain relief and have produced significant results, but more study is required in the long-term care facility environment.

3.1.5. Conclusion

People have had a relationship with nature since the dawn of human existence, relying on nature to provide the necessities of life (Ulrich, 1993). The biophilia hypothesis, as described previously, conveys the innate relationship and positive response people have with nature (Ulrich, 1993; Wilson, 1984). There are endless opportunities for the design of outdoor space in long-term care settings that can provide a benefit for residents. Nature is inherently calming for humans and the multi-sensory qualities of nature make outdoor environments unique from indoor environments. Residents in long-term care facilities experience many health conditions, including chronic illness and dementia. The approach of the person-centered model-of-care has gradually revealed natural and pleasant ways of combating symptoms associated with health conditions to achieve better health in long-term care facilities. Common health-related concerns that can be addressed with nature are agitation, depression, stress, and pain. Symptom reduction is at the forefront of long-term care facility health-improving research (see Cooper Marcus & Sachs, 2013; Detweiler et al., 2008; Mather et al., 1997; Rappe & Kivelä, 2005). While studies support the use of nature for reducing negative psychological, physiological and behavioural symptomology, further research is needed on several topic areas mentioned. Overall, research suggests that positive health outcomes can be accrued from outdoor space if accurately designed for use by long-term care facility residents.
3.2. Impact of Nature/Outdoors on Residents’ Well-being

Well-being is a word rarely defined in specific terms in the environmental gerontology literature, and can refer to a wide spectrum of well-being measures, such as social (Kweon, Sullivan, & Wiley, 1998), physical (Heliker, Chadwick, & O’Connell, 2001; Whear et al., 2014), emotional (Chalfont, 2006; Mooney & Nicell, 1992; Rappe & Kivelä, 2005), spiritual (Chalfont, 2006; Heliker et al., 2001), and psychological (Burton & Sheehan, 2010; Heliker et al., 2001; Kearney & Winterbottom, 2006; Scopelliti & Giuliani, 2006; Tse, 2010; Ulrich, 1979; Whear et al., 2014) well-being. Other interpretations speak of an “overall” or “general” well-being that is accrued from nature (Gibson, Chalfont, Clarke, Torrington, & Sixsmith, 2007; Paavilainen et al., 2005). There are many aspects of well-being referred to in the literature, but no pervasive or uniting definition exists. The term should perhaps be defined as a subjective and transformative term, used in conjunction with a chosen adjective to represent a facet of positive state-of-being. Regardless, striving for well-being outcomes is an appropriate goal for this population group. Residents in long-term care facilities have the same well-being needs as any other person and those needs are not always met in a long-term care facility.

At times, it is difficult to remember that older adults in long-term care facilities, who have lost some functional and cognitive abilities, were independent thinking and acting people, with their own interests and skills throughout their lives. In Hernandez’ (2007) study, staff forgot that residents had their own habitual places and routines before long-term care; that residents “had lives before coming here” (p. 139). In their earlier years, residents would have freely addressed their well-being needs, such as social relationships and independence. However, in an organizational care setting, well-being must be considered for residents, as they may not have the cognitive capacity or external support to attain positive well-being. Part of the natural human experience involves a yearning for well-being considerations like positive social interaction and independent decision-making. In many ways, the natural environment can be designed to facilitate these normative human needs. Residents can ultimately have a more positive experience residing in long-term care facilities if well-being considerations are addressed. Residents themselves report positive well-being sentiments from spending time in nature (Kearney & Winterbottom, 2006; Rappe & Kivelä, 2005).
The nature-related well-being literature with respect to long-term care facility residents primarily focuses on sleep (Connell et al., 2007; Martin, Marler, Harker, Josephson, & Alessi, 2007), attention restoration (Kearney & Winterbottom, 2006; Ottosson & Grahn, 2006), social interaction (Bengtsson & Carlsson, 2006; Rappe & Topo, 2007; Raske, 2010; Tse, 2010), independence (Kwack et al., 2005; Rappe & Topo, 2007), purpose (Raske, 2010), wandering (Algase et al., 2010; Detweiler et al., 2008), reminiscence (Bender et al., 1999; Borgen & Guldahl, 2011; Kwack et al., 2005), and sensory stimulation (Chung et al., 2007; Cox et al., 2004). Additional well-being considerations include providing a structured and calm setting to regulate the environment to suit the effects of dementia. This is accomplished through creating a walkable setting for purposeful instead of aimless wandering; through garden features that promote reminiscence and familiarity; and sensory stimulation that reduces negative sentiments and provides a uniquely fascinating environment.

### 3.2.1. Psychosocial Well-being

In long-term care facilities, studies that seek the opinion of residents (Kearney & Winterbottom, 2006; Rappe & Kivelä, 2005), staff and visitors (Detweiler et al., 2008; Raske, 2010) on perceived resident well-being indicate psychosocial benefits of time spent in nature. The outdoor environment offers a unique setting that can alter residents’ perceived health and well-being. Specific nature elements that cannot be found inside are perceived by residents as positively impacting their well-being (Bengtsson & Carlsson, 2006; Cox et al., 2004; Hernandez, 2007; Kearney & Winterbottom, 2006) and are found exclusively in the exterior environment. Virtual nature has also shown well-being benefits among young adults (Mayer et al., 2009) and imagined nature experiences have elicited positive well-being responses for older adults in the community (Gibson et al., 2007). While authentic nature environments have received more study, the potential for other types of virtual or imaginary nature conditions speak to the value and significance of nature environments to influence well-being.

There is significant qualitative evidence in support of spending time in nature settings. Improvements to resident well-being as a result of nature environments are reported by residents (Kearney & Winterbottom, 2006; Rappe & Kivelä, 2005), care
providers, and loved ones (Detweiler et al., 2008; Raske, 2010). A study by Rodiek (2008) focused specifically on perceived outcomes from spending time outdoors. Staff and resident interviews revealed that 65% of residents who spent time outdoors experienced higher overall wellness, perceived health, and activity levels than those who did not use the garden (Rodiek, 2008). Other reported benefits in the literature include perceived improvements to mood (Cox et al., 2004; Rappe & Kivelä, 2005), mental wellness (Hernandez, 2007; Kearney & Winterbottom, 2006), physical wellness (Hernandez, 2007; Kearney & Winterbottom, 2006; Raske, 2010; Rodiek, 2008), energy level (Kearney & Winterbottom, 2006), social interaction (Bengtsson & Carlsson, 2006; Cox et al., 2004; Hernandez, 2007; Kearney & Winterbottom, 2006; Raske, 2010) and independence (Cox et al., 2004; Hernandez, 2007; Raske, 2010). In addition, several studies note residents' appreciation towards distinctly outdoor elements, such as the sun and fresh air (Bengtsson & Carlsson, 2006; Cox et al., 2004; Hernandez, 2007; Kearney & Winterbottom, 2006).

Subjective well-being can be accrued from simply visualizing a nature experience. Gibson et al. (2007) expressed a phenomenon where an envisioned nature experience had a positive impact on both community and residential care-dwelling older adults. Among residents in both housing groups, participants gained a sense of well-being from interacting in both actual and imagined outdoor settings (Gibson et al., 2007). Visualizing participation in an outdoor activity (e.g. playing golf) had well-being benefits for older adult participants (Gibson et al., 2007). The authors stipulated that imagined nature should not be a substitute for actual time spent in nature (Gibson et al., 2007). This finding does, however, suggest the potential of nature in its ability to increase well-being. A related study tested virtual nature environments with young adults and found well-being improvements to mood, reflection capacity, and attention (Mayer et al., 2009).

These studies address subjective and psychosocial well-being among long-term care facility residents in outdoor environments. The outdoors provides opportunities for well-being within a distinct environment, and the exposure is positively viewed by residents, staff and visitors for its perceived influence on the residents. The impact of nature may even be significant in imagined or virtual nature environments, though more research is needed to understand the extent of its benefit and determine its relevance for older adults in long-term care facilities.
3.2.2. Sleep & Circadian Rhythm

Disturbed sleep patterns are a common phenomenon for long-term care facility residents (Ancoli-Israel, Martin, Kripke, Marler, & Klauber, 2002; Martin et al., 2007). Residents with dementia experience greater difficulty maintaining regular sleep habits than residents without cognitive impairment (Paavilainen et al., 2005). Residents with dementia frequently doze throughout the day, hindering their ability to sleep through the night (Paavilainen et al., 2005). One major topic on resident well-being is the impact of nature on sleep. This finding is one of the most conclusive in the literature. As residents spend the majority of their time indoors, the lack of exposure to natural light affects the quality and quantity of sleep that residents attain, which impacts the function of their circadian rhythm (Ancoli-Israel et al., 2002; Lyketsos et al., 1999; Martin et al., 2007). Lack of physical activity also hinders residents’ ability to sleep (Connell et al., 2007; Martin et al., 2007) and a lack of sleep may impact resident behaviour (Mather et al., 1997; Voyer et al., 2005). Nature environments can provide the bright light and activity needed to improve sleep and awake time, lead to a more robust circadian rhythm, and may improve resident behaviour.

There are several ways to improve the quality and quantity of residents’ sleep. Medication provides temporary relief, but not a solution to an irregular circadian cycle. Two non-pharmacological approaches that strengthen the circadian rhythm for nursing home residents are physical activity and morning light (Martin et al., 2007). Residents who spend time outdoors report better sleep quality than those who do not visit outdoor space as often (Rappe & Kivelä, 2005). In visiting the outdoors, residents are exposed to bright light to regulate their circadian cycle (Ancoli-Israel et al., 2002; Calkins et al., 2007; Martin et al., 2007; van Someren, Kessler, Mirmiran, & Swaab, 1997). Early morning bright light has been shown to provide the best results (Calkins et al., 2007; Mishima et al., 1994). Findings in support of nature environments have shown that exposure to bright light improved the timing of the circadian rhythm (Calkins et al., 2007; Mishima et al., 1994), the robustness of the circadian cycle (Ancoli-Israel et al., 2002; Calkins et al., 2007; Mishima et al., 1994), and have increased activity levels during the day (Ancoli-Israel et al., 2002; Martin et al., 2007; Mishima et al., 1994). In some cases, bright light did not improve all sleep measures. In one case, Ancoli-Israel et al. (2002)
found that night-time sleep and daytime alertness did not improve through exposure to bright light (Ancoli-Israel et al., 2002).

A few researchers have also found that increased physical activity improved sleep (Connell et al., 2007; Martin et al., 2007). Martin and colleagues (2007) found that physical activity increased daytime wakefulness and woke residents earlier in the morning. Connell et al. (2007) found that activity participation and being active in an outdoor setting increased the duration and overall sleep-time for residents (Connell et al., 2007). Being active in the outdoors, participating in programs, and being exposed to morning bright light, may significantly benefit residents’ sleep and circadian rhythm and reduce the need for sleep-related medication. Perhaps establishing the right balance of time spent outdoors and bright light exposure could successfully regulate the sleep and wake time of residents with dementia, however, there is no prescriptive formula that would work for every individual.

A lack of natural light affects sleep, which can lead to adverse resident behaviour. Agitation is commonly linked to sleep issues for residents with dementia (Calkins et al., 2007; Lyketsos et al., 1999; Mishima et al., 1994; Voyer et al., 2005). Voyer et al. (2005) explored reasons for aggression among long-term care facility residents and found that aggression could be partially linked to insomnia. Mishima et al. (1994) found that poor circadian rhythm and low melatonin production were associated with behavioural issues among residents with dementia. Although there is some support to suggest that negative behaviour among residents with dementia can be attributed to sleep issues, results do not definitively point to sleep as the sole cause and further study is needed. Literature that focuses on nature’s ability to improve agitation through sleep include a study by Mather and colleagues (1997) who found that although resident behaviour did not change when comparing pre- and post-scores on time spent in an outdoor environment, those who used the space most frequently had less observed behavioural issues than less regular users. Likewise, for residents with dementia, bright light may only effectively improve agitation in people exhibiting clearly abnormal sleeping patterns (Lyketsos et al., 1999). Further study with control groups is needed to determine the impact of improved sleep on agitation scores among residents with dementia.
Sleep is important for maintaining optimal health and well-being, yet inconsistent sleep cycles remain and issue for people in long-term care facilities. Nature is a non-pharmacological approach used to address a disrupted sleep and wake cycle. Nature can strengthen the circadian rhythm, which in turn improves the quality and quantity of sleep and wake time attained. Good sleep habits are particularly difficult to maintain for residents with dementia. Among people with cognitive impairment, lack of sleep may even lead to negative behavioural outcomes. Spending time outdoors exposed to bright light, participating in activities, and increasing resident physical activity level can all improve sleep.

3.2.3. Attention Restoration

The outdoors provides a unique and invigorating environment outside the walls of a long-term care home (Bengtsson & Carlsson, 2006). Restorative environments have become an area of focus in long-term care facilities and primarily refer to the conceptual work of Ulrich’s (1983) stress recovery theory and Kaplan’s (1995) attention restoration theory (Berto, 2014). These theories are two of the few that have found empirical support for restorative environments. Other findings with respect to restoration include resident perceptions of restorative benefits, more significant restoration for those in need, and improvements in resident engagement.

Two theories support nature restoration for long-term care facility residents. According to Kaplan’s (1995) attention restoration theory, people with dementia experience attention fatigue from trying to focus while tedious stimuli, such as sound and movement, surround them. For residents with dementia, adverse behaviour can be exacerbated by attention overload, necessitating attention restoration to reduce the likelihood for behavioural symptoms (Bossen, 2010). Nature has the ability to restore attention and reduce stress for residents with and without dementia. Empirical findings with respect to attention restoration have found that the natural environment can help reduce attention fatigue by promoting the use of a natural environment as an attention revitalizing tool, enabling residents to improve their focus and reduce stress (Detweiler et al., 2012; Kaplan, 1995). For stress response theory, findings from different populations strongly support nature as a stress-reducing tool. Among student volunteers, nature
videos were more successful than urban videos in recuperating participants’ emotional, psychological and physiological state following a stress-inducing video (Ulrich et al., 1991). A similar study produced even more powerful evidence among older adults. Following a stressful task, residents who rested in a garden recuperated successfully while the stress of residents who rested inside gradually increased, especially among participants with poor psycho-physiological balance (Ottosson & Grahn, 2006).

The restorative influence of nature environments has been compared to the restorative influence of other types of rooms and environments. Similar to Ulrich and colleagues’ (1991) study of nature and urban stress-recovery videos on restoration, researchers have evaluated other environments to determine their effect on mood, psycho-physiological balance, and attention restoration. However, true nature immersion may be the most beneficial when it comes to attention restoration. Scopelliti and Giuliani’s (2006) sample of community-dwelling older adults rated natural settings as more restorative than urban settings using Kaplan’s (1995) four restorative variables. Within the general adult population, nature settings were found to be more aesthetically pleasing to participants than both urban (Mayer et al., 2009; Scopelliti & Giuliani, 2006; van den Berg et al., 2003) and virtual nature settings (Mayer et al., 2009). True nature environments led to improvements in mood and concentration (Mayer et al., 2009; van den Berg et al., 2003) and stimulated reflections on life (Mayer et al., 2009). For studies that focus on residents in long-term care facilities, few attention restoration setting comparisons exist. It would be reasonable to question whether time spent elsewhere, perhaps in a participants’ favourite setting or own bedroom, could have similar attention-revitalizing benefits because it is a preferred environment. Though very little research has addressed this question, Ottosson and Grahn (2006) compared time spent in a garden with time spent in residents' favourite room. They found that outdoor exposure was more successful in ameliorating resident stress and concentration, especially among residents with poor psycho-physiological balance (Ottosson & Grahn, 2006). While little evidence exists with respect to other environments, nature environments have been shown to be the most beneficial for adults and for residents in long-term care facilities.

Residents in long-term care facilities express perceived restorative qualities from nature environments. Kearney and Winterbottom (2006) recorded resident impressions
following time spent in a garden space. Findings included that 15% of residents felt re-energized following time outside and 22.5% of residents found that the garden environment helped their mental state (Kearney & Winterbottom, 2006). Despite a difference in size and contents, all three sites studied by Kearney and Winterbottom (2006) elicited positive restorative findings. This suggests that using outdoor spaces may generally evoke positive sentiments despite different garden layouts and features. Other studies have found perceived improvements in residents’ concentration abilities following garden visits as well as a perceived sense of recovery (Rappe & Kivelä, 2005). Residents’ subjective findings are an important measure when it comes to resident well-being. In these studies, residents’ perceptions of time in garden environments support its value in restoring attention.

Spending time among nature and its effect on attention may be particularly pronounced for people with poor health and well-being. In a study by Mayer et al. (2009), young adult participants experienced restorative effects from being in nature conditions; however, the benefits of nature exposure were not attributed to replenished attention capacity. The positive state of mind and emotion found in this study were explained as feelings of connection towards nature (Mayer et al., 2009). In other words, the positive benefits could be explained by an appreciation of nature rather than the restorative qualities in nature. Mayer et al. (2009) suggest that attention restoration may be more prevalent for individuals experiencing “negative affective states” (p. 636). For instance, older adults in long-term care settings could expect more benefit than Mayer’s young adults due to the higher prevalence of health conditions (e.g. depression) and well-being concerns (e.g. psychosocial well-being). Van den Berg et al. (2003) determined that of their sample of university students, those who strongly preferred natural environments and more strongly disliked built environments were individuals experiencing higher levels of stress. Therefore, older adults in long-term care settings may receive more attention restoring benefits from being among nature if they experience greater health and well-being concerns.

A similar concept to attention restoration is resident engagement. Resident engagement refers to the level of resident participation in events or activities. One study found that it was possible to increase engagement through garden activities. Jarrott and Gigliotti (2010) compared traditional and horticultural therapy programs and found that
residents with dementia in the horticultural group exhibited better engagement. Residents participated more, both actively and passively, and exhibited less maladaptive behaviour during the activities than those in the traditional therapy group (Jarrott & Gigliotti, 2010). While this study did not refer to attention restoration theory in its methodology, Jarrott and Gigliotti (2010) were able to capture residents’ attention through horticultural therapy programs that were aimed at resident engagement. This study suggests that, like attention restoration, well-planned programs and activities in the outdoors may improve residents’ ability to concentrate. In this case, residents were engaged enough to improve their participation ability.

Attention restoration is a well-studied and theorized topic in long-term care facilities. Natural environments are capable of stimulating attention restoration among residents, with and without dementia, to reduce stress and improve mood. Both qualitative and quantitative results indicate natures’ benefit. It is likely that those most in need of restoration obtain the greatest benefit. Resident engagement in activities, though not directly related to attention restoration, supports nature’s ability to influence attention.

3.2.4. Social Interaction

Within the literature, social interaction is discussed as both a perceived and measured positive result of spending time outdoors. Tse (2010) studied resident well-being using a gardening program. He found that at baseline, many older adults living in long-term care settings experienced a high degree of loneliness and social isolation (Tse, 2010). Loneliness is also found elsewhere in the long-term care facility gerontology literature (see Cooper Marcus & Sachs, 2013; Prieto-Flores, Forjaz, Fernandez-Mayoralas, Rojo-Perez, & Martinez-Martin, 2011; Slettebø, 2008). The desire for social interaction is a fundamental need for all people (Kwack et al., 2005). Spending time outdoors can reduce feelings of loneliness and lead to more interaction opportunities between residents and with visitors and staff. An outdoor area can foster social opportunities that residents do not have elsewhere. Residents themselves express social benefits of spending time outdoors. Gardens increase the social potential of the environment by means of offering a less familiar space; through utilizing outdoor
contents for topics of verbal and non-verbal interaction; by way of using shared hobbies and specialty activities to increase relationships; and through using the design of space to increase attentiveness for residents with dementia.

Residents and those who spend time with them express perceived social opportunities for residents in nature environments. Kearney and Winterbottom (2006) interviewed 40 residents without dementia in three long-term care residences. Of their sample, 20% enjoyed engaging with/watching people outdoors, 10% stated that meeting people was one of the benefits of spending time outside, and 5% enjoyed participating in social events in an outdoor setting. In another study, 60% of Raske’s (2010) interviewees (i.e. visitors, staff, volunteers, residents) cited that resident relationships improved through use of outdoor space. Even when participating in a program indoors, Tse (2010) found that residents felt more a part of a group and were more socially connected as a result of an indoor horticultural program. Therefore, many residents and those close to them indicate perceived social benefit from being among nature.

As residents do not typically frequent garden spaces during their daily routines, garden spaces provide new exploration grounds. Gardens offer an inviting and opportunistic venue for increased social interaction (Cox et al., 2004; Hernandez, 2007; Rodiek, 2009). Outdoor environments bring people together in a location free from well-established indoor routines (Bengtsson & Carlsson, 2006). Bengtsson and Carlsson (2006) found that because residents were not confined to a usual setting, the garden space entailed more movement and varied use of space. Use of garden space increases interaction between residents, and between residents and other individuals (Bengtsson & Carlsson, 2006; Raske, 2010). Both family members and residents remark on the improved relationships and increased communication accrued through use of outdoor space (Raske, 2010). Gardens that are used by a mix of residents from multiple units or floors strengthen interaction potential (Bengtsson & Carlsson, 2006). The topics to discuss become more numerous and can engender relationships through common interests and activities (Bengtsson & Carlsson, 2006; Raske, 2010; Rappe & Topo, 2007; Tse, 2010). Separate from regularly scheduled activity programs, outdoor space provides a unique spot to host additional special events, family gatherings and holiday celebrations (Hernandez, 2007). Unique and unfamiliar outdoor environments have the
potential to promote meeting new people and provide new topics for conversation that make outdoor environments ideal for fostering social interaction.

Garden activities create social opportunities for both long-term care facility residents with verbal skills and residents without verbal skills. For residents who have difficulty communicating, Kwack et al. (2005) describe a social activity whereby residents sit outside and pass around a plant, indicating their opinion of it. Garden environments provide ample features to elicit opinions. A non-communicative resident could relay their opinion of the smell, view or feel of a plant using head nods and facial expressions (Kwack et al., 2005). In that way, the resident could still contribute to the conversation and experience the well-being benefits of social interaction (Kwack et al., 2005). For residents with verbal skills, group interactions could include discussing topics to do with the garden, such as how to prepare grown produce (Raske, 2010). While participating in scheduled garden activities would likely influence social interaction between participants, only a few studies discuss empirical social benefits of formal gardening activities conducted as a group (see Rappe & Topo, 2007; Raske, 2010; Tse, 2010). This may be because in the general long-term care facility community, it is uncommon for residential care homes to regularly program outdoor activities (Chapman, Hazen & Noell-Waggoner, 2007; Cutler & Kane, 2006; Grant & Wineman, 2007). Of the studies found, one included a horticultural activity program that was only scheduled for the duration of the study (Tse, 2010). Yet for residents, horticultural activities are appropriate and provide familiar tasks for this age group (Jarrott & Gigliotti, 2010). For residents who are verbal and non-verbal, nature-related programs should be created to foster social interaction among residents.

Garden-related activities can increase opportunities for socializing whether indoors or outdoors. Temperate weather conditions are most conducive to using outdoor space, but during less favourable conditions, indoor nature-related activities can also improve the potential for social interaction. Studies of horticultural activities have produced positive social findings for residents (Rappe & Topo, 2007; Raske, 2010; Tse, 2010). In Rappe and Topo’s (2007) study, plants provided residents with opportunities to communicate with staff and other residents. Horticultural activities increase the opportunity for social exchange through providing new conversation topics (Rappe & Topo, 2007; Raske, 2010; Tse, 2010). Tse (2010) compared an indoor gardening
program to a traditional recreation program in a long-term care facility. The gardening program improved baseline feelings of loneliness and social interaction (Tse, 2010). The gardening activity increased social interaction through discussion of residents’ shared interest—gardening—and through trading information on horticultural practices (Tse, 2010). One resident described the communication opportunities experienced from participating in a garden activity, “there are plenty of topics, such as rotation and positioning of our plants” (Tse, 2010, p. 955). Participating with other residents in a garden activity also achieved feelings of belonging, “I was no longer alone; now I had become a team member in this gardening activity” (Tse, 2010, p. 955). Tse’s (2010) findings positively supported social and well-being benefits and Tse found consistent support when the data was controlled for age, gardening experience, education level, and wealth. This indicates that gardening activities may be ideal for a vast number of long-term care facility residents (Tse, 2010).

For residents with dementia who experience difficulty communicating, a garden environment can increase lucidity, thereby increasing social potential. Instances of lucidity and improved concentration are exhibited in numerous studies. Bengtsson and Carlsson’s (2006) study with a staff focus group determined that the intimacy of the outdoor space improved focus for residents with dementia and in-turn enhanced social capabilities. As one staff member explained, “…they get undivided attention and they can attach to one and the same. It is easier for them to focus their minds” (Bengtsson & Carlsson, 2006, p. 63). Raske (2010) found that residents with dementia were able to communicate more effectively in a garden space. Family members also noticed a difference in resident behaviour (Cox et al., 2004; Raske, 2010). In one case, a visitor noticed that her friend was more likely to engage in conversation with her in the garden space (Cox et al., 2004). This was also found in another study where a family member reflected that her loved one, “initiates conversations out in the garden but not inside; it’s something that we can do together and relate to when I’m here” (Raske, 2010, p. 343). Outdoor environments can improve awareness for residents with dementia. The intimacy of an outdoor space facilitates increased social capabilities and provides positive justification to bring residents with dementia outside.

Nature settings are unique to a typical long-term care environment. These settings provide a new and interesting location that residents can use to converse and
connect with other residents, staff, and loved ones. Studies have shown perceived social benefits that residents themselves express as well as positive improvements to loneliness and social interaction. There are activities that can be performed outdoors to increase the likelihood of social interaction and of non-verbal communication. For residents with cognitive impairment, the outdoors can lead to more lucidity and concentration ability, which in turn increases communication. All of these social interaction considerations contribute to enhanced well-being among residents in long-term care facility environments.

3.2.5. Independence & Valuation-of-Self

Independence and self-confidence are integral elements of well-being. In long-term care facilities, many choices are regularly made by staff for residents, restricting opportunities for residents to remain independent. Promoting independence wherever possible should be a priority. There are two ways in which the literature discusses promoting independence for residents in outdoor environments. The first independence strategy is fostering decision-making opportunities for residents and places where residents can control either something within the environment or within an activity. The second independence strategy is creating easy and self-supported access to outdoor space to reduce feelings of restraint and to provide a new environment for independence. Residents’ valuation of their functional abilities (Raske, 2010), self-esteem, and confidence (Kwack et al., 2005) are impacted by their ability to be independent. In old age, some loss of functional ability is likely. Improving residents’ perception of their own abilities will enable greater well-being in long-term care settings by redirecting residents’ focus to capabilities instead of disabilities. Independence strategies to increase well-being include improving residents’ assessment of their sense-of-self and functional abilities; offering independent gardening activities; ensuring access into an outdoor space; supplying an accessible location with contents that can be used independently; and taking advantage of the natural sense-of-freedom attributed to an outdoor setting.

It is important that residents positively frame their abilities in order to maintain a positive sense-of-self and increase confidence to participate in independent decision-
making and activities. Residents’ perception of their abilities is impacted by their sense-of-self, through their perceived ability to be independent and through their history of accomplishments. Three theories address sense-of-self for older adults: The prosentia hypothesis, life review, and attention restoration theory. Both the prosentia hypothesis and life review involve communicating with another party to solidify positive feelings of self. Chalfonts’ (2006) prosentia hypothesis entails fostering a positive sense-of-self for residents with dementia through the triad of an older adult and a person with whom they can positively interact, in a stimulating nature environment. Butlers’ (1963) life review, on the other hand, entails a valuation of sense-of-self and coming to terms with life through reminiscence (Bender et al., 1999). Residents can be assisted in remembering their life story and accomplishments (Bender et al., 1999). Because communication opportunities increase in a garden setting (Cox et al., 2004; Hernandez, 2007; Raske, 2010; Rodiek, 2009), residents may feel more at ease discussing their story and reflecting on their lives within an outdoor environment. Likewise, attention restoration theory addresses residents’ potential to reflect in nature.

Garden activities provide new opportunities to develop independence (Grant & Wineman, 2007; Kwack et al., 2005; Rappe & Topo, 2007) self-esteem (Kwack et al., 2005; Rappe & Topo, 2007), and a sense-of-freedom (Bengtsson & Carlsson, 2006). A person’s sense-of-self can be affected by their loss of capabilities (Bender et al., 1999). As abilities diminish in later life, maintaining competency and using existing skills may help maintain self-esteem (Rappe & Topo, 2007). Maintaining abilities and self-esteem can be supported through completing independent horticultural activities and familiar tasks (e.g. raking) (Rappe & Topo, 2007). Raske (2010) found that 84% of study participants responded that the addition of a garden space created meaningful activities. An outdoor setting within a long-term care home increases the locations and activities that can be performed by residents (Raske, 2010). Activities conducted outdoors can be tailored to include independent tasks that lead to enhanced feelings of confidence and independence (Kwack et al., 2005). Activities that increase sense-of-autonomy and self-esteem include ones where residents complete projects and contribute, participate in tasks independently, and conduct familiar tasks (Rappe & Topo, 2007). Rappe and Topo (2007) found that participating in garden activities increased residents’ self-esteem. An example of an independence-increasing activity is choosing the plants to be planted in
the garden space (Kwack et al., 2005). If a resident exhibits “odd” behaviour while outdoors, it may be because they are trying to exert their autonomy. For instance, Rappe and Topo (2007) describe a situation where a resident moved plants around in the exterior environment. They explain that when residents exhibit behaviour such as this, they may be trying to exert a sense of control or independence in the environment. Therefore, providing meaningful independence-increasing activities in the outdoors can support resident autonomy.

Lack of outdoor access is the most significant way in which resident independence is restricted. Locked doors are common independence barriers expressed throughout the literature (Day et al., 2000; Grant & Wineman, 2007; McMinn & Hinton, 2000; Voyer et al., 2005). Locked doors represent a loss of freedom (McMinn & Hinton, 2000; Namazi & DiNatale Johnson, 1992), which is an integral requirement for residents with and without cognitive impairment (Namazi & DiNatale Johnson, 1992). Autonomy and choice can be developed in the living environment of residents through access to the outdoors (Namazi & DiNatale Johnson, 1992). The realization that there is the ability to freely leave the interior may be sufficiently comforting and satisfying to residents. It has been found that residents who are free to go outside may not necessarily choose to venture outdoors. Namazi and DiNatale Johnson (1992) found that residents who keenly wished to leave the interior were often seen opening the door and stepping out, only to venture back inside. This was a repeated behaviour during the day. The authors describe that residents were satisfied once they discovered that they had the freedom to be outdoors (Namazi & DiNatale Johnson, 1992).

Residents frequently try to exit through locked or inaccessible doors, creating frustration and limiting independence. Door accessibility also has a significant impact on resident agitation levels (Cohen-Mansfield, 2001; McMinn & Hinton, 2000). Restricting a person’s freedoms may lead to defensive agitation as a response (Fogarty, 1997). Being released from confined locked-door conditions has provided a sense-of-freedom that has reduced the need for psychotropic medication to combat behavioural issues (McMinn & Hinton, 2000). Grant and Wineman (2007) found that residents who had access through a propped-open door made significantly more use of an outdoor area than residents who were constrained due to a locked door, alarms or keypads. Cohen-Mansfield (2001) indicated in her review that it is likely that the independence resulting from easy door
access is a positive benefit in and of itself. With an accessible door to the outdoors, residents choose where they want to spend their time (Cohen-Mansfield, 2001; Day et al., 2000). Doors that cannot be used by residents should be camouflaged to prevent resident attempts to exit (Day et al., 2000). Doors that lead to usable outdoor space should be easily accessible to increase independence and prevent inaccessibility and behavioural issues.

Barring residents from reaching the outdoors may evoke a similar reaction to physically restraining residents. Physical restraints represent a loss of basic freedoms and have serious consequences: a loss of self-confidence, defensive comportment, and aggressive behaviour (Voyer et al., 2005). Locked doors similarly remove a fundamental freedom that a resident has held his or her entire life: the ability to go outside. Brehms’ theory of psychological reactance describes the negative behavioural result of removing a resident’s freedom (Voyer et al., 2005). Theory of psychological reactance entails the psychological response to a threatened or restricted fundamental behavioural freedom that a person typically controls and values highly (Fogarty, 1997). Restricting a basic freedom represents a similar restriction to physically restraining the residents themselves.

In addition to overcoming the hurdle of inaccessible doors, the location and contents of garden spaces—if too far away—present another barrier to garden access (Cutler & Kane, 2006). Discussed more in-depth in the design guidelines chapter, location can restrict garden use for residents who cannot or do not wish to travel long distances to reach a destination. In addition, the further the garden space from the central area of the home, the greater the inconvenience for staff. In Cutler and Kane’s (2006) study, outdoor spaces were underutilized and resident use was “unrealistic” (p. 43) because gardens were located far from common areas and required staff facilitation.

Outdoor spaces are unique from the interior environment, as they provide residents a sense of freedom and can support greater independence. Having the freedom to visit outdoor space provides independence opportunities, presents options for where residents spend their time, and helps residents maintain existing abilities (Grant & Wineman, 2007). Residents have positive sentiments about being able to visit the outdoors. A staff member in Raske’s (2010) study commented that, “Some of the
residents can come out here and come and go as they please. They have their freedom back” (p. 345). This sense of freedom is greatly associated with autonomy. One of Bengtsson and Carlsson’s (2006) themes, access to surrounding life, describes the sense of freedom residents can obtain from their outdoor surroundings. The outdoors provides greater opportunities for decision-making and distinct stimulation. As one quote described, “You do not feel confined in a garden. When you come to the garden you feel somewhat more alive” (Bentsson & Carlsson, 2006, p. 60). Choice is more readily available outdoors because outdoor space is less habitual, offers seating options, provides opportunity for socializing, presents activities, and provides other uses that create a feeling of freedom and distance from the interior.

The sense of worth and achievement that is accrued from becoming more independent can significantly impact a resident’s well-being. Especially as a resident’s ability to independently maintain essential daily activities is reduced because of higher acuity level, providing any opportunity for him or her to assert choice and build self-confidence is crucial. Opportunities to achieve independence include providing a supportive setting for life reflection, creating a distinct environment from the indoors, and providing choice and accessibility to and within outdoor space.

3.2.6. **Sense of Purpose**

Sense of purpose relates to independence and is mentioned in the literature, meriting some discussion. This aspect of well-being refers to feeling valuable and productive. As adults age, they are not always capable of continuing the activities from their younger years, many of which may have been conducted in outdoor environments. Resident purpose can be addressed through meaningful activities outdoors (e.g. watering, sweeping, weeding, bird watching) (Raske, 2010; Rodiek, 2009). Residents with dementia, in many cases, maintain the skillset required to participate and engage in garden activities (Rodiek, 2009). The meaningfulness these activities provide is described by a resident’s family member, “he can’t concentrate on anything for very long […] but gardening is something that he can still do and enjoy very much” (Raske, 2010, p. 343). Despite losing some capabilities, helping residents develop a sense of purpose enables them to feel useful. Finding a purpose for residents increases instorative
benefits and improves sense-of-self, which can help residents maintain better psychological and physiological well-being. The word *instorative* has been used to describe the improved feelings of value, purpose, and self-worth accrued from an outdoor environment (Bengtsson & Carlsson, 2006). Like attention restoration, *instorative* benefits influence the psychological and physiological aspects of the person (Bengtsson & Carlsson, 2006). However, unlike the recovery effects of attention restoration, *instorative* benefits are preventative in nature (Bengtsson & Carlsson, 2006).

There are numerous meaningful activities that can be conducted outdoors. Residents may have participated in many outdoor activities before entering a long-term care facility. In finding a purpose, residents can improve their psychological and physiological well-being.

### 3.2.7. Wandering Behaviour

Wandering is a common activity for residents with dementia in long-term care facilities (Algase et al., 2010; Detweiler et al., 2008; Kwack et al., 2005). Though, in some cases, wandering can be reduced through design, some wandering may be inevitable. While wandering has been described as a non-purposeful activity as the result of agitation, wandering can serve the purpose of improving mood in an outdoor setting (Detweiler et al., 2008; Hernandez, 2007). Additional benefits to wandering behaviour include more opportunity for physical activity (Hernandez, 2007). Wandering behaviour can be mitigated or repurposed into purposeful wandering for residents with dementia through the design of defined spaces, a calm environment, and appropriate stimulation.

Wandering may decrease as a result of a purposeful, controlled, and well-defined environment for residents with dementia. In the *need-driven dementia-compromised behaviour model*, wandering is described as the result of an unfulfilled need (Algase et al., 2010). Algase et al. (2010) determined that wandering subsided when the environment contained a defined purpose for residents and when the environment contained opportunities to socialize. Algase and colleagues (2010) also found that wandering reduced in a calm environment with dimmed lighting and reduced noise. If a resident still wanders while in a room that has a defined purpose, the resident may have
an unmet need that corresponds to that room (Algase et al., 2010). For example, if a resident is wandering in a kitchen, they may need assistance obtaining food. It is also possible, though not yet empirically established, that if a space has a clear and singular purpose, it may afford residents more functional independence by cognitively simplifying the environment (Roberts & Algase, 1988). Therefore, simple and defined spaces may reduce resident wandering.

Through proper design, wandering becomes meaningful and stimulating (Zeisel, 2007). While wandering is not always beneficial, walking can be stimulating if residents have somewhere to walk and something to see. Walking in the garden provides a distinctive place to walk that can produce positive outcomes (Hernandez, 2007). Zeisel (2007) explains that the configuration and features within the outdoor space can promote optimal resident comprehension. Outdoor garden environments provide both a calming and appropriately stimulating environment for residents with dementia. This is evident in research where stress has decreased through outdoor use (Ottosson & Grahn, 2006; Orsega-Smith et al., 2004; van den Berg & Custers, 2011) and where mood has improved in the outdoor environment (Cooper Marcus & Barnes, 1995; Detweiler et al., 2008; Hernandez, 2007). Cohen-Mansfield and Werner (1998) found that the most concerning types of wandering behaviour, trespassing and exit-seeking, were reduced as a result of time spent in outdoor settings compared to indoor settings. A wander garden is discussed infrequently in the literature as a style of garden to support wandering residents. However, many of the features required to create a wander garden are suggested for long-term care facility garden design. This type of garden refers to an appropriate wandering environment with consideration for a cognitively simple setting, continuous path, security measures and sensory stimulation (Detweiler et al., 2008). When wandering is conducted within an outdoor space, safeguards needs to be in place to prevent elopement, while still enabling residents to explore and wander at their leisure without feeling confined (Kwack et al., 2005). In Detweiler and colleagues’ (2008) study, staff and family expressed how spending time in a garden designed for wandering improved quality-of-life and mood, as well as reduced agitation in residents with dementia.

Gardens, if designed for stimulation and meaningful wandering, can produce positive changes of mood and behaviour among residents with dementia. Providing
outdoor environments that have a clear purpose and appropriate stimulation for purposeful wandering can help improve resident well-being.

3.2.8. Reminiscence

Outdoor spaces can be used to connect to the residents’ past. Before entering a long-term care facility, many older adults would have participated in outdoor passive and active activities such as gardening, walking, golfing, and sitting outside. Reminiscence therapy is a successful and commonly used approach for people with dementia (Bender et al., 1999; Bruce & Schweitzer, 2008) and without dementia (Bender et al., 1999). While there are several sources in the existent literature that discuss reminiscence, few contribute empirical findings towards its benefit in nature settings. There are, however, multiple ways an outdoor environment can potentially stimulate reminiscence. Recollected memories can be enjoyable, help a resident come to terms with life, increase self-confidence, and improve opportunities for social exchange.

A small number of empirical studies have examined reminiscence well-being for older adults in garden settings. Sensory gardens have been discussed as a tool to elicit memories from the past for people primarily with dementia (Brawley, 2001; Borgen & Guldahl, 2011; Kwack et al., 2005). Heliker and colleagues (2001) found that after participating in a three month gardening project, community-dwelling older adults frequently related their experience to memories from their past. In describing the value of the gardening activity, the authors reflected that, “the evoking of past memories and reminiscing attest to the meaningfulness of the garden experience” (Heliker et al., 2001, p. 51). Sensory gardens have the ability to stir emotions and memories in residents through the viewing of traditional plants and garden features and through sensory stimulation in the garden (Borgen & Guldahl, 2011). Garden features, such as mailboxes, can help residents recall their past while outdoors (Hernandez, 2007).

Reminiscing is a way to reflect on time and history. As people age, many reflect on their life-course (Coleman, 1994). This reflection is termed by Butler (1963) as the *life review*. This stage in the life-course involves a desire to story-tell and share experiences with others, helping to preserve a person’s story and maintain their sense-of-self (Coleman, 1994). As Coleman (1994) explains, reminiscing focuses on life experience,
“...A common element in all reminiscing is the possession of a life-story, an autobiography unique to each person” (p. 8). The memories a person is drawn to remembering may be happy, sad, proud or regrettable. Ultimately, this process enables the person to come to terms with his or her life by revisiting memories (Butler, 1963). Reminiscence has the ability to connect residents to other people using a shared history, interests and experiences (Bender et al., 1999). Reminiscence helps connect residents with other residents and with staff (Bender et al., 1999). If residents discuss experiences with each other and with their care providers, they may find similarities in their stories prompting more interaction and a stronger relationship. Common experiences such as gardening, wartime stories, and living off the land, could improve social ties and resident well-being.

Garden spaces can contain many reminiscence features that can stimulate conversation. The reminiscence elements in gardens can evoke memories of a residents’ childhood (Cooper Marcus, 2007b; Hernandez, 2007), familiar home activities (Cooper Marcus, 2007b), and memories of being outdoors in the past (Bengtsson & Carlsson, 2006). In Bengtsson and Carlsson’s (2006) study, a staff member remarked on a memory of a resident who used to maintain outdoor space, “He came to me this spring and asked when we were going to sweep the patios and prepare them [...] He used to have a garden and a house and he is used to sweeping and pottering about.” (p. 62). As the outdoor environment was familiar to him, this resident remembered the habitual tasks he would have done in his own outdoor space (Bengtsson & Carlsson, 2006). For family members of cognitively impaired residents, the garden can help them remain connected to the person behind the condition of dementia. As one family member stated in Raske’s (2010) study, “There are days when my mom can’t even tell me who I am. When she comes out in this garden I see my mom, because she lights up” (p. 344). Barnes and the Design in Caring Environments Study Group [DCESG] (2002) suggests including home-like spaces in residential environments that are reminiscent of a typical home. In an outdoor setting, small outdoor gardens, garden features, and sitting spaces should be home-like and provide reminiscence opportunities for residents.

Reminiscence has many purposes and benefits for older adults in long-term care facilities. Reminiscence experiences can help residents evaluate their life-course and connect to their former selves through sensory and familiar features. Residents can also
experience a more positive sense-of-self through participating in activities they formerly participated in before entering a long-term care facility. Finally, reminiscence can improve feelings of social connectedness based on a shared history, interests and experiences.

3.2.9. Sensory Stimulation

Sensory systems often diminish with age (Brawley, 2001; Fitzsimmons, 2011). As a result, the pleasure derived from sensory interaction, such as viewing flowers, is less impactful for older residents with poor vision; they appreciate olfactory stimulation more than those with better vision (Kwack et al., 2005). Multi-sensory stimulation can address the sensory limitations as well as the cognitive and physical impairments present in older adults. An environment can offset a person's loss of competency by providing an environment that is more supportive, as detailed in the ecological theory of aging (Lawton & Nehamow, 1973). Sensory environments can address loss of competency through physical design strategies (e.g. way-finding cues) (Bengtsson & Carlsson, 2006). In addition, sensory stimulation can improve other well-being constructs including attention restoration (Kaplan, 1995) and improved sense-of-self (Chalfont, 2006). The type and amount of sensory information influences its benefit for residents with and without dementia. While the literature on sensory stimulation is primarily descriptive, a few studies have empirically evaluated sensory stimulation and natural environments in residential care settings. Of those available, many are small-sample studies that have compared or evaluated multi-sensory environments for residents. Multi-sensory outdoor environments can provide normative sensory stimulation for residents with appropriate amounts and enabling types of stimulation.

Multi-sensory environments in long-term care facilities most often refer to Snoezelen rooms. Snoezelen environments typically refer to an indoor room designed specifically for one-on-one multi-sensory stimulation (Baker et al., 1997). Despite the interest in Snoezelen from the long-term care facility community, the approach has only recently received empirical study. Before 2004, there was little empirical basis for its benefit (Cox et al., 2004). However, the literature is quickly growing. Padilla's (2011) review of environmental therapy approaches for residents with dementia determined that
Snoezelen environments improved residents’ mood and behaviour. Sensory benefits can occur in other environments as well. A few studies have compared the benefit of Snoezelen and sensory garden settings. Unlike Snoezelen rooms, outdoor garden settings are more familiar to residents. Anderson, Bird, MacPherson, McDonough and Davis (2011) suggest that it is misleading to term time spent in a garden environment as “multi-sensory therapy” (p. 175). They, instead, refer to the garden as a “normal social activity” (Anderson et al., 2011, p. 175). To refer to a garden environment as such suggests its benefit in providing a normal and social environment, which is preferable to an overly-planned and unfamiliar environment for residents. Though studies that compare Snoezelen and garden environments contain small sample sizes, findings suggest that garden environments may be as suitable for residents as the carefully crafted Snoezelen rooms (Anderson et al., 2011; Cox et al., 2004). A pilot study by Anderson et al. (2011) found that a garden environment achieved similar results to a Snoezelen room, which is far more costly to implement. Cox et al. (2004) found that the Snoezelen and garden environments influenced residents in different ways. The Snoezelen environment was more soothing for residents while the garden environment was more engaging (Cox et al., 2004).

For residents, an outdoor space provides a unique environment with many new types of stimulation (Bengtsson & Carlsson, 2006; Cooper Marcus & Barnes, 1995; Gibson et al., 2007). For some individuals, more stimulation is beneficial, while for others, less stimulation is needed. Residents can exhibit negative behaviour with both under-stimulation (Voyer et al., 2005; Chung et al., 2007) and overstimulation (Chung et al., 2007). In many cases, residents in long-term care settings are sensory deprived, necessitating more sensory stimulation (Cohen-Mansfield, 2001). Therefore, an important consideration in outdoor environments is sensory stimulation (Chalfont, 2008). Padilla’s (2011) review found that sensory stimulation could improve residents’ ability to perform ADLs. In another study, the stimulation shifted residents’ focus from their disabilities to their abilities (Chung et al., 2007). An outdoor setting can be the appropriate environment to provide the necessary level of positive stimulation to support positive outcomes for residents.

Nature settings provide sensory environments unique to other multi-sensory therapy approaches. As emphasized by Barnes and DCESG (2002), “A garden is an
important part of the care setting and can provide diverse sensory stimulation, including sound, colour and fragrance” (p. 782). There are numerous benefits to sensory stimulation in a nature environment. Nature has the advantage of providing diverse sensory stimulation (Barnes & DCESG, 2002). In addition, nature offers an unobtrusive and relaxed sensory environment with inconspicuous sensory stimulation to create a calm and restorative setting (Ulrich et al., 1991; Ulrich, 1999). This setting can act as a reprieve from internal emotions, stress, pain, and can simply provide a break from being indoors (Cooper Marcus & Barnes, 1995). In a study by Bengtsson and Carlsson (2006), care staff indicated that a change in environment was important to contrast residents’ usual setting and that the right design could produce appropriate stimulation.

There are different ways in which stimulation can affect residents. Bengtsson and Carlsson (2006) distinguish between a type of compensatory stimulation that can offset possible functional and cognitive impairments, and advancement stimulation, that provides intrigue or motivation (Bengtsson & Carlsson, 2006). In creating outdoor environments, Bengtsson and Carlsson (2006) term advancement stimulation, *inspiring design*, as it incorporates unique sensory features that challenge the mind. Combining both compensatory and inspiring sensory features provides opportunity to meet an array of resident needs (Bengtsson & Carlsson, 2006). These two streams of stimulation discussed by Bengtsson and Carlsson (2006) are similar to the *sensory-based interventions* concept by Chung and colleagues (2007). While Bengtsson and Carlsson’s (2006) *inspiring design* focuses on improving and enhancing residents’ experience through sensory stimulation, Chung et al. (2007) refer to using *sensory-based interventions* to shift residents’ focus from their disabilities to their abilities. *Sensory-based interventions* entail providing a sensory environment for residents with dementia as well as empowering residents to utilize their remaining abilities (Chung et al., 2007). The sensory information that Chung et al. (2007) describe is presented to residents in a less overwhelming manner and is, as a result, processed more suitably by each individual (Chung et al., 2007). Both approaches focus residents’ attention on the personal empowerment that can be achieved through sensory strategies.

Many of the theories that pertain to outdoor settings in long-term care environments incorporate sensory stimulation to help residents improve their well-being. The previously discussed *attention restoration theory* refers to appropriate stimuli that
outdoor spaces can provide to help renew focus (Kaplan, 1995). Sensory stimulation is also important in the *ecological theory of aging*, whereby appropriate stimulation provides a comfortable and suitable performance potential zone as opposed to the potential for maladaptive behaviour from too little competency or environmental-press (Lawton & Nehamow, 1973). Lastly, Chalfont’s (2006) *prosentia hypothesis* refers to a stimulating nature environment used with a friendly companion to formulate an improved sense-of-self. Each of these theories requires appropriate sensory stimulation to achieve individual well-being.

Nature-based sensory stimulation in a long-term care environment has not yet been adequately researched. The studies that have looked at garden settings have found comparable results to *Snoezelen* approaches. These environments were able to help residents participate in ADLs and improve their mood. Appropriate sensory stimulation can help residents process sensory data and can enhance their experience by highlighting their abilities. It is clear that among many theories mentioned in this review, sensory stimulation is an important factor to achieve resident health and well-being.

### 3.2.10. Conclusion

Well-being is an important goal for residents in long-term care facilities. Without physical and social environmental support for well-being, residents can exhibit anxiety, agitation, poor sleep patterns, excessive wandering, and low confidence. A positive outdoor environment provides a therapeutic setting that offers opportunities for residents’ increased well-being. This includes opportunities for social interaction, independent activities, attention restoration and improved sleep. Without access to the outdoors, residents can become “divorced from reality” (Bengtsson & Carlsson, 2006, p. 61). While other settings have been used to achieve well-being benefits (i.e. virtual environments, imagined environments, *Snoezelen* rooms), outdoor settings offer the most familiar environment for residents and contain unique nature elements not found elsewhere (e.g. sunshine). Residents can benefit from participating in normative activities as well as from reminiscing in an environment that helps to retain residents’ sense of self.
3.3. Barriers to Access

Access is the most crucial factor impacting the benefit of nature environments for residents. This is a consistent finding throughout the literature (Cutler and Kane, 2006; Grant & Wineman, 2007; Heath, 2004; Mather et al., 1997; Murphy et al., 2010; Rappe & Kivelä, 2005). Despite the provision of a well-designed nature environment, outdoor space is ineffective in meeting residents’ needs without addressing accessibility considerations at the organizational level. Without encouragement for regular use of garden space, residents cannot obtain optimal benefit. Inaccessibility ultimately renders the garden underutilized. Residents encounter barriers to access and use of outdoor space as a result of several levels of influence. At the macro-level, organizational support and policy impacts accessibility; at the meso-level, staff influences resident garden use; and at the micro-level, the physical environment can present an obstacle.

Organization-level access is a significant hurdle identified in the literature (Chapman et al., 2007; Cutler & Kane, 2006; Grant & Wineman, 2007). The organizational policy of the long-term care facility must continually support and promote garden space. Appropriate organizational vision and planning can ensure suitable physical design of the outdoor space, which can provide residents with a safe experience and ease staff fears when residents are outside. Outdoor space requires endorsement by the upper management of the care facility. In part, this can be achieved by incorporating nature environments into the organizational policies of long-term care facilities. Grant and Wineman (2007) found that at the organizational level, incorporating nature into the mission statement of a long-term care facility was only beneficial when accompanied by objectives for use. Without a unified understanding of use and benefit from all levels of staff, there will be contradictory opinions of resident needs. This could result in inadequate garden access. The organization needs to educate staff on the value of nature, methods of interaction, and strategies to support residents outdoors. Each staff member should understand who is responsible for ensuring garden access and should possess a unified understanding of garden use and benefit. In doing so, all staff members will understand the parameters for garden visitation and how to appropriately connect with residents.
Several studies discuss the importance of enacting policy for outdoor space in long-term care settings (Cutler & Kane, 2006; Murphy et al., 2010). Policy examples include defining when garden doors are to be unlocked (Cutler & Kane, 2006) and whether staff are permitted to access gardens independently (Heath, 2004). Murphy et al. (2010) described the importance of organizational support in their study of a newly designed wander garden. They expressed their study sites' lack of a “coordinated plan to optimize garden utilization” (Murphy et al., 2010, p. 368), such as combining the efforts of both the nursing and recreation staff. Gibson and colleagues (2007) explained that combined department efforts ensured resident participation. In Gibson et al.'s (2007) study, residents of long-term care facilities were more likely to partake in nature activities than older adults living in the community. This was because many staff departments (e.g. recreation staff, care staff) worked together to encourage resident participation in outdoor activities. It is also important to ensure that despite staff and resident rotation, the garden remains available to residents. Chapman et al. (2007) trained administration and recreation staff on garden environments. They found that frequent staff turnover in their study sample hampered the ability to implement garden changes and share knowledge with others in their respective facilities (Chapman et al., 2007). The transfer of information from departing to incoming staff members would ensure consistent knowledge among staff (Chapman et al., 2007). Both knowledge dissemination from the organization and the transfer of information to incoming staff members are important considerations at the organizational level.

The organization must stipulate policies to achieve independent use by developing a committed plan (e.g. staff education, outdoor activity schedule, informational brochures) (Grant & Wineman, 2007). Without facility support for garden use, staff are less inclined to alter busy schedules to support residents. In a facility case study, Grant and Wineman (2007) found that the program director believed that scheduling programs in the garden space would reduce its relaxation potential. As a result, no programs were planned outside (Grant & Wineman, 2007). Heath (2004) found that established policies prevented staff from using garden space independently. Policies can greatly influence the access and utilization of outdoor space. Granting staff access to the outdoors would help staff members develop their own connection to the outdoor environment. This would perhaps facilitate a more positive outlook on granting
Residents access. It is important to determine whether the garden will be used for scheduled programs and whether staff and residents will have independent access to the space.

Residents with dementia may not venture outdoors even when provided access (Chalfont, 2008; Rappe & Topo, 2007). Cognitive impairment restricts residents’ decision-making ability (Chalfont, 2008). Residents may not venture outdoors due to incorrect, or no memory, of previous visits (Chalfont, 2008). Residents may also avoid outdoor space due to the fear of unknown in the outdoors (Cohen-Mansfield & Werner, 1998), or inaccurate assumptions about the weather (Cohen-Mansfield & Werner, 1998; Gibson et al., 2007). A few authors found that residents would decline visits to the outdoors when asked (Gibson et al., 2007; Rappe & Topo, 2007), and sometimes for undisclosed reasons (Cohen-Mansfield, 2007). Cohen-Mansfield (2007) found that of a sample of 320 long-term care facilities, 28% contained residents who did not venture outdoors for unknown reasons and 24% included residents who refrained because the outdoor environment was unfamiliar to them. In some instances, residents may incorrectly perceive their garden use as greater than reality. Gibson et al. (2007) found that residents expressed frequent outdoor use. However, when observed, residents would decline going outside citing reasons such as anticipating that they would be cold. For residents with cognitive impairment, staff can help prompt the use of outdoor space, either by visually showing them the space discussed (Chalfont, 2008; Cohen-Mansfield & Werner, 1998), or by reducing their fears of being uncomfortable outdoors (Gibson et al., 2007).

Persuasion is sometimes required to prompt residents to venture outdoors. The organization can support staff by developing opportunities for regular and independent use of outdoor space. The design of the physical environment may not facilitate visual and physical access, creating a reliance on staff-scheduled programs to ensure that the outdoor space is used regularly (Grant & Wineman, 2007). Resident garden use often occurs at structured times (Gibson et al., 2007; Hernandez, 2007). Likewise, Kearney and Winterbottom (2006) found that residents frequently interacted with nature when facilities provided regularly scheduled outdoor programs. Offering these programs greatly impacts the success potential of outdoor space (Cutler & Kane, 2006). For residents with dementia, a routine established by the long-term care facility provides
reinforcement to increase familiarity with the space (Chalfont, 2008). Over time, regular visits to the outdoors develop an expectation of garden use and can reduce the difficulty of convincing residents to participate (Chalfont, 2008). For physically and cognitively capable residents, a well-designed environment can promote independence and facilitate meaningful routines. When residents have unobstructed access to garden space, they have the opportunity to develop their own routines and rituals (Hernandez, 2007), such as regular garden visits with friends, and daily plant watering.

A few studies report that facilities rarely or never provide programmed activities outdoors (Cutler & Kane, 2006; Grant & Wineman, 2007). When activities are planned, some residents may not be included. In Cutler and Kane’s (2006) study that included 1,988 residents, staff indicated that 50% were not included in scheduled outdoor programs. In the same study, 40% of residents indicated a desire for more frequent outside visits (Cutler & Kane, 2006). Among residents with dementia, outdoor visits may not be memorable due to cognitive impairment. Gibson et al (2007) found that some staff members expressed the opinion that outdoor programs were unnecessary if residents would not remember the experience (Gibson et al., 2007). However, there are many health and well-being benefits associated with nature exposure apart from remembering the visit, as previously expressed. Nature benefits for residents with dementia include reduced ‘as needed’ medication use (Detweiler et al., 2009) and decreased agitation (Detweiler et al., 2009; Mather et al., 1997; Murphy et al., 2010). Mooney and Nicell’s (1992) two-group experiment findings are particularly persuasive. Mooney and Nicell (1992) found that violence in long-term care facilities without gardens increased by 681% during a two-year study period and violence decreased by 19% in facilities with garden settings.

Staff-related barriers are common in the literature (Cutler & Kane, 2006; Detweiler et al., 2008; Grant & Wineman, 2007; Zeisel & Tyson, 1999). Frontline care staff are the primary gatekeepers of outdoor space. Even with established organizational policy for garden use, procedures may not be followed (Grant & Wineman, 2007). Personnel responsible for opening garden doors have the power to permit or restrict outdoor access. If safety is not ensured, staff may not permit resident use or may restrict unsupervised use. Staff will be less likely to provide access to outdoor space without a secure physical environment and safety enclosure (Zeisel, 2007). The organization and
care staff must equally comprehend who provides access and both must feel comfortable allowing residents to use the space (Zeisel, 2007). If unmonitored residents with dementia pose a concern for nursing or administrative staff, both may be responsible for restricting garden availability (Detweiler et al., 2008). Access can especially be restricted when a facility is short-staffed and where outdoor access may increase workload. As described by Detweiler et al. (2008), “such events disrupted the nursing routine, as the resident may require a medical evaluation, a change of clothes, and either a fall or incident report” (p. 42). Staff need to feel that the outdoors is safe and supportive for residents, and where necessary, monitoring is available (Zeisel, 2007). The best way to achieve this is to design an appropriate outdoor environment, ensure the organizational policy clearly supports the garden space, and educate staff members.

In order to ensure optimal garden use, the organization must prepare staff to support residents’ use of outdoor space. Staff can be instructed on garden benefits, taught to use garden space appropriately with residents, and educated on methods to encourage use (Heath, 2004). Staff can also be taught to comprehend associated benefits of nature use, such as increased independence and maintenance of functional abilities (Grant & Wineman, 2007). For staff, increasing garden use among residents with dementia could be as simple as rephrasing ‘do you want to go outside?’ to, “let’s go have a look at the garden” (Chalfont, 2008, p. 89).

In many cases, residents only visit the outdoor environment when staff are available. This becomes an issue of contention for busy staff members (Hernandez, 2007). Detweiler and colleagues (2008) found that some staff members thought that being in the garden decreased their quality of life. It is likely that staff felt that spending time outdoors increased their workload. In some cases, staff are ultimately responsible for unlocking access doors and taking residents outside (Hernandez, 2007). Therefore, use of garden space may be idealistic given the need for staff availability, especially if the door is customarily locked or the space is isolated from resident common areas (Cutler & Kane, 2006). Staff should be instructed on the benefits of time outside, taught to encourage its use, and permitted to allow residents to visit on their own (Grant & Wineman, 2007). This can only be achieved if the physical environment ensures the greatest possible safety and if the organizational policies promote garden use.
Long-term care facilities intentionally and unintentionally restrict garden access to times when staff members are available (Cohen-Mansfield, 2007; Cutler & Kane, 2006; Grant & Wineman, 2007; Heath, 2004; Rappe & Kivelä, 2005). Barriers in the physical environment can be influenced by staff assistance. In a study by Kearney and Winterbottom (2006), 80% of resident participants indicated insufficient garden access; 40% due to physical impairment and 20% due to the need for assistance. Assistance is a recurrent suggestion expressed in the literature as a way to increase use of an outdoor environment (Cutler & Kane, 2006; Heath, 2004; Kearney & Winterbottom, 2006). However, the need for assistance has not been empirically established in the literature. In a study by Rappe and Kivelä (2005), 70% of residents reported access difficulties that were primarily a result of insufficient staff assistance. Heath (2004) found that sparse staffing and a shortage of volunteers prevented residents from reaching outdoor space. The literature does not indicate whether staff support is a requisite for residents in outdoor settings or whether appropriately designed environments reduce the need for staff support. In some cases, residents without support may feel more confident than expected while outdoors (Rodiek, 2006). If enough residents require enhanced surveillance, the cost may precipitate other solutions. The resources required to monitor residents outdoors are costly for facilities (Cohen-Mansfield, 2007). There are some residents who simply cannot reach outdoor space on their own due to frailty (Rodiek, 2009), ambulation issues, or confinement to geri-chairs and other assistive devices (Bengtsson & Carlsson, 2006; Murphy et al., 2010). According to Gibson and colleagues (2007), less ambulatory residents with dementia experienced significantly more trouble accessing outdoor space. Restricted mobility and the inability to navigate outdoor environments has been expressed as “more detrimental to well-being than the dementia itself” (Gibson et al., 2007, p. 65). Easier physical access to the outdoor environment would improve residents’ independent use (Grant & Wineman, 2007). Regardless, policies surrounding necessary accompaniment must be clearly devised to determine who will bring residents out and when. Without direction, staff may not provide the desired accompaniment to facilitate resident access.

There is significant variability in the contents and physical design of outdoor environments in long-term care settings. Access needs within outdoor environments are described in detail in the design guidelines section, and entail a clear, safe, and
unobstructed environment with areas for rest, shelter, and a legible garden layout. Among the most important physical obstacles is the transition environment that bridges the interior and the exterior environment through the aforementioned door and window views and door design. Locked doors restrict residents from reaching the outdoors and prevent independent use. Alarms, keypads, and other restrictive door barriers deter residents (Grant & Wineman, 2007). In a large study of 40 facilities in the U.S., Cutler and Kane (2006) found that there was extraordinary variability within long-term care facility outdoor spaces and that the majority were locked to residents. Providing access can also improve behavioral issues for people with dementia. McMinn and Hinton (2000) found that creating access to the outdoors reduced verbal and physical aggression, and reduced ‘as needed’ medication for behavioural issues among older adults housed in special care units. While physical variability in long-term care facility gardens is to be expected, regulating outdoor environments could ensure support for the range of resident needs, promote optimal independence, and establish resident safety. Given the need to provide a well-regulated interior environment, it would be appropriate to also provide regulations outside (Cutler & Kane, 2006). Regulations could standardize the environment and reduce the need for assistance to reach the outdoors.

Several articles in this review expressed a need for greater access to outdoor space and the benefits that can be accrued when access is optimized. Access falls within the purview of many different levels of influence and is therefore a complex issue. The three levels of access discussed are organizational policy, staff training, and the physical environment. The organization is integral to achieving regular and consistent access to nature environments. This is accomplished by developing policy, creating objectives, and promoting garden use through staff training. Organizational support pledges the facilities’ commitment with a well-developed plan to maintain consistent use of garden sites. Staff education facilitates an outcome that ensures a uniform understanding of use and assistance protocol. Staff members hold significant power to permit and assist residents to experience the outdoors. Unfortunately, outdoor programs are often not available and when they are, many residents are not included. It is important that staff members understand the benefits of outdoor space through training and education. The physical environment can provide safe and easy access for residents of all abilities. Currently, there is a need for standards and regulations to
control the physical design of outdoor spaces. Its proper design will diminish the need for resident accompaniment and reduce staff fears. Through cooperation of numerous departments, the burden on staff can be reduced and regularly scheduled programs can be created. In doing so, use of outdoor space can become routine for residents, similar to other common spaces in long-term care facilities. These access considerations will help ensure that residents have the opportunity to experience health and well-being benefits related to outdoor garden use.
Chapter 4.

Design Guidelines

Garden spaces for long-term care facility residents are often designed as an afterthought or without consideration for specific features that can improve resident well-being and health. In many cases, gardens for older adults are simply designed to be visually pleasing without further consideration (Barnes & DCESG, 2002). There is significant variation between the design of these spaces (Cutler & Kane, 2006). Yet, despite the variation, nature promotes health and well-being for residents in long-term care settings (Cohen-Mansfield, 2007; Detweiler et al., 2008; Raske, 2010).

There are many manifestations of long-term care facility outdoor space. In residential care, there are numerous outdoor spaces for different resident needs. In a large US study that looked at long-term care environment gardens, 68% of the 320 garden sites had independent gardens for residents with cognitive impairment (Cohen-Mansfield, 2007). Some gardens are designed for a specific purpose (e.g. wander, memory), others for different groups of people (e.g. special care unit gardens). Special care unit outdoor spaces are the most well-researched and carefully designed spaces available and are created for residents who typically exhibit behavioural concerns attributed to dementia. Outdoor environments for residents with cognitive impairment and agitated behaviour are often designed for only this subpopulation, as their needs are unique within the long-term care residential community. Safety considerations are imperative when designing environments for residents with cognitive impairment; unnecessarily risky environments could produce harmful and even fatal consequences.

In his paper on therapeutic dementia gardens, Zeisel (2007) expressed that a garden creator must be aware of the challenges residents with dementia face in order to truly understand how to design an outdoor environment that suits them. The environment must be versatile enough to ensure that despite different types and levels
of impairment, residents are able to comprehend the space. Cognitive decline and a gradual reduction in abilities among residents with dementia necessitates caution to ensure that garden spaces are designed in a “dignified” manner and do not appear child-like (Hoover, 1995). Due to the variation in resident capabilities in long-term care environments, outdoor design recommendations for each outdoor space should be incorporated based on the level of resident needs (Hoover, 1995; Cooper Marcus & Sachs, 2013). Design of outdoor space needs to be congruous with the interior environment. Whenever possible, the design of outdoor space should be planned and constructed in concert with the interior (Zeisel, 2007). The literature points to numerous strategies to influence the design and use of nature settings. The most commonly discussed guidelines in the literature for long-term care facility gardens refer to layout and access; door design; climate conditions; physical safety and sense of safety; path network; plant selection; home-like character; reminiscence features; sensory stimulation; independence; attitude and culture; and attention restoration.

4.1. Spatial Location of Garden

Keeping the physical location in mind will ensure a truly well-designed environment for older adults. The spatial location of an outdoor garden requires careful planning to ensure optimal use. Cutler and Kane (2006) write about spatial issues found in 40 long-term care homes they evaluated:

Beautiful outdoor spaces were built,[...] but it was unrealistic to think that residents could make use of the spaces, either independently because of their distance from resident rooms or with the assistance of staff because of the time required to assist residents to the space. (p. 43)

If an outdoor setting is appropriately placed, the location will enable residents to easily see and visit the space. To accomplish this, the entrance to the garden should be situated in a central location within the home (Burton & Sheehan, 2010; Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006; Rodiek, 2009) and should be visible from indoors for both residents with and without dementia (Burton & Sheehan, 2010; Chalfont, 2008; Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; Kearney & Winterbottom, 2006; Rodiek, 2009; Zeisel & Tyson, 1999). This encourages
as much independent access as possible. A central garden space with features of interest near the garden entrance is imperative, especially for residents with limited mobility (Cooper Marcus & Sachs, 2013). A strategic central location would also allow staff to view the garden throughout the day to keep an eye on residents. Within the literature, common suggestions for the placement of garden spaces include locating the garden near the regularly busy dining room (Cooper Marcus & Barnes, 1995; Rodiek, 2009), and near the front entrance in order to survey activity coming into the home (Cooper Marcus & Sachs, 2013; Rodiek, 2009). Residents tend to gather in or near the dining room before and after meals, providing an opportunity to explore nearby environments at those times.

For certain residents, a garden space at the entrance to the home is ideal but is not advisable for residents with cognitive impairment. Residents with dementia require greater enclosure and reduced views offsite (Rodiek, 2009; Zeisel, 2007; Zeisel & Tyson, 1999). For residents who can safely spend time in a front garden, incorporating outdoor space at the front of a home allows residents to view nearby activity (Cooper Marcus & Sachs, 2013; Cutler & Kane, 2006; Rodiek, 2009). Residents are able to people watch in the entryway and parking lot (Cutler & Kane, 2006). Cooper Marcus and Sachs (2013) indicate that those who are able to view vehicles from the garden spend more time in the space than those who cannot. This tends to be a well-liked place to gather with opportunities for social interaction (Cutler & Kane, 2006). For residents who remain indoors, windows facing the front garden provide a view of activity taking place outside (Cutler & Kane, 2006). Even at night, outdoor lighting increases garden visibility through windows (Cooper Marcus & Barnes, 1995).

Proximity to residents and common space can greatly influence residents’ ability to effectively view and use outdoor settings. Appropriate garden placement can include areas adjacent to dining and living rooms that provide a convenient and popular hub in which to transition from the indoors to the outdoors. In some cases, areas of activity adjacent to garden space are beneficial, especially for residents without cognitive impairment. For residents with dementia, views offsite and views of nearby activity are not suggested. With these initial steps to secure an appropriate spatial location, access points, and views, outdoor environments can be situated in an ideal location for use and benefit.
4.2. Interior/Exterior Connection

In addition to the location of a garden, the areas that bridge the interior and exterior environment must support the physiological needs of residents as well as form a psychological connection between the resident and the outdoor space. This is accomplished by ensuring that adjacent space both inside and outside provides comfort and safety with appropriate lighting and temperature regulation. A significant factor in designing physical access of the transition space is dedicated to forming a successful *interface* between the indoors and the outdoors. This area, known as the *transition zone*, has the ability to prompt more outdoor usage if designed suitably for residents (Rodiek, 2009). Transitional areas encompass the space near the entrance into the outdoor environment and the corresponding outside space that leads into the indoor environment. These areas smoothly bridge the interior and exterior environments, meeting residents’ physiological needs and psychologically connecting residents to the outdoors.

*Transition zones* are mentioned throughout the general and dementia specific literature on this topic (Brawley, 2001; Cooper Marcus & Sachs, 2013; Grant & Wineman, 2007; McBride, 1999; Zeisel & Tyson, 1999). These areas—that connect the indoors and the outdoors (McBride, 1999; Rodiek, 2009)—serve the purpose of improving resident flow and increasing resident comfort. Transition areas attract residents through specialized design conditions on both sides of the access door to preview the garden space in comfort (Rodiek, 2009). Indoor transition areas can psychologically entice residents to visit the outdoors through a distinct nature-themed design. Design considerations include provision of plants and flooring that has a nature theme (Rodiek, 2009). These features can help provide cues that there is an outdoor environment nearby. In addition, transition zones provide residents—who do not or cannot venture outdoors—a destination that still has nature features. The *transition zone* contains the area referred to by Rodiek (2009) as the ‘*interface*’ that helps entice and facilitate resident usage. This is accomplished through well-placed doors and numerous windows looking out onto the space to facilitate maximum visibility and flow of movement (Rodiek, 2009; Zeisel & Tyson, 1999).
Resident well-being in an outdoor space is influenced by lighting (Burton & Sheehan, 2010). From a physiological perspective, transition zones are necessary to ensure that residents become accustomed to changing light levels (Grant & Wineman, 2007; McBride, 1999; Rodiek, 2009). Older eyes experience age-related pupil shrinking which results in a reduction of light penetrating the eye and the need for a longer time to adjust to changing light levels (Stuen & Faye, 2003). Therefore, residents’ eyes require an adjustment period when transitioning between an indoor and outdoor environment because of the change in lighting and glare (Cooper Marcus & Sachs, 2013; Grant & Wineman, 2007; McBride, 1999). In order to ease the transition for residents’ eyes, residents would benefit from similar lighting conditions between the outdoors and indoors that can be facilitated using lighting and shelter (Cooper Marcus & Sachs, 2013; Rodiek, 2009). Lighting strategies for the transition spaces include skylights (Brawley, 2001; Cooper Marcus & Sachs, 2013; Rodiek, 2009) and bright lights placed in transitional areas (Brawley, 2001; Cooper Marcus & Sachs, 2013; Rodiek, 2009). In addition, designing a waiting area on either side of the access door, away from the flow of movement, provides an adjacent area to wait during the adjustment period before venturing further into the space (Brawley, 2001; Rodiek, 2009).

Similar to lighting, resident well-being and use of an outdoor space is influenced by temperature (Burton & Sheehan, 2010) and weather (Grant & Wineman, 2007). Adjustment time is necessary to become accustomed to temperature changes (Cooper Marcus & Sachs, 2013). Outdoor transition zones allow residents to inspect the environment before choosing whether to venture further (Rodiek, 2009). Temperature can be modified using heaters, fans (Rodiek, 2009) and various natural and manmade covers. The transition area can be sheltered and shaded with porches, overhangs, patios, porte-cocheres, and awnings (see Cooper Marcus & Sachs, 2013; McBride, 1999; Rodiek, 2009; Zeisel & Tyson, 1999). These features also protect from adverse weather conditions (Grant & Wineman, 2007; McBride, 1999; Rodiek, 2009). It is likely that these covered spaces could prevent accidents and injury (e.g. slip on a wet surface). A sheltered space provides an area to wait during a period of disorientation and temporary immobilization as the eyes adjust. Strategically placed seating near the doors can protect residents from the elements by offering a sheltered place to meet the physical adjustment needs of residents (Cooper Marcus & Sachs, 2013; Grant &
Wineman, 2007; Rodiek, 2009). They can make the transition while seated and sheltered, comfortably previewing the outdoors (Cooper Marcus & Sachs, 2013; Grant & Wineman, 2007; Rodiek, 2009). Seating close to the entrance is also helpful for residents who do not wish to travel too far into the space (Rodiek, 2009).

To create an outdoor environment that enables residents to easily flow from the indoors to the outdoors, the design of the transition zone and interface must be considered. The transition zone eases the physiological transition for residents through the provision of seating, lighting, and shelter. By incorporating nature-like décor, residents can psychologically connect transition space to the garden’s presence. Providing seating to preview outdoor and indoor space before choosing to venture further gives residents the time to psychologically become comfortable with the new environment while being physically supported at the same time. The interface physically informs residents where to go for outdoor enjoyment and psychologically informs residents of its presence through windowed views creating a bridge between the environments. These design strategies help create a safe and comfortable transition for residents and ensure that residents can independently use outdoor space with ease.

4.3. Doors

The likelihood that residents will use an outdoor space is greatly impacted by the level of ease they experience trying to reach it (Cutler & Kane, 2006; Rodiek, 2006; Rodiek, Nejati, Bardenhagen, Lee & Senes, 2014b). Rodiek, Lee and Nejati (2014a) found that doorways to the exterior environment greatly inhibited residents’ perceived and actual ability to access the space. In a study of 320 special care unit facilities, Cohen-Mansfield (2007) found that 25% of the facilities expressed accessibility issues that included inappropriate and heavy doors. Doors can become barriers to use if persistently locked or not designed to facilitate ease of movement. Recommendations include choosing the appropriate number and location of doors, improving door design for accessibility, and changing the aesthetic design of doorways.

The literature provides conflicting guidelines with respect to the number of doors that should be available to residents in order to access outside space. In a general long-
Term care facility garden, numerous doors can increase access (Kearney & Winterbottom, 2006). However, for residents with dementia, a single, constantly visible re-entry door has been suggested as being most beneficial (Cooper Marcus, 2007b; Cooper Marcus & Sachs, 2013; Zeisel, 2007). In dementia care settings, less entry and exit doors reduce the environmental complexity experienced by residents (Cooper Marcus & Sachs, 2013). Kearney and Winterbottom (2006), however, suggest that for residents with dementia, multiple points of entry can prevent the confusion and exertion it takes to reach a single point of entry. As a potential way to bridge these perspectives, Zeisel and Tyson (1999) indicate that if there is more than one door, a clearly visible hierarchy must be established in their design, particularly if the doors are close to one another. A single, clearly marked door can be made more obvious with a noticeable colour (Cooper Marcus & Sachs, 2013; Zeisel, 2007) an overhang (Cooper Marcus & Sachs, 2013), or with a typical home-like design (Zeisel, 2007).

The accessibility features of a door are as important as the number of doors available and their placement. Door features that pose problems for older adults include heavy manually operated doors (Chapman et al., 2007; Cohen-Mansfield, 2007; Kwack et al., 2005; Murphy et al., 2010; Rodiek et al., 2014a) and raised thresholds (Kearney & Winterbottom, 2006; McBride, 1999; Rodiek et al., 2014a). This is especially true for less ambulatory residents and residents bound to seated adaptive technology (Kwack et al., 2005; Rodiek et al., 2014a). Raised threshold strips along doors that residents must pass to reach the outdoors require a lot of exertion and create a trip hazard. There are guidelines expressed within dementia and non-dementia literature specific to door types, thresholds, and handles. Guidelines include providing an even threshold (Kearney & Winterbottom, 2006; McBride, 1999; Rodiek & Lee, 2009; Rodiek, 2009), a wide doorway (Chalfont, 2008; McBride, 1999), and either a door equipped with a lever-door handle (Cooper Marcus & Sachs, 2013; McBride, 1999; Rodiek, 2009) or an automatic door system (Heath, 2004; McBride, 1999; Rodiek, 2009). Murphy et al. (2010) do not consider automatic doors to be an option for residents with dementia because residents may find the automatic feature distressing. It is unlike any typical door in a house and is unfamiliar to the current generation of older adults. Yet, when residents have difficulty maneuvering doors, it can deter them from using outdoor space (Rodiek, 2009). If doors are not automatic, they need to be easy to open in order to prevent strain and injury.
Especially for people with arthritis, physical impairment, and general frailty, the design of the door can impact their ability to access a space (McBride, 1999). If a door is not automatic, usage can be increased with a door that is propped-open or unlocked (Chalfont, 2008; Grant & Wineman, 2007; Cooper Marcus & Sachs, 2013).

Doors should clearly indicate where they lead and serve as a landmark for people in a garden space. For residents with cognitive impairment, it is important to provide a clear view of where a door leads (Mooney & Nicell, 1992). For both residents with and without dementia, the entrance to the garden should be clearly marked and easily visible from both inside and outside to reduce confusion and disorientation (Kearney & Winterbottom, 2006). While in a garden space, doors reduce confusion by serving as a landmark (Cooper Marcus & Sachs, 2013; Zeisel, 2007). If a door is visible throughout the entire space, it can orient residents to their spatial location within the garden (Cooper Marcus & Sachs, 2013; Hoover, 1995; Zeisel, 2007) and help residents return indoors.

There is significant literature with respect to doors and long-term care facility gardens. However, the literature is not conclusive as to whether one or more doors should be available for residents to access outdoor space. When there is more than one door, there are strategies that can be used to visually indicate primary entryways. In doing so, these doors serve as landmarks to inform residents where they are within the outdoor space. From the indoors, the garden door should be obvious. Doors that are simple to navigate—that include automatic and level-sill features—ensure that residents can independently navigate the environment without difficulty. It is through these steps that the outdoor environment becomes more accessible and navigable for long-term care facility residents with and without dementia.

4.4. Climate

When residents spend time in an outdoor environment, protection from the elements must be addressed (Chalfont, 2008; Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006; McBride, 1999; Mooney & Nicell, 1992; Rodiek, 2009). Certain geographical climates leave residents exposed to extreme temperatures. This is
especially relevant as older adults are often more sensitive to heat and cold and may not have the capacity to recognize when they have been outside too long. For residents with dementia, discomfort from weather conditions (e.g. wind, sun, glare) can result in agitated behaviour (Mooney & Nicell, 1992). In the design of space, it is important to consider the time of day and time of year that residents will be outdoors (Chalfont, 2008). Special attention must be paid to shelter and microclimates, lighting levels and the patterns made by shadows.

Microclimates can occur naturally and can be specially crafted to improve resident comfort. There are numerous types of naturally occurring microclimates that transpire throughout the day (Chalfont, 2008). These include wind conditions and the changes produced from the sun’s direction and intensity of its rays (McBride, 1999). McBride (1999) emphasizes the need to consider the most intense midday sun conditions and afternoon glare. Some residents enjoy direct sunlight for warmth, while it creates too much glare for others (Cooper Marcus & Sachs, 2013). Sunlight can help improve residents’ quality and quantity of sleep, circadian rhythm, and can also facilitate absorption of Vitamin D (Ulrich, 1999). For others, some common medications interact with sunlight (Cooper Marcus & Sachs, 2013; Rodiek, 2009; Ulrich, 1999) and increase sensitivity to direct sunlight (Cooper Marcus & Sachs, 2013). In addition, residents with dementia may not realize they are overheating or getting sunburnt (Chalfont, 2008; Rodiek, 2009). Natural and artificial means can be used to create microclimate changes within an outdoor space. Among the solutions is placing furniture in both sunny and shaded areas to provide the option of where to sit outdoors (McBride, 1999). Tree cover and plant materials can reduce sunlight penetration, cut wind, and provide shade (McBride, 1999). Other methods to reduce the sunlight include sunscreens, umbrellas, awnings, and trellises (McBride, 1999). Glare, caused by the sun and reflective surfaces (e.g. water features, metal) can be reduced by strategically placing these features in shaded areas (McBride, 1999).

Both natural and artificial lighting can impact resident use and comfort. While both natural and built features are useful for providing shade (Hernandez, 2007), sun-cast shadows projected onto the site produce potential tripping hazards for residents (Cooper Marcus, 2007a). Residents sometimes perceive contrasting patterns (Kearney & Winterbottom, 2006), colour (Chalfont, 2008; Cooper Marcus & Sachs, 2013),
shadows and texture variation as physical gaps or changes to the surface level (Cooper Marcus & Sachs, 2013). Some features and shadows may even warp residents’ reality and create delusions (Cooper Marcus & Sachs, 2013). Straight-lined structures can create the illusion of “visual cliffing”; when the colour of the path changes or dark patches occur across a path as a result of shade (Cooper Marcus & Sachs, 2013). While trellises, fences, and other built structures are suggested to block sun and wind (McBride, 1999), Cooper Marcus and Sachs (2013) suggest avoiding strong-lined features or incorporating vines and other greenery along trellises and arbor-type structures to soften their shadow. Cooper Marcus and Sachs (2013) also suggest using the shadow cast by the building in the afternoon for a large carpeting shade cover.

Certain meteorological events create unpleasant and even dangerous outdoor conditions for residents. Episodes of rain, wind, and harsh temperatures pose a risk to resident health and well-being. There are many approaches to mitigating the effect of these meteorological conditions. Shelter provides relief from the elements without restricting access to the outdoors (Kearney & Winterbottom, 2006). Covered areas protect residents from the elements while still enabling them to walk freely (McBride, 1999). The sensory benefits from being able to stay outside during different weather patterns—such as rain showers—can provide memories and stimulation from the sound, look, and feel of rain. Porches offer shelter, protect from unfavourable weather and can be equipped with heat lamps (Kearney & Winterbottom, 2006), radiant heaters, and overhead fans to regulate temperature (Rodiek, 2009). Various trees and plant materials can reduce the effect of wind (McBride, 1999). In sunny weather, surfaces that conduct heat or cold must be avoided (e.g. metal chairs, metal railings) in favour of heat-reflecting materials (Chalfont, 2008; Cooper Marcus & Barnes, 1995). By using a number of these features to suit the space, an outdoor environment can offer a comfortable place to remain outdoors during a variety of weather conditions.

Residents should have the opportunity to view the garden space indoors. This is especially valuable if the climate region of a facility limits use of the garden year-round. An attractive solarium or windowed area from which to view the garden at different times of the year allows consistent access to nature, natural light, and warmth (Cooper Marcus & Sachs, 2013; Hernandez, 2007). The garden viewing space and garden itself must be placed in close proximity to resident rooms or it will not receive enough use (Cutler &
Kane, 2006). Ideally, outdoor areas for resident use would be centrally located. For residents with dementia, the garden should be positioned to provide optimal usage during the morning or late afternoon (Cooper Marcus & Sachs, 2013), for shade in the summer and direct sun in the winter (Zeisel, 2007).

The geographical location also impacts the ability to grow different plant types and should influence plant selection. A well-maintained garden is important to ensure its desirability among residents (Cooper Marcus & Sachs, 2013; Rodiek, 2006). Plant seasonality and upkeep should be taken into account in a garden space for residents, especially if the garden is viewed or used year-round. Among older adults, waning and damaged plants can produce negative psychological effects (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013). Therefore, ensuring that there are compatible and seasonal plants within the environment is important for residents. By using the garden, viewing the garden, and participating in seasonal activities, residents may experience greater awareness of the time of day and season (Zeisel, 2007). Windows (Zeisel, 2007) and seasonal vegetation (Bengtsson & Carlsson, 2006) are ideal methods to increase resident awareness.

4.5. Safety

Garden safety is addressed similarly for residents with and without dementia. Both physical safety and psychological sense of safety are important among all residents, while more imperative security measures must be taken into account for residents with cognitive impairment. Three safety considerations must be addressed: psychological sense of safety through defined space and way-finding features; physical safety by ensuring enclosed boundaries; and safety for residents with dementia through restricting views offsite. Other specific safety considerations mentioned elsewhere in this chapter refer to plant choice, visual access, glare, garden features, path design and physical accessibility.
4.5.1. Physical Safety

Physical safety for older adults is primarily achieved through ambulatory aids and rest places. Ambulatory aids, such as handrails, can increase the use of outdoor space for residents. Handrails are overwhelmingly supported in the literature as a positive addition to an outdoor space (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; Hernandez, 2007; Kearney & Winterbottom, 2006; McBride, 1999; Rodiek, 2009). These aid devices provide functional support (Cooper Marcus & Sachs, 2013; Hernandez, 2007; Rodiek, 2009), offer a place to lean (Cooper Marcus & Sachs, 2013), and facilitate better navigation of the environment for people with impairments (Kearney & Winterbottom, 2006; McBride, 1999). McBride (1999) suggests that handrails should be placed along both sides of a walkway because residents may be more physically able on one side of their body due to a health condition (e.g. a stroke). In addition to providing physical support, handrails serve the purpose of facilitating more interaction between residents and outdoor environmental features (Rodiek, 2009). For example, holding onto a handrail can stabilize a resident to facilitate the smelling or touching of a plant (Rodiek, 2009).

In outdoor settings, the most important physical safety considerations for residents with and without dementia are ones that support basic resident needs. Grant and Wineman (2007) found that basic needs, such as seating and comfort, took precedence over other design features in the outdoor space. Sitting is one of the most common activities performed outside by older adults in a long-term care facility (Hernandez, 2007; Rodiek, 2009). Sitting is also important to facilitate use of the entire space through providing rest areas for residents’ comfort (Brawley, 2007; Cooper Marcus & Sachs, 2013) and physical safety (Cooper Marcus & Sachs, 2013). It is imperative that the right type and enough seating be available to support the walking abilities and physical impairments of residents.

4.5.2. Sense of Safety

Psychological sense of safety can restrict residents’ comfort in using and enjoying outdoor environments. Cooper Marcus and Barnes (1995) state that gardens need to be designed to increase feelings of safety to counteract common sentiments of
confusion and anxiety. A calming environment can be achieved through a clearly defined space with way-finding and destinations, secluded pocket spaces for residents to be alone, and defined boundaries of the outdoor environment to create a sense of security.

Sense of safety can be increased through way-finding cues to improve resident navigation. This can be established by incorporating signage (Heath, 2004) and a constantly visible re-entry door (Kearney & Winterbottom, 2006). From the interior, doors should be strategically placed so that they are visible throughout the space that extends into the garden (Rodiek, 2009). Door visibility will help encourage use and increase perceived sense-of-safety if residents are visible from the indoor common space (Rodiek, 2009). A view of the door from the entire outdoor space may also increase sense of security for residents (Rodiek, 2009). Lighting and plants in the space that fall either higher or lower than residents' bodies enables a complete view of the space and of residents within the space, increasing safety and surveillance potential (McBride, 1999).

Pocket spaces in the outdoor environment enhance residents’ choice and ability to feel secure in that setting. To increase resident ease, the garden layout needs to have clear and well-defined spaces. A quiet garden ambiance with soothing nature sounds and sensory stimulation can quell the anxiety of residents. By creating more than one type of micro-space within the environment, residents have the choice of where to spend their time. Grant and Wineman (2007) found that those who used the garden space tended to either make use of the area by the entrance or another far from the entrance—the former being more social and the latter more private. These two settings provide options to become a part of either an engaging or quiet environment. Residents can be immersed in social interaction or secluded in a private area, which increases their sense of safety by choosing an environment that suits them. Numerous small and independent garden spaces give residents nearby destinations and reduce the need to travel to find outdoor space (Kearney & Winterbottom, 2006).

Thirdly, the boundaries that are created within a space guide, contain, and impact residents’ sense of security and actual security within a space. Boundaries dictate which space is for resident use and which belongs to the wider community (McBride, 1999). Mooney and Nicell (1992) describe how boundaries must
inconspicuously guide residents in an outdoor environment. By enclosing the garden, the
design of the garden ensures that resident attention is on what is within the garden and
not what is outside it (Cooper Marcus & Sachs, 2013). Views offsite can be stressful for
residents with dementia and create opportunities to elope (Zeisel & Tyson, 1999). While
some residents can enjoy views offsite without issue, enclosing the garden increases
safety and reduces anxiety for others (Zeisel & Tyson, 1999).

Residents' feelings of psychological sense of safety can be increased outdoors
through ensuring proper boundaries, numerous and defined pocket spaces, and
methods to way-find and see the access door from both the indoors and the outdoors.
For residents without significant dementia, views off-site can be stimulating, provide a
visually and physically enclosed space, and increase safety and sense of safety. Unique
pocket spaces offer numerous destinations in which to spend time. This helps residents
feel more at ease by providing their ideal type of outdoor environment.

4.5.3. Safety for People with Dementia

Safety and security precautions are necessary for residents with dementia
(Cooper Marcus & Sachs, 2013; Zeisel & Tyson, 1999). From a physical design
perspective, this is typically achieved through providing a fenced-in area to prevent
resident elopement and injury. While residents can fall and hurt themselves in any indoor
or outdoor setting regardless of its design, there are a number of steps that can be taken
to mitigate the risk of falls and injury. The first is through providing enclosure to reduce
the risk of elopement and the second is through ensuring staff are able to monitor
residents. There are other considerations that include paths and doorway design. These
are beneficial for all residents, not only those with dementia, and are therefore discussed
further on in the chapter.

Ensuring enclosure for residents with dementia thwarts one of the most serious
threats to residents’ safety and well-being—elopement. There are a number of ways to
enclose a garden that includes fences and building sides (Zeisel & Tyson, 1999). Cohen-
Mansfield's (2007) survey of 320 special care unit outdoor spaces found that over 75%
of these spaces were courtyards, over 50% were patios, and evidently some facilities
offered both. Fences are frequently discussed as a method to establish security (Hoover,
In long-term care settings, secure environments are established by using a number of different material methods. Of the facilities surveyed by Cohen-Mansfield (2007), 46% were contained using a wooden fence, 37% by the building edges, and 31% with a chain link fence. While the literature does not endorse one particular building method, Cooper Marcus and Sachs (2013) suggest that walls be considered as the primary enclosure method for people with dementia. A fenced-in garden may feel more constricting, especially as the fence would need to extend approximately 8-feet high to prevent elopement (Cooper Marcus & Sachs, 2013; Zeisel, 2007). The fence would be especially noticeable because this is not a common height among everyday fences. However, design strategies can be used to disguise fences (Cohen-Mansfield, 2007; Cutler & Kane, 2006; Zeisel, 2007) and their design can make residents feel safer (Zeisel, 2007). Zeisel (2007) explains that the garden enclosure can, “still feel friendly and empowering—as if they are keeping dangers out, rather than restricting the person’s freedom” (p. 30).

Staff members are typically concerned about outdoor safety for residents with dementia (Bengtsson & Carlsson, 2006; Cohen-Mansfield, 2007; Heath, 2004). Family members (Heath, 2004) and staff do not feel comfortable leaving residents outside unattended (Bengtsson & Carlsson, 2006; Heath, 2004). Cohen-Mansfield (2007) found that of over 300 facilities, the majority of garden spaces (69%) considered staff accompaniment to be the primary safety measure instead of other measures to enhance safety (e.g. security monitors, fences). Without better monitoring, staff and organizations are inclined to restrict outdoor use in favour of preserving resident safety and security (Cutler & Kane, 2006; Grant & Wineman, 2007; Hernandez, 2007). By providing an expansive view of the outdoor environment, care staff are able to keep an eye on residents periodically without completely abandoning their other duties. Staff accompaniment outdoors is time-consuming, expensive (Cohen-Mansfield, 2007), and care staff are often engaged in other work (Heath, 2004). By educating staff on the benefits of spending time in nature, it may increase staffs’ intent to provide residents with access (Grant & Wineman, 2007; Kearney & Winterbottom, 2006). In addition, access can be increased if the design features within the environment support the safety needs of residents (Cohen-Mansfield, 2007) and if the layout of the environment facilitates easier monitoring (Bengtsson & Carlsson, 2006; Cooper Marcus & Sachs, 2013). With a
design that specifically supports the physical, psychological and physiological needs of residents in the environment, residents would become more capable of independently accessing and enjoying the environment without assistance. This would likely lead staff and family to feel more confident empowering residents to come and go in the outdoor space without constant supervision. An outdoor environment that is safe and contained reduces residents’ risks, while maximizing their independence (Kwack et al., 2005).

Safety in an outdoor long-term care environment is of the utmost importance. Psychological sense of safety is established through a clear layout, visibility throughout the site, and pocket areas that address different resident needs. Physical safety is developed through handrails and other physical aids that support residents’ impairments as well as appropriate seating at frequent intervals to enable full use and comfort within the space. For residents with dementia, additional safety considerations include an enclosed space to mitigate risks and increase visibility for residents and for staff to clearly survey the site from inside and outside.

4.6. Visual Access

There are three visual access concerns that must be addressed to ensure easy use of the space, visual understanding of the space, and resident safety within the space. The three visual considerations are views from the interior, views within the garden, and restricting views offsite. Especially for residents with dementia, the more legible the visual environment is to navigate, the more independent residents can be. These visual access features use outdoor visibility and the interior and exterior connection to entice resident use of nature environments.

Garden visibility provides an important connection to nature for residents living in long-term care settings (Kearney & Winterbottom, 2006). Residents appreciate window views of nature (Burton & Sheehan, 2010; Kearney & Winterbottom, 2006). Window views have the added benefit of increasing outdoor usage (Rodiek & Lee, 2009). Some residents may not be capable of visiting outdoor space due to health and frailty conditions (Rodiek, 2009). Even if not used frequently, knowing outdoor space is available can have a passive psychological effect on older adults (Cranz & Young,
For residents with dementia who require enhanced environmental support to navigate their environment, there are a number of considerations that can make spaces more desirable and accessible. Views enable residents to take part in the benefits of nature and can improve residents’ ability to venture outdoors. Design guidelines found in the literature describe the best approach to implementing views of nature: through the placement and style of windows and doors in the transition zone that connect the indoors to the outdoors.

For residents living in a long-term care environment, there are several ways to improve their relationship to the outdoors. According to Rodiek (2009), the area that connects the indoors and the outdoors is termed the ‘interface’. The interface is integral to achieving successful use of the outdoors and is created by bridging the outdoors and indoors primarily through windows (Kearney & Winterbottom, 2006; Rodiek, 2009; Rodiek, 2009) and doors (Chalfont, 2008; Rodiek, 2009). Proximal areas are also part of the interface. These include sitting places where residents can see through windows (Rodiek, 2009). To obtain the greatest possible benefit, windows need to be situated low enough to accommodate seated residents and wheelchairs (Cooper Marcus & Sachs, 2013; McBride, 1999). For a person who is bedridden, window placement and height can be strategically placed to enable an outside view that stretches from the ground to the sky (McBride, 1999). Less common window environments, such as atria and greenhouses (Rodiek, 2009) give an immersive experience of viewing nature while still indoors. Views from the interior enable residents—who cannot or do not wish to go outside for various reasons (e.g. illness, weather)—to partake in the benefits of nature.

Visual access improves residents’ ability to see features within the outdoors that interest them and empowers them to choose whether or not they wish to visit (Chalfont, 2008). Greater garden visibility entices residents to visit (Rodiek, 2009). The literature points to a need to strategically position the garden where it will be clearly visible from inside the building (Chalfont, 2008; Cooper Marcus & Sachs, 2013; Zeisel & Tyson, 1999). Windows should have strategic views of nature that are arranged to frame different garden elements (Cooper Marcus & Sachs, 2013; Kearney & Winterbottom, 2006). The garden should contain desirable destinations to entice residents to visit (Grant & Wineman, 2007). In this way, residents are more able to observe other residents visiting the garden, and to observe activities in the garden. This may increase
the likelihood that they will visit and partake in activities in the outdoor space (Cooper Marcus & Sachs, 2013).

Residents with dementia may not be inclined to go to an outdoor environment because it is unfamiliar to them. Residents who cannot see the outdoor space may say “no” when asked to visit (Chalfont, 2008). They may not know which space is being referred to, they may be unaware that they regularly visit (Chalfont, 2008), or they may think that venturing outside will make them feel cold (Gibson et al., 2007). Cohen-Mansfield (2007) found that of her sample of 320 long-term care facilities, 24% of home representatives reported that residents did not go outdoors because they were not used to it. It is also not uncommon for residents to give various reasons to not go outside that may not be based in reality (Chalfont, 2008). Therefore, the more visibility a resident has of the garden, the more familiar it may become and the more they may want to visit. Also, it would be helpful to create a schedule within the residence whereby residents regularly visit the outdoors to make it a part of their daily routine (Chalfont, 2008).

Visual access is important for residents with dementia (Chalfont, 2008; Cooper Marcus & Sachs, 2013). Creating opportunity for a clear and simple succession—from seeing the garden to accessing it—may thwart the cognitive impairment that impacts residents’ ability to reach the garden. Zeisel (2007) explains that there must be a simple and clear layout where residents do not need to go to another part of the building to access a space that they can see out a window elsewhere. The door to outside space needs to be an accessible distance from the windows in order to connect residents successfully to the outdoors (Chalfont, 2008). In many cases, the thought process required to independently reach the outdoors may be prohibitive for residents with dementia. A resident must be able to see the outdoor space; determine that he or she can visit it; find the door; and maneuver his or her way out, which poses a difficult list of tasks for residents with dementia (Zeisel, 2007). This is especially true if there are doors that do not clearly indicate where they lead. With a visually legible environment geared to helping residents reach the outdoors, residents with dementia can be empowered to use the outdoor space more effectively and more often.

Once residents reach the outdoors, the environment must still support their need for visual clarity. Visual access strategies that need to be taken into account are:
features that can help residents visually identify items, places, and paths to better navigate within the garden. They enable residents to negotiate the environment with greater confidence and with less confusion because residents are able to see what is around them with greater accuracy. This includes reducing risk through incorporating colour and contrast to features in the garden. For example, to improve depth perception, the colour of the tables and chairs should contrast with the colour of the flooring material (McBride, 1999). The appropriate type of flooring should be smooth (Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006) and the path colour should be distinct from the garden and grassy areas (McBride, 1999). These are some of the considerations with respect to visual access. Way-finding landmarks can help residents better navigate outdoor space (Chalfont, 2006; Rodiek, 2009; Zeisel & Tyson, 1999). One of the main ways that way-finding can be established is through ensuring visibility throughout the entire site (Chalfont, 2008). Garden features viewed throughout the entire site (e.g. garden door), and minor landmarks, can facilitate way-finding and entice residents to keep moving throughout the site (Zeisel & Tyson, 1999).

In order to contain residents in the outdoor environment, garden sites need to ensure that the space is enclosed (Cohen-Mansfield, 2007). In many cases, enclosure includes limiting views offsite. Cohen-Mansfield (2007) found that in dementia gardens, resident views encompassed primarily a view of the fence (41%). The most common off-site view was of a suburban neighbourhood (30%) (Cohen-Mansfield, 2007). There are conflicting recommendations of whether views offsite benefit residents. Views beyond the garden can increase interest in visiting the space (Rodiek & Lee, 2009) due to the activity that can be viewed offsite, and can create a sense of belonging to the larger community (Cooper Marcus & Sachs, 2013). For residents without dementia, these views can provide a sense of normalcy and interest that are valuable. However, as previously mentioned, when designing an outdoor space for residents with dementia, views offsite can create a safety hazard.

When designing for cognitively impaired residents, there is a degree of risk associated with providing an offsite view that could entice residents to reach something within that view. There are instances where offsite views are beneficial; for residents who lived rurally throughout their lives, views of fields may be calming (Zeisel & Tyson, 1999). In addition, views of moving cars and of daily activity offsite provide a level of
interest and stimulation that is sometimes recommended for residents with dementia (Cohen-Mansfield, 2007). However, serious consideration must be given to the type, location and extent of the view. Views can precipitate anxiety among residents (Zeisel & Tyson, 1999). Zeisel (2007) suggests restricting views offsite, because while eloping may not be an issue with some views, safety is of the utmost importance for residents. By restricting views offsite, it will help quell staff fears and incite increased access and independence (Zeisel, 2007). It is better to err on the side of caution when designing for residents who rotate frequently in long-term care facilities. There is no way to predict which views will incite elopement attempts among residents.

Long-term care facilities primarily use plants and fences to enclose outdoor space (Cohen-Mansfield, 2007). In many cases, an eight-foot fence is recommended to prevent elopement (Cooper Marcus & Sachs, 2013; Zeisel, 2007). As a result, residents may feel trapped by fences that resemble prison walls. To remedy this situation, fences can be successfully concealed to reduce feeling contained. Mooney and Nicell (1992) suggest providing inconspicuous yet defined boundaries that guide residents throughout the outdoor space. When fences are used, they can be disguised to prevent elopement attempts (Cohen-Mansfield, 2007; Zeisel, 2007). Camouflage, using plant materials and other methods of disguise, can prevent residents from viewing features offsite (Zeisel, 2007). Another strategy is to attach an inward hanging trellis to a fence, which prevents residents from climbing over the barricade and masks the traditional fence appearance (Zeisel & Tyson, 1999). Unfortunately, to prevent compromising resident safety, strategies to mask the fence are sometimes overlooked in favour of completely barring access to a garden space (Cutler & Kane, 2006). With the appropriate fence height, design, and camouflage, residents can freely use outdoor spaces without the risk of elopement.

The use of outdoor environments can be successfully improved with visual access into the space, visual access within the space, and visual restrictions outside the space. Especially for residents with dementia, visual access informs residents of the garden’s existence and entices residents to use the space. Within an outdoor environment, visual considerations create clarity for residents, minimize risk, and increase use. Design of the interface improves knowledge of the outdoor environment and connects the indoors to the outdoors; visual access within the space increases
resident independence and reduces risk; and an enclosed site without views ensures safety for all residents.

4.7. Seating

In both the dementia specific and general literature, many researchers suggest that an outdoor space should have seating at frequent intervals (Cooper Marcus, 2007a; Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006; McBride, 1999; Rodiek, 2009). More specifically, some authors suggest that seating should be located around every 15-feet (Cooper Marcus, 2007a; Cooper Marcus & Sachs, 2013). There are a number of seating types defined in the literature. The outdoor environment should offer comfortable seating (Kearney & Winterbottom, 2006; Rodiek, 2006; Rodiek, 2008; Rodiek, 2009) with cushioned support and armrests (Cooper Marcus & Sachs, 2013; Rodiek, 2009). Ultimately, the furniture must ergonomically fit to residents’ bodies (Chalfont, 2008; Diaz Moore, 2007). A few authors suggest movable (Cooper Marcus & Barnes, 1995; McBride, 1999; Rodiek, 2009) and lightweight furniture (Cooper Marcus & Sachs, 2013; McBride, 1999) to create areas that are more flexible for conversing or choosing where to sit (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; McBride, 1999). While some of the authors stress that lightweight options must not be easily overturned (Cooper Marcus & Sachs, 2013), other authors raise the concern that this type of furniture reduces support, increases unsteadiness, and augments the risk of falling (Mooney & Nicell, 1992; Brawley, 2007; Chalfont, 2008). In studies of residents with dementia, opponents of lightweight furniture recommend solid and heavy alternatives (Brawley, 2007; Mooney & Nicell, 1992). Other unmovable seating strategies include fixed seating (Cooper Marcus & Barnes, 1995; Zeisel & Tyson, 1999). In many cases, authors suggest either choosing furniture on a case-by-case basis (Chalfont, 2008) or providing numerous options for residents to choose from (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; Zeisel & Tyson, 1999).

In terms of furniture arrangement, seating that is grouped together should be placed at angles that promote face-to-face interaction at the appropriate distance for conversing (Cooper Marcus & Barnes, 1995). Seating should also face interesting and varied viewpoints (Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006;
Rodiek & Lee, 2009). The existing literature suggests providing numerous options to suit various seating preferences (Cooper Marcus, 2007a; Diaz Moore, 2007; Rodiek, 2009). In addition, it is suggested that the size of seating areas should correspond to their proximity to the entry door(s). Rodiek (2009) suggests providing group seating areas closer to the door(s) and private seating areas further away. This creates secluded and quiet environments for alone time and social areas near the entrance for interacting.

### 4.8. Path System

A walkable space is important for residents and the design of the path determines residents’ ability to navigate without obstruction and confusion. Cohen-Mansfield (2007) found that 25% of participating special care unit facilities had general accessibility issues with outdoor space. Especially for residents with dementia, walking is a primary activity (Mooney and Nicell, 1992). Chief among the guidelines for outdoor space is the design of a clear, looped path layout (Chalfont, 2008; Diaz Moore, 2007; Hoover, 1995; Kwack et al., 2005; Zeisel & Tyson, 1999). An improper path material, inaccessible path, and convoluted layout all influence residents’ ability to use an outdoor environment and will affect their overall experience within the space. In order to ensure appropriate design, many authors suggest a hierarchical path system; accessible path size and materials; visual cues for flow of movement; and in some cases, different levels of difficulty.

For long-term care environment residents with and without dementia, the path network should be clearly defined while still providing different options of where to go and what to do (Chalfont, 2008; Cooper Marcus & Sachs, 2013; Rodiek, 2009; Zeisel & Tyson, 1999). Since residents may not be able to process intuitive cues in the environment, the garden needs to have a simple and comprehensible layout (Zeisel, 2007). A simple looped pathway system is often used in this type of setting as it permits continuous walking and limits dead ends (Cooper Marcus & Sachs, 2013). Looped pathways also enable confused residents to walk unsupervised (McBride, 1999). An appropriate design includes a hierarchy of pathways (Cooper Marcus & Barnes, 1995) whereby a primary path forms the walking loop and secondary paths provide different route options while ultimately maintaining the integrity of the loop (Zeisel & Tyson, 1999).
Shorter paths can be arranged to break away from primary paths at a 90-degree angle to reduce confusion (Zeisel & Tyson, 1999). Varying route lengths provide choice and satisfy different resident needs (McBride, 1999; Rodiek, 2009). Secondary paths can provide shortcuts for frail residents and guide garden users towards seating areas, quiet nooks, and features of interest. With careful placement, focal features help residents navigate a path network and orient themselves within the space (McBride, 1999).

Major and minor routes can be distinguished by using different planting types around that area (Zeisel, 2007), and by using a narrower path to differentiate a minor path from a major path (Zeisel & Tyson, 1999). Secondary routes in a path network can also be distinguished by using a different path colour or material (Zeisel, 2007; Zeisel & Tyson, 1999). The paths’ primary route should begin near the entrance of the site for clarity (Zeisel, 2007) and should connect to the interior of the building (Chalfont, 2008; Zeisel & Tyson, 1999). Along the way, there is ample opportunity to incorporate landmarks, new routes, and places to re-join the interior environment (Zeisel & Tyson, 1999). A loop that meanders shifts older adults’ focus in the direction of focal features and views (Cooper Marcus & Barnes, 1995).

The material and design of the path network is described thoroughly throughout the literature. The type of surface used as the path material must be smooth (Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006) because loose materials are difficult to negotiate with wheelchairs (Cutler & Kane, 2006). The path must be wide to accommodate users who walk past one-another (Zeisel & Tyson, 1999), require assistance, walk side-by-side, are seated in wheelchairs, or pushed on gurneys (Cooper Marcus & Barnes, 1995). To increase visual safety, Rodiek (2009) suggests a clear, noticeable edge or boundary along the sides of the path. This can be incorporated using a distinct colour and/or a raised edge along the route. In order to reduce glare, careful attention must be given to tinting glare-susceptible paths (Cooper Marcus, 2007b; Hernandez, 2007; Rodiek, 2009) and avoiding high contrast paving patterns (Kearney & Winterbottom, 2006). Other recommendations include using rounded corners along pathways to prevent walking aids from falling onto softer ground (Murphy et al., 2010). The pathway design should include ramps with an appropriate pitch and only small 4-inch steps for older adults, where appropriate (McBride, 1999). Overall, path barriers in the outdoor environment must be eliminated (Kearney & Winterbottom, 2006).
Within the garden, features that create physical barriers for some residents can create opportunities to maintain functional abilities for others. A few authors suggest providing more difficult features in the physical environment in order to give residents options in lieu of only providing for minimal physical abilities (Chalfont, 2008; Cooper Marcus & Sachs, 2013). Incorporating both ramps and stairs, for instance, provides different levels of difficulty that challenge more mobile residents to maintain their functional abilities and competency (Chalfont, 2008; Hoover, 1995). The ecological theory of aging, by Lawton and Nahemow (1973), expresses the important balance between a person’s competence and the support of their environment. If the environment undercompensates or overcompensates for residents’ abilities, they experience negative behavioural effects. In response, the environment can be molded to fit residents’ needs by providing numerous physical options (McBride, 1999; Hoover, 1995). While numerous difficulty levels can provide appropriate environmental-press for residents without significant cognitive impairment, residents with dementia could uncomprehendingly attempt something beyond their difficulty level. Hoover (1995) suggests that options for residents to challenge themselves should only be offered to residents with early-stage dementia. Other authors suggest maintaining consistent press through a level path network (Cooper Marcus & Barnes, 1995; Grant & Wineman, 2007) that avoids inclines and declines (Grant & Wineman, 2007) and has good traction (Cooper Marcus & Barnes, 1995). One of the benefits of a level garden space is that all areas are visible to users at all times (Cooper Marcus & Sachs, 2013). This is an important consideration when accommodating residents with cognitive impairment who are easily confused. While paths are integral to easy movement for residents, one author suggested that open grass spaces should also be available for resident use (Heath, 2004). In a study of residents with and without dementia by Heath (2004), respondents desired more open space with grass for picnicking with family. Therefore, this may be an option for residents with high physical abilities who are able to navigate uneven and unsteady terrain.

Paths make the outdoor environment navigable for residents to experience and participate fully in everything that an outdoor garden space has to offer. By providing primary and secondary pathways, residents can move without confusion throughout the entire space. The literature describes the need for way-finding cues, and an accessible,
looped pathway system. In residential homes where residents using outdoor space are high-functioning, various difficulty features may be included to give residents options to maintain existing abilities, but this is not appropriate for residents with significant cognitive impairment. According to the literature, the environment needs to be clearly laid out and promote use of the site and its features through an accessible and supportive path network.

4.9. Plants

Specific consideration should be given to the layout of plants and plant types used in the long-term care environment. Older adults positively respond to lush vegetated surroundings with a diversity of carefully selected plants (Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006). In general, residents prefer more greenery than hardscape in their outdoor setting (Cooper Marcus, 2007a). In a study by Burton and Sheehan (2010), residents cited the garden’s appearance (e.g. attractive plants) as most influential to their well-being within a garden space. Designing an appropriate plant habitat for long-term care facility residents entails plant selection and placement that provides visual clarity, maintains resident safety, avoids disruptive shadows, contributes sensory and reminiscence benefits, and provides pleasant views.

Certain design strategies make plants more visually legible and physically accessible for residents. Plant selection and placement greatly affects resident safety and comfort. Knowing the population that will use an outdoor site is important when making choices about flora. The most important safety consideration for residents with dementia is choosing plants that are non-toxic (Hernandez, 2007; Kwack et al., 2005; Zeisel & Tyson, 1999). Plants near the entry doors ensure that residents who cannot travel far into the space get an immersive experience (Cooper Marcus & Sachs, 2013). When planning garden beds, visual strategies include grouping plants of a monotone colour. Planting beds that contain flowers or plants of one colour are easier to discern than beds with many multi-coloured plants (Kwack et al., 2005). In addition to plants of a singular colour, older adults’ eyes can more easily discern warm hues than cool-coloured hues; therefore, flowering plants in red, orange, and yellow are the most appropriate (Cooper Marcus & Sachs, 2013; Hernandez, 2007; Kwack et al., 2005;
McBride, 1999). Strategies to make the garden more physically accessible for residents includes using raised planters to make gardening activities more physically accessible and comfortable for residents (Hernandez, 2007; Kwack et al., 2005; Zeisel & Tyson, 1999). Raised planters permit gardening while preventing strain and general discomfort associated with bending and reaching (Cooper Marcus & Sachs, 2013). Raised planters at seated height are becoming commonplace in long-term care facility gardens. Cutler and Kane (2006) evaluated 40 facility gardens and found that over half contained raised planters. In addition, ground level plant beds along walkways increase practicability for residents seated and in wheelchairs to touch and view plants (Cooper Marcus & Sachs, 2013).

To ensure optimal safety, medium-sized plants must be situated strategically in a garden space to avoid blocking the view of residents within the garden (McBride, 1999). Tall plantings can be useful along the perimeter to mask a fence (Cooper Marcus & Sachs, 2013). Plants can be placed strategically to create a greater sense of privacy and seclusion for residents. However, while it is important that plants must be included in resident views, they must not block visibility of the site for either residents or staff. In design recommendations from an older adult housing project, Cranz and Young (2006) indicated that full-foliage flora, trees and plants are capable of shaping space and buffering sound from other garden users and nearby windows. Plants can also soften noise reverberation within the garden by buffering against solid wall surfaces (e.g. concrete) (Cranz & Young, 2006). Natural greenery, such as bushes, can reduce noise from surrounding neighbourhoods and streets (Rodiek, 2009). Plants can also shape space to provide private and semi-private outdoor areas (Cranz & Young, 2006). Plants that reduce noise create more intimate and quiet garden spaces, allowing residents to hear both the sounds of nature and the sounds of a person speaking to them. When dealing with the organic shapes of plants, it is important to consider how the shape will affect its shadow. The shape and shadows created by plants can distress residents with dementia who misinterpret the shape as threatening (Cooper Marcus & Sachs, 2013). For older adults in general, tree branches that move with a breeze are positively recommended because they add movement to an outdoor space through shade and light (Cooper Marcus & Barnes, 1995).
Plant selection must be carefully chosen to reflect the visual needs of residents and be placed to create private and quiet spaces. Plant placement can facilitate views of the entire site, ensure that residents can properly interact with plants, and planting beds can foster interaction among residents. Safety is maintained through non-toxic plants, shielded fence views, and design for non-threatening shade. These considerations improve the ability for residents to successfully and safely use a garden site.

For residents with and without dementia, both reminiscence and sensory stimulation can be achieved through plant selection and interaction. Reminiscence and sensory stimulation can be fostered by using plants that residents have the ability to grow themselves; by incorporating plants that residents are able to experience with their senses; and by offering a diverse number of plants with different sensory properties that offer passive and active interaction within the garden.

Residents should have the opportunity to grow plants (McBride, 1999). There are functional benefits to interacting with plants. Gardening is a positive activity that can remind residents with dementia of past gardening habits. Gardening activities increase normalcy for residents and contribute to maintaining habits from before entering the long-term care facility. Gardening provides residents with active engagement to maintain their physicality and helps residents retain their existing gardening knowledge (Hernandez, 2007). It is important to consider plants that would be nostalgic for residents (Cooper Marcus & Sachs, 2013; Hoover, 1995). Even if residents cannot remember gardening, they may instinctively begin a gardening activity on their own (e.g. watering plants) (Cox, et al., 2004). In order to accumulate plants for garden use, one approach proposed in the literature is to ask visitors to bring presents in the form of plants instead of traditional cut flowers (Cranz & Young, 2006; Zeisel & Tyson, 1999).

There are sensory benefits to interacting with plants. One of the last senses older adults lose is their sense of smell (Cooper Marcus & Sachs, 2013). Conveniently, scent can be used as a strong reminiscence tool. The smelling of scented plants and cooking herbs activates olfactory stimulation (Kwack et al., 2005). Although edible plants provide a sensory benefit, residents may try eating plants not for consumption, necessitating special care to toxicity of all plants on site (Kwack et al., 2005), especially in a garden for
residents with significant dementia. In addition, it may be prudent to plant edible plants in monitored areas in case of choking.

An array of plants provides a maximized passive experience with nature (Kearney & Winterbottom, 2006). Overall, plant diversity is a coveted feature for outdoor gardens (Cooper Marcus & Sachs, 2013; Kearney & Winterbottom, 2006; Rodiek & Lee, 2009). This includes plants of various shapes (Kwack et al., 2005), sizes (Cooper Marcus & Sachs, 2013; Kwack et al., 2005), textures (Cooper Marcus & Barnes, 1995; Kwack et al., 2005) and colours (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; Hernandez, 2007; Kwack et al., 2005). Choosing plants residents would have had in their own gardens supports reminiscence (Kwack et al., 2005). Plants that are unconventional, striking, and colourful, provide interest (Rappe & Topo, 2007). A garden that exhibits seasonal variation remains interesting to residents throughout the year and helps inform residents of seasonal change (Cooper Marcus & Barnes, 1995). Plants that bloom at different times of the year maintain interest in the garden throughout the seasons (Cooper Marcus, 2007b; Hernandez, 2007; Zeisel & Tyson, 1999). Finally, greenery can attract insects and animals. Providing animal-attracting features within the garden, such butterfly-favoured plants and nesting trees for animals, offers passive activities for residents (Kearney & Winterbottom, 2006).

The design of outdoor plants for residents in long-term care settings should include variability in plant type, colour, height, and sensory properties. Plant variety increases the multi-sensory nature of the garden and provides residents with the optimal unique and beneficial experience. By ensuring a visible space, non-toxic plantings, and plants to fit residents’ sensory deficits, an outdoor environment can be well designed to meet resident needs, enhance their outdoor experience, facilitate reminiscence and sensory stimulation, and provide active and passive engagement.

4.10. Home-like & Reminiscent Environments

In recent decades, there has been a shift towards the deinstitutionalization of long-term care environments. This represents a departure from the medical model-of-care to the person-centered model-of-care (Flesner, 2009). With its origin in hospitals,
long-term care homes of the past resembled institutional environments. These long-term care facilities were unlike any ‘home’ an older adult has previously lived. Their resemblance to hospitals was not and is still not compatible with producing feelings of home. The shift towards the person-centered model-of-care entails focusing on the resident as the center of care. One major change in the paradigm shift is the appearance of the residential care environment. Older adults report that a traditional, home-like environment is important to them in long-term care settings (Burton & Sheehan, 2010). Outdoor spaces can play a pivotal role in providing a home-like and reminiscent environment for older adults.

4.10.1. Home-like Quality

As many older adults would have had garden spaces in their own homes throughout their lives, a home-like outdoor environment could increase resident familiarity and comfort in a long-term care facility. Several sources indicate that outdoor space should have a home-like design (Hoover, 1995; Cooper Marcus & Sachs, 2013; McBride, 1999). The design should be familiar for residents with and without dementia (Day & Calkins, 2002; Cooper Marcus & Sachs, 2013; Grant & Wineman, 2007), and should contain opportunities for residents to personalize the space (Heath, 2004).

Few articles discuss the importance of outdoor home-like features in long-term care environments. There is currently no concrete definition of the term ‘home-like’ (Grant & Wineman, 2007). Those who refer to the term typically describe a ‘personalized’, ‘domestic’, ‘familiar’, ‘home-like’ or ‘traditional’ environment (Burton & Sheehan, 2010; Cooper Marcus & Sachs, 2013; McBride, 1999; Rodiek, 2009). Grant and Wineman (2007) found that the words that most corresponded to ‘home-like’ for residents with dementia in long-term care facilities were “sense of familiarity, belonging, freedom and warmth” (p. 114). These words are ones that could easily relate to resident descriptions of their own homes before entering long-term care settings. When transitioning to a new living environment, it is important to maintain as much consistency as possible. This means that the homey character must extend to the exterior environment. During their earlier years, many residents would have lived in houses that included outdoor greenery on their properties or in nearby parks. Outdoor space that
resembles these environments are familiar and common for older adults and this type of design would help residents feel more at ease within a long-term care setting (Zeisel, 2007).

The appearance of outdoor spaces for people with and without dementia should be similar. Outdoor environments should resemble a garden residents would have had on their own properties—as traditional as possible (Cooper Marcus & Sachs, 2013). The garden should give the appearance of a domestic garden in terms of its content (Cooper Marcus & Sachs, 2013; Grant & Wineman, 2007) and plant assortment (Cooper Marcus & Sachs, 2013). For residents with dementia, home-like and familiar features can make the outdoor space more comprehensible (Day & Calkins, 2002). If a space is large or resembles a public green-space as opposed to a home garden, some features can help outdoor space bear semblance to a public park. Appropriate features that can contribute to the appearance of a public park include attractive park-type lighting (Rodiek, 2009), planters, gazebos, and porches for viewing the garden (Hoover, 1995). In some residential care homes, it may be useful to have more than one space, tailored for residents of different levels of cognitive and physical impairment. In these spaces, the environment must be flexible to support changes in resident needs while also providing opportunities for residents to make the space their own. This necessitates a garden that is not overly planned and leaves room for personalization, such as providing open green-space and uncultivated garden plots (Heath, 2004).

While the approach to institutional care has shifted the focus to creating person-centered environments, progress is still ongoing to develop home-like outdoor spaces. For older adults, green space would have been familiar and frequented before entering the long-term care environment. Garden spaces can be designed to include plants and home-like features that are similar to what residents experienced in their own home gardens or in nearby parks. By leaving room for personalization, residents can further cultivate the home-like feelings reminiscent of a private garden or public park.

4.10.2. Reminiscence Features

In many cases, home-like environments create reminiscence opportunities for residents. Bengtsson and Carlsson (2006) describe the value of an environment that
connects residents to their past. They explain that the environment can help residents maintain their identity through provision of seasonality, familiarity and reminiscence (Bengtsson & Carlsson, 2006). Reminiscence can be incited through the sensory stimulation of a garden (e.g. smelling of plants, seeing familiar flowers). Reminiscence can also be incited by familiar garden features that remind residents of their upbringing and of living in their own homes. While home-like garden environments are not discussed as frequently in the literature, reminiscence environments have received significant attention, especially for their merit with residents with dementia. The reminiscence potential of a garden environment can be improved with items that residents enjoy and may remember from their past. This can be accomplished through familiar plants, and with features chosen by consulting the demographic characteristics of the residents, such as their background, age, period, and cohort.

Reminiscence features are mentioned frequently in the literature and can serve numerous purposes for residents with and without cognitive impairment. First, such features attract resident interest and provide interaction opportunities. Garden features may provide significant meaning for residents or simply incite happiness because they are reminiscent of items that residents would have had in their own gardens. In Hernandez’ (2007) study, a resident asked her family member to buy a novelty Christmas item. The item became a feature in the garden space. Even though that resident did not always remember her association to the item, it brought her joy to view the item (Hernandez, 2007). Appropriate additions mentioned for residents with dementia are items residents would have interacted with prior to moving into a long-term care facility that may stimulate engrained memories (Brawley, 2001). Such features include push lawnmowers and clotheslines (Brawley, 2001; Cutler & Kane, 2006). These features not only provide passive interest, but also active participation through their use on site. Second, familiar garden features create landmarks (e.g. water features, mailboxes) for residents to navigate the space (Zeisel, 2007). However, not all familiar features evoke positive sentiments. There are different features that should be considered for residents with mild dementia or no dementia than for residents with significant dementia. It is important to keep in mind that some reminiscence features may be confusing or scary to residents with significant dementia. For example, Hernandez (2007) found that for residents with advanced dementia, a doghouse created
fear among some residents that a dog would attack them. As well, less cognitively impaired residents did not understand why their garden contained a mailbox because they understood that mail was not delivered there (Hernandez, 2007). Therefore, home-like and reminiscence features should be chosen with consideration for the dementia level of garden users. Third, knowing the background and cultural significance of certain features can be beneficial and evoke memories, such as porches and hand pumps (Cooper Marcus, 2007a; Zeisel & Tyson, 1999). There may be familiar and significant elements for a particular cultural group or for people who live in a certain region, such as windmills—a symbol of the Netherlands—that could be incorporated in some way in a home that caters to a Dutch demographic.

A home-like environment can be established through specialty features and a design aesthetic that suits a typical living environment. This consideration helps reduce the institutional feel of the setting by incorporating features that remind residents of their past. Home-like environments provide pleasant sentiments, stimulate memories, and inform residents of the time of year and the season. Though a few studies mention home-like settings in the outdoors, it is not yet a topic of significant empirical focus. Reminiscence, on the other hand, has received attention in indoor and outdoor long-term care environments. Reminiscence features can stir memories and engage residents in nature through familiar tasks. Items can be incorporated that suit the cognitive needs of residents and incongruent features can be avoided. Garden features can also suit the cultural and historical background of residents. Together, reminiscence and home-like features contribute to providing a person-centered environment that enhances resident comfort through an exterior environment that is familiar to residents.

4.11. Social Interaction

A garden environment can increase social opportunities, improve relationships, and increase residents' connection to their community. This is accomplished through the design of the physical environment, through features that entice visitors and residents to spend time in the garden, and by inviting the community into the space. The environment can provide a suitable physical layout for interaction with conversation
features, can include passive and active recreation features to foster social interaction, and can invite the community to connect through volunteering opportunities.

Consideration must be given to the desired usage of a garden space. The literature describes an ideal garden as having an array of pocket spaces of various sizes to give residents the option of where they want to spend their time and the amount of interaction they wish to have (Bengtsson & Carlsson, 2006; Cranz & Young, 2006; Grant & Wineman, 2007; Cooper Marcus & Barnes, 1995; McBride, 1999). This includes small and large areas to socialize—specifically designed with seating in small and large quantities (Rodiek, 2009). The greater the variety of pocket areas available within a garden environment, the more opportunity residents and visitors will have to find a niche to suit their needs.

A gardens’ seating and focal features impacts the ability to formulate conversation topics and have places to carry out discussions. Social interaction can improve through seating that is arranged face-to-face (Cooper Marcus & Barnes, 1995) within the pocket spaces discussed. Appropriate seating can foster social interaction among residents, family, and staff (Cooper Marcus & Barnes, 1995; McBride, 1999; Raske, 2010). Seating in the direction of views enables garden visitors to take in and discuss nearby features (e.g. birds, sound of nearby water flow) (McBride, 1999). With seating areas offered in the sun and in the shade that face different viewpoints (e.g. a bird bath) and activity centres (e.g. a fountain), residents can be poised to informally interact with others (McBride, 1999). Other common conversation starters include elements unique to nature, such as flowers (Raske, 2010; Rappe & Topo, 2007; Raske, 2010). A mailbox or a fixed vehicle promotes normalcy for residents and can stimulate conversation (McBride, 1999). The more traditional elements brought into a long-term care environment to make it authentic, the more at home and comfortable visitors will feel spending time in a long-term care setting. These features promote reminiscence conversation opportunities for residents. Some garden elements are interactive and can be used to improve communication with others, such as a shuffleboard court (Cooper Marcus & Sachs, 2013). Another suggestion to increase interaction potential is through gardening beds. Tse’s (2010) indoor horticultural program increased social opportunities for residents, expanded their social network and provided topics of conversation. Residents who participated in the group horticulture program experienced significant
improvements to their social well-being (Tse, 2010). These strategies for seating placement, items for interaction and topics of conversation help improve residents’ opportunities for social interaction.

There must be options within the outdoor environment for different groups of people to gather. Inclusion of spaces that can be used for group events, by family, and by staff, encourage more use by residents and increase interaction among all parties (McBride, 1999). Outdoor space is unique and versatile in that communal gardens can bring people together from throughout the residence, thereby increasing the number of people to meet and offering a flexible space where groups of various sizes can gather (Bengtsson & Carlsson, 2006). The potential to host family gatherings or events planned by the residence promotes normalcy of the environment and increases use of the space (Hernandez, 2007). An ideal social gathering space is an entry patio to the garden large enough to seat many people and with structures and features to accommodate various events and activities (Cooper Marcus, 2007b; Cooper Marcus & Sachs, 2013). Other large places for social interaction include areas that accommodate barbecues, parties (Cooper Marcus & Sachs, 2013; Zeisel & Tyson, 1999), waiting before mealtime (McBride, 1999), and planned recreational activities (Cooper Marcus & Sachs, 2013; Kearney & Winterbottom, 2006). Outdoor space can be connected to indoor party rooms (McBride, 1999). These are some of the ways in which the physical environment can be planned for group social interaction.

In recent years, intergenerational partnerships have become a popular topic in long-term care settings. The BC Care Providers Association (2009) totes intergenerational programming as having the benefit of “establishing relationships that help diminish the impact of declining physical and mental health on older people” and of creating communities that are “age-friendly by breaking down barriers between ages and stereotypes by one age group toward another” (p. 2). While many young people have the attention span to sit and enjoy nature, in a long-term care setting, there is often very little for a child to do. Some studies suggest incorporating features for children, such as outdoor play structures (Cooper Marcus & Sachs, 2013; McBride, 1999) and putting greens that can be used by visitors of any age (Cooper Marcus & Sachs, 2013). These features entice young people to visit and introduce sounds of laughter and children’s
voices to the garden space. In addition, these features provide residents with the passive activity of watching children play.

Developing a connection to the community surrounding a long-term care facility can be fostered through a garden space. While this area is not often discussed in the design recommendation literature, it would seem to be an important concern for older adults in long-term care environments. Long-term care residences can be isolating, “people with advanced dementia are at an even greater risk of being hidden away in nursing homes where they lose contact with, and social standing within, their community” (Chalfont, 2008, p. 145). Reaching out to the community for involvement and partnerships is important in this setting. Without community connectedness, residents can become secluded from their surrounding environment. Community connectedness can be difficult to achieve if the community members do not have a direct connection to a resident in the facility. However, through an outdoor space, residents can create a connection through gardening. Raske (2010) found that through promoting a gardening project that asked volunteers to come and help create a garden space, community connections increased significantly through having residents participate with the community volunteers to create and maintain the garden space. Another way of connecting residents to the community is by taking a few residents to a location offsite where they can be viewed in the neighbourhood (e.g. a public park) (Chalfont, 2008). This necessitates accessible public space within the community (McBride, 1999). Where appropriate, facility garden spaces should offer a view of the surrounding community to provide a visual sense of expanse (Cooper Marcus & Sachs, 2013). Residents can take in the surrounding community to increase their sense of belonging and recognize their place as part of the neighbourhood (Cooper Marcus & Sachs, 2013). However, as previously stated, this is not ideal for residents with dementia as they may try to reach somewhere offsite (Cutler & Kane, 2006). It becomes difficult to create community connectedness for residents with dementia who require high fences and shielding from offsite views.

There are numerous ways to increase the social interaction potential of an outdoor environment for residents living in a long-term care facility. Integral to creating this environment is designing many pocket spaces that serve different social needs. The proper environment gives residents the opportunity to discuss passively sourced topics
and find common ground in activities performed together. By providing numerous types of spaces, visitors can also feel more comfortable and capable of interacting with residents. This includes intergenerational ideas to bring young people to the home. Community connectedness can be fostered through programs and projects that entice the community to interact with residents in the outdoor space. Likewise, visits outside the facility can facilitate connection with the community. Through these changes, residents can experience greater social interaction and feeling of connectedness with the surrounding community.

4.12. Sensory Stimulation

The outdoor environment can be designed to be vastly unique from the interior environment, creating, on one hand, an oasis setting for rest and relaxation, and on the other, multi-purpose activity spaces for ample interaction. Cooper Marcus and Barnes (1995) describe how for older adults, noninvasive sensory stimuli can help residents shift their focus from internal struggles to an exterior restorative retreat. Outdoor sensory stimulation can maintain the attention of residents through the design of many types of gardens (McBride, 1999). Thus, sensory properties can provide both relaxing and engaging stimulation. Multi-sensory spaces can especially benefit people with dementia when designed appropriately (Chalfont, 2006). Dementia can result in sensitivity to some stimuli and can lessen informational transmitting abilities. The use of many sensory stimulation sources at once helps residents with dementia comprehend the world around them, clarify their surroundings, and increase their sense of control (Zeisel, 2007). To create an appropriate environment for residents, outdoor settings can be designed with a variety of stimulation sources that address many senses (Barnes & DCESG, 2002). Some of the many opportunities to stimulate the senses include the use of lighting, tastes, smells, shapes, sounds and views. This includes the colour, textures, contrasts and symmetry of features within the garden (Cooper Marcus & Barnes, 1995). Additionally, there are many activities residents perform inside that can benefit from outdoor stimulation. The literature recommendations for older adults fall under three areas: sensory greenery, sensory features and both passive and active stimulation.
An immersive sensory experience can be established by providing greenery at varying heights with many colours and shapes (Kwack et al., 2005). Choosing a mixture of non-toxic plants is one simple way to provide sensory stimulation within the garden space. Hoover (1995) suggests that toxicity is not as imperative among residents without significant dementia and that plants that evoke memories are beneficial at this stage. Memories can be stimulated through use of red, orange and yellow-coloured flowers, various leaf textures to see and touch, numerous plant sizes for viewing, and an assortment of pleasing smells from garden vegetation (Cooper Marcus & Sachs, 2013; McBride, 1999). Herb gardens and common scented flowers (e.g. lilac) provide ideal olfactory stimulation that may incite memories. A resident with a history of gardening would benefit from commonly planted flowers to remind them of their garden. Ideally, an array of different types of gardens should be provided to increase mental alertness through sensory stimulation (McBride, 1999).

Another natural feature commonly discussed among the literature is the use of water (Cooper Marcus & Barnes, 1995; Cooper Marcus & Sachs, 2013; Hoover, 1995; Kwack et al., 2005; McBride, 1999). Water can be used to provide motion and activity on site (McBride, 1999). Water provides a soothing sound for residents with dementia (Kwack et al., 2005) and can act as white noise, which can be restorative for older adults (Cooper Marcus & Barnes, 1995). Altering garden features to fit resident safety can be done tactfully. It is important to continue to treat residents with dementia as adults with dignified solutions that are not child-like (Hoover, 1995). An example is finding a way to provide a water feature when water may pose a risk that residents will fall, drink the water, or go in the water. A dry streambed can add ambiance to a site (Hoover, 1995) and a tempered glass panel with a rippled effect gives the illusion of a waterfall (Rodiek, 2009).

The outdoors provides a unique escape from a long-term care environment increasing positive state of being and stimulation (Bengtsson & Carlsson, 2006). Natural sensory features can include water or plants (McBride, 1999) that can also increase the home-like appearance of the outdoors. Tactile features can be touched and manipulated by residents (McBride, 1999). Kinetic sculptures (McBride, 1999) that move independently are useful not only for outdoor residents, but also indoor residents unable or unwilling to visit the outdoors. Whether natural or man-made, these should be
included at standing and seated heights to include residents in wheelchairs (Cooper Marcus & Sachs, 2013). Another stimulating and social example in this study was a home with a view of a local sports field that enticed residents, families, and friends to gather on the upper floors of the building to watch sports games (Cutler & Kane, 2006).

Sensory stimulation can be achieved through viewing wildlife (Brawley, 2001; Rodiek, 2009). This can be useful for residents outdoors and indoors and include domesticated and wild animals. Plants chosen for the site can attract wildlife and insects, such as butterflies and nesting animals (Cooper Marcus & Barnes, 1995; Kearney & Winterbottom, 2006). McBride (1999) suggests attracting wildlife that can be viewed from the indoors and the outdoors. Cutler and Kane (2006) describe an example of a social and stimulating environment derived from views of rabbits in their natural habitat. The rabbits often visited the property and provided a topic of conversation. Stimulation and visual interest can be achieved through attracting birds and other wildlife onto the property (Brawley, 2001; McBride, 1999; Rodiek, 2009). In addition, the facility could become owners of various pets. The care of rabbits can improve residents’ sense of purpose, provide a sense of enjoyment, and support visual and tactile stimulation (Rodiek, 2009).

Passive enjoyment of an outdoor sensory space involves deriving satisfaction from the garden without significant effort or purposeful directed attention from a resident. A sensory environment permits residents to take in natural sensory elements through sitting and walking and does not overwhelm them or require exertion. Kearney and Winterbottom (2006) found that among residents living in long-term care settings, the majority used the garden for passive enjoyment that included looking at nature, sitting and observing, and socializing. Passive interactions can be fostered through design of physical space and with appropriate stimuli.

The appropriate type of sensory stimulation for passive enjoyment is noninvasive and helps older adults to shift their focus from their state of being towards an outside focus (Cooper Marcus & Barnes, 1995). Among the passive experiences appropriate for residents is listening to the soothing sound of water (Kwack et al., 2005). Unobtrusive natural tactile sensory features can include plant leaves, water, soil, grass, and bark (Kwack et al., 2005). Garden features, such as birdbaths and birdfeeders, supply
passive activities for residents (Kearney & Winterbottom, 2006). Physical locations where residents can passively enjoy the garden are useful. A sense of privacy helps improve focus for conversations and greater attention for sensory pursuits (Cranz & Young, 2006). A park-like design may be useful in creating a sense of retreat. A park-like environment is more convincing when placed further from the building where residents can face inwards and not towards a fence (Zeisel, 2007). This could reduce feelings of confinement for residents unable to leave the property (Zeisel, 2007).

Active sensory engagement can be established through opportunities to be independent, interact with the environment, and connect with people in the garden. This entails participating with on-site features that actively engage residents. Zeisel (2007) explains that an outdoor environment can promote opportunities to learn and gain new memories. This is achieved through hands-on opportunities, inviting features, and regular activities scheduled outside. Another feature that increases active engagement is the incorporation of design features that entice visitors to use the space. This increases the likelihood of informal interaction and stimulation through watching and hearing others use the space. Regularly scheduled activities that are useful for residents can be conducted outdoors to add a new element of stimulation to an engaging activity. An example would be music therapy with the enhanced stimulation of nature (Hernandez, 2007). Certain types of active interactions outdoors may be more beneficial than others for people with dementia. Zeisel (2007) explains that people with dementia have trouble learning new declarative learning approaches, such as people’s names and places. They have more success, however, with procedural learning, which entails tasks that become second nature, such as brushing teeth and navigating a familiar environment. These tasks are conducted overtime through repetition of mind and body and tend to be less affected by dementia (Zeisel, 2007). Therefore, gardens used repeatedly through procedural learning can help residents maintain independence (Zeisel, 2007).

If designed appropriately, the outdoor environment can offer ample sensory stimulation. Both passive and active stimulation is possible in a garden and can be facilitated through micro-spaces to enhance resident focus within the outdoor space. Nature offers non-invasive passive stimulation that is ideal for long-term care facility residents. Water in the outdoor environment offers soothing sounds and a pleasant visual setting. A variety of plants support visual and olfactory stimulation and can also
provide tactile sensations when touched. Residents can experience active stimulation through manmade tactile features, such as kinetic sculptures placed in the garden. Viewing of wildlife and plants provides visual interest and topics of conversation in the outdoor space. Conducting scheduled activities outside can increase the sensory experience for residents while regular use of outdoor space with hands-on activities can improve retention of skills. Ultimately, there are many ways to engage and enhance the sensory properties of an environment for a resident in a long-term care facility through the design of outdoor space.

4.13. Independence

The outdoor environment is an ideal place to provide independence for residents who often have little independence while living in a long-term care facility. Autonomy for people with dementia entails the option to make choices, take chances, and agree or disagree to participation (Chalfont, 2008). Provision of destinations, views, seating options, and path routes in the outdoor environment give choices to residents who may have little choice inside (Cooper Marcus & Sachs, 2013). Bengtsson and Carlsson (2006) describe the completely different choices in the outdoor environment as an opportunity for “stimulation, and to get away and feel free” (p. 64). This is accomplished by allowing residents to be involved in the personalization of space, having a fully accessible garden to foster independence (as mentioned previously), and designing decision-making opportunities within an outdoor environment.

Independence and sense of pride are important well-being outcomes of spending time outdoors. Residents should be given the ability to maintain and contribute to the garden space, shaping its meaning for residents. Resident input in garden development may help provide a sense of ownership over the space (Hernandez, 2007). Fostering independence among residents cannot be achieved without organizational support. This support empowers resident decision-making within the garden and permits resident contribution to the maintenance of the garden. Provisions to help residents create a sense of ownership include brooms, watering implements, and garden tools to facilitate maintainence the space (Cooper Marcus & Sachs, 2013). In addition, areas for gardening, that include raised beds, allow residents to sit and garden (Cooper Marcus &
Sachs, 2013; Hoover, 1995). Especially for residents who are high functioning, a good option to improve independence is providing space for them to garden (Heath, 2004). As previously mentioned, asking visitors to consider bringing plants as gifts for special occasions will help residents develop a personalized connection with the space (Cranz & Young, 2006; Zeisel & Tyson, 1999). These types of features allow residents to exhibit their personality and skills in the environment leading to the environment facilitating exertion of independence.

Residents in long-term care facilities have gradually lost their ability to live independently. It may be hard for residents in long-term care settings to find opportunities to be independent. Accessibility within the garden and access into the space provides the option to visit the space and use it as independently as possible. The leadership staff must support residents’ autonomy by providing programs and tools to allow residents to actively contribute to personalizing and maintaining the garden space. Residents can be given the opportunity to contribute to a garden through activities they have likely done in their past, such as raking and weeding. These strategies create decision-making opportunities and facilitate independent participation in activities within the outdoor environment.

4.14. Attitudes and Culture

Although many people enjoy spending time outdoors and among nature, garden use is not desirable for everyone. There are many reasons why people choose not to visit the outdoors. Personal dispositions, history, and culture influence enjoyment. A few sources indicate the importance of attitude and culture in the design of outdoor spaces. Other literature indicates that by designing micro-spaces within the outdoors and providing many different opportunities, it will provide an array of areas residents can choose from that will suit their needs.

Resident attitudes of nature and the outdoors must be sensitively addressed (Cooper Marcus & Sachs, 2013). While certain garden elements may be pleasant for some residents, for others, features may elicit painful or stressful memories from the past. A resident who experienced a near drowning event may not want to go near water
and a resident who worked long hours picking crops to provide for his or her family may not want to actively garden. On the contrary, certain residents would have grown up participating in outdoor activities with family and friends. This increases the likelihood that, if those memories were positive, the residents would likely have continued the activities into adulthood and would still enjoy them now. Activities, such as outdoor sports, hiking, camping, walking, and gardening, can provide an affinity towards nature. Burton and Sheehan (2010) found that some residents wanted opposing elements in their long-term care environment, such as private or social settings. Therefore, an outdoor space must be designed for the many preferences of residents.

Residents of different cultural heritage may have different preferences in outdoor space and may not interact harmoniously with other residents. A study focused on culturally specific recommendations for use of outdoor space described considerations directed at older adults living in the community based on heritage. Alves, Gulwadi and Cohen (2006) found that individuals of Hispanic heritage tended to prefer socializing in a nature setting, while individuals of British heritage preferred having a friend or family member present to take in an activity, such as bird watching. In order to ensure residents feel comfortable in the space, an environment that has room for growth and change enables older adults to make the space their own (Alves et al., 2006). A concern when housing residents of many cultural backgrounds is that differing opinions may lead to animosity between residents. In a community housing project of older adults, Cranz and Young (2006) found that some residents did not understand the customs and languages of other residents, which resulted in cultural tension. Cranz and Young (2006) described a situation where a resident did not mind listening to a group of English speaking older adults painting in the garden, but found a group of Chinese older adults doing Tai Chi disruptive because of the sound of their language. Creation of pocket spaces and using plants to reduce the ability for noise to travel throughout the space can help ease the tension and enable multiple groups to gather based on their interest or cultural practice (Cranz & Young, 2006).

While enjoyment of nature can relate to experiences a person has had in his or her past, the garden experience can also be influenced by cultural conventions (Cooper Marcus & Sachs, 2013). There are specific activities and features that are simply not appropriate among some cultural groups (Cooper Marcus & Sachs, 2013). For example,
furniture placement is important for people who follow Feng Shui (Cranz & Young, 2006). There are also some types of gardens, or elements within gardens, that are perhaps more fitting for what some cultures consider a garden space (Cooper Marcus & Sachs, 2013). For example, certain plants are culturally significant or well-liked among specific cultures (Cooper Marcus & Sachs, 2013). Determining the demographics of the home and consulting their cultural norms is important, as not all features will be well received. Whether a superstition, religious belief, or cultural convention, there are many opinions of nature’s plants and animals. For example, birds can be an area of contention (Cooper Marcus & Sachs, 2013). The common raven has been historically known to represent death and disease, while it was praised in mythology for its intelligence (Raven, 2015). In addition, certain cultures consider seeing an owl as a sign of death.

A resident’s history, cultural conventions, and cohort impacts his or her ideal outdoor space and impression of various features within the garden. In order to create a garden that will suit the needs of many people from different cultures and life-histories, consideration must be given to the inhabitants of the home, whether they encompass older adults of particular ancestry, and what garden features and designs best suit their needs. Familiar features designed to stimulate memories can be chosen based on the period in time when residents would have been children or adults. Numerous pocket spaces of various sizes can serve different resident uses and can ensure that residents can find a place to suit their particular needs. Pocket spaces also enable different groups to enjoy the garden without disrupting one another. These design considerations help residents to find a space where they can comfortably spend their time.

4.15. Attention Restoration

Attention restoration is one of the most studied topics of long-term care facility outdoor space. While many studies discuss attention restoration as being a benefit of spending time outdoors for residents, few studies describe specific aspects of the garden that contribute to the restorative properties of attention restoration. One study looked at which garden features could help restore attention in this type of environment. Diaz Moore (2007) examined 5 highly acclaimed dementia gardens in the US to determine which features within these gardens contributed to Kaplan’s (1995) four
restorative properties: being away, fascination, extent, and compatibility. This was accomplished using data of the gardens’ outstanding design features as described by a panel of experts (Diaz Moore, 2007).

Through evaluating the comments from experts on the design concepts of these spaces, Diaz Moore (2007) connected these features of the gardens to Kaplan’s properties that contribute to attention restoration. Although this piece was descriptive and did not test each of these features, it provided an understanding of how to apply the properties to cultivate attention restoration. The article describes that being away can be achieved through unique stimulation and a distinct environment separate from the interior. This is accomplished through a boundary to provide enclosure that is shielded with dense plant cover to soften its presence (Diaz Moore, 2007). Fascination specifications include tree canopies that move with the wind creating soft shadowed shapes and frequent focal features such as a fountain and other engaging details (Diaz Moore, 2007). The property extent constitutes engaging stimulation (e.g. variety of plant colours, interactive features) that envelops the user in a suitable way to maintain engagement (Diaz Moore, 2007). Lastly, compatibility constitutes furniture to suit resident needs, a diverse and lush environment at many levels, and nearby washrooms (Diaz Moore, 2007).

Attention restoration is achieved through appropriate sensory stimulation in a unique and captivating environment. An outdoor setting must provide a sanctuary for residents. A restorative environment should be comprised of diverse plants, stimulating garden features at frequent intervals, and views of movement and opportunities for interaction. This must be achieved within an environment that supports the needs of users in order to enable residents to restore attention successfully.

4.16. Conclusion

While long-term care facility outdoor environments are often designed without significant consideration to more than aesthetic beauty (Barnes & DCESG, 2002), these environments have the ability to greatly improve resident health and well-being if designed appropriately for residents. The literature in this field provides design
recommendations to meet the physical, physiological and psychological needs of residents with and without cognitive impairment. Garden elements to be taken into consideration include the location and access into the garden, creation of a familiar space that supports residents’ basic needs, features that make the garden more legible and navigable, and a design that mirrors the physical and cognitive abilities of residents.

The design of outdoor environments need to provide residents with a space that—above all—supports basic needs. Residents with cognitive impairment require further imperative measures, such as mitigating the behavioural symptoms of dementia, providing safety measures to prevent harm and elopement, and creating appropriate sensory stimulation to restore attention. The cultural makeup of residents, their background, age, and cohort necessitates consideration to the reminiscence and familiar features used within the garden. The cultural makeup of older adults in long-term care facilities also necessitates pocket spaces for different groups of residents to gather and participate in cultural customs. Places to conduct traditional group activities, such as barbecues and birthday parties, increase the normalcy of the outdoor space. For residents in long-term care settings, the garden environment should resemble gardens that residents would have had on their own properties or in nearby parks. Familiarity can be established through reminiscence features and a home-like appearance. Gardens can also be designed to promote independence through active participation within the garden as well as social interaction through the design of interactive features, resident gardening areas, features that stimulate interaction, and pocket areas that create small and large group spaces conducive for interacting.

Primary concerns for the physical design of the environment entails the spatial layout of the site with respect to its proximity to residents, its physical connection to busy common areas within the home, and visibility of the outdoor space from within the residence. The geographical region of the garden space impacts the need to change the design of the plants and garden features to suit the climate. For physiological needs, the environment must provide a transition area that allows older adults to preview and adjust to the new environment comfortably through provision of physical covers, such as patios, lighting, and temperature control. Physical features that impact residents’ ability to easily transition from the indoors to the outdoors include door accessibility, door design and the number of doors. While in the garden space, residents must be able to navigate without
obstruction or confusion with a path network that is clear and continuous. In addition to the path network, navigation of the space can be enhanced through way-finding features, sensory elements to attract residents to use the path and sensory stimulation to improve attention and clarify the environment for residents with sensory deficits. The environment must be physically safe for residents through the provision of fences, appropriate surface materials and plant selection. Seating ensures that residents can safely move throughout the site with places to rest that are also places to converse and enjoy passive views of nature.

Special consideration must be given to designing numerous gardens for residents of different cognitive and physical abilities. For residents with dementia, it is important to provide an environment that does not appear child-like. It is necessary to ensure physical enclosure, no views offsite, a clear and simple layout, and features that promote positive stimulation. The physical environment must enable residents to access and enjoy the outdoor space through accessibility measures to ensure easy access into and throughout the site as well as features to challenge different levels of functional abilities. Careful attention must be given to ensure that garden elements do not produce shade that confuses or scares residents and that familiar garden features are chosen to fit the level of comprehension among residents.

Ultimately, residents can only access outdoor space with clear visibility, physical access, and physiological support. Features that contribute to physical well-being while outside include seating and overhead shelters that curb microclimates and improve the transition into outdoor space. Residents require sensory stimulation to navigate the environment and remain engaged while outside. If consideration is given to the residents that will be using the site, and the site is appropriately challenging and supportive, a garden can entice residents to visit. This supports the achievement of the greatest possible health and well-being for long-term care facility residents.
Chapter 5.

Discussion and Conclusion

5.1. Summary of Theories

The concepts, theories, and conceptual frameworks discussed in the first chapter provide an understanding of the topic of nature environments in long-term care facilities. These ideas highlight the psychosocial benefits for the residents of these facilities. Several concepts are related to supporting older adults, while others are general environment-behaviour and environmental psychology concepts. The conceptual work explored can be viewed in three categories that represent different substantive areas. The first category consists of environmental psychology contributions of environment and behaviour. The theories that fall under this category are: biophilia hypothesis, theory of affordances, and field theory. Within this category are the ecological psychology distinctions that describe the intrinsic connection of nature and resulting behaviour, individual assessment of the environment, personal history and preferences, and intuitive environmental use. These concepts provide the foundation to comprehend the basic relationship between humans and nature. The second category is the impact of nature on resident outcomes. This includes numerous theories that describe well-being and health benefits that can be accrued through access to nature. The theories in this category are: overload and arousal theory, attention restoration theory, stress recovery theory, theory of supportive garden design, and the prosentia hypothesis. These concepts promote nature as a means of restoring or enhancing a particular aspect of resident welfare. The third category looks at benefit-potential. This category includes concepts, tools and models that influence garden use and benefit: the ecological theory of aging, garden-use model, PLANET, seniors’ outdoor survey, and the Alzheimer's garden audit tool. These concepts and tools promote health and well-being among residents by ensuring that support is available for residents to obtain the greatest
possible benefit while avoiding dissatisfaction and negative repercussions. Overall, these concepts describe important aspects of the topic. However, the scarce empirical literature and lack of additional theoretical contributions to the many nature-related benefits reflect a dearth of meaningful knowledge to inform the planning and design of long-term care facility nature environments.

5.2. Limitations in the Conceptual Work

The body of conceptual contributions to this topic is still in its infancy. Limitations include a small number of studies focusing on outdoor environments that provide an inadequate basis to formulate sound conceptualization. In addition, there is a need to develop conceptual work to focus on the benefits of nature and to address the gap between theory and practice.

There are numerous nature benefits proposed in the literature and a limited number of conceptual theories pertaining to benefit areas. There is currently insubstantial evidence to formulate conceptual theory. Only attention restoration and stress have yielded substantial theoretical production. The theory of supportive gardens, attention restoration theory, overload and arousal theory, and stress recovery theory have stress reduction as an outcome measure of time spent in nature. These four concepts assert that urban environments can be stressful and over-stimulating for humans, compared to nature environments. Stress is evidently a significant concern within the literature. Not enough empirical research has been conducted in other areas to assert explanatory relationships or support creation of conceptual distinctions. Much of the literature is still exploratory in nature. Diaz Moore (2007) similarly emphasized the need for greater theoretical comprehension of nature’s influence. A few nature-related areas of study have received evaluation in the interior environment. The topics of reminiscence, home-like character, and sensory stimulation have received greater attention indoors. In addition, certain benefit areas have received greater study among other adult populations. More conceptual distinctions need to be established in the context of outdoor environments in care settings for older adult residents.
The wide range of health and well-being findings in this field of study contributes fragments of knowledge to the garden design areas. The scope of the findings make practical implementation difficult—especially with a lack of standards and regulations to inform design and availability of outdoor space in long-term care facilities. Other authors have also expressed this concern (see Cutler & Kane, 2006; Hernandez, 2007). Implementation is at the discretion of the designer, resulting in inconsistent conceptual basis for garden contents and benefit potential. With a succinct conceptualization from each benefit area, a working definition could be formulated with a clear conceptualization of benefits and their method of execution. Well-defined evidence-based benefits associated with design strategies and solutions are imperative to bridge the disconnect between theory and practice.

Though the conceptual work in this field is currently limited, there are several environmental audit tools and models available that can help identify existing barriers and provide refinements that can be made to an outdoor space. Rodiek and colleagues’ (2014b) *Seniors’ Outdoor Survey* and Cooper Marcus’ (2007) *Alzheimer’s Garden Audit Tool* both use checklists to evaluate design and maintenance of the physical environment, but do not approach organizational level factors. Rodiek et al.’s (2014b) tool deliberately focuses on the micro-level resident experience and Cooper Marcus’ (2007) tool evaluates the functional success of a garden for residents. Another approach, Chalfonts’ (2007) *PLANET* tool, uses a checklist to assess the design of the social, physical and natural environmental features. *PLANET* also evaluates an individual’s ability to engage with nature by assessing their physical, emotional and sensory capabilities (Chalfont, 2007). Grant and Wineman’s (2007) garden-use model is the only conceptual model that incorporates factors that impact garden use. These factors include organizational policy and employee attitude in addition to a checklist of physical features. The model is specific to spaces for residents with dementia and seeks to enable use of outdoor settings. Grant and Wineman’s (2007) model defines the specific features that pertain to each level of influence, and provides sample solutions. While each model and tool is useful, the literature indicates that access is the most critical component to resident use of outdoor space. Without access, residents cannot benefit from a nature environment. The access factors discussed in the garden-use model match what was determined in this review with respect to barriers to garden use.
Defining a model that focuses on access barriers for residents (e.g. organizational, physical, psychological, physiological) would clarify how access can be supported. Conceptual distinctions are necessary to consolidate the findings once exploratory research has identified explanatory relationships.

5.3. Key Findings from Empirical Evidence

The literature includes a wide-range of nature benefits and recommendations to support optimal use and benefit of outdoor space. While this topic is poorly theorized, the empirical support for gardens is growing. Overall, there are a few common substantive threads in the extant literature in this area. First, there is a concentration on selective nature advantages: namely behavioural symptom reduction, stress alleviation, attention restoration, and perceived resident benefits. Second, each benefit area is not mutually exclusive. Many of the design and access considerations used in nature settings can impact more than one aspect of health and well-being. There is significant benefit overlap associated with a well-designed space. Third, nature benefits are more impactful to some residents than others. Fourth, access barriers originate from numerous sources and can restrict the use of outdoor space. Finally, on the issue of resident safety—the empirical literature has not yet determined whether safety should be managed through monitoring or through physical design.

There are several key findings that contribute to the endorsement of outdoor space. Perhaps the most persuasive and compelling argument for providing access to outdoor environments is the perceived benefits from the residents themselves; an expressed appreciation of spending time outdoors. Studies have found that outdoor conditions have impacted well-being to a greater extent than indoor spaces, virtual settings, and urban environments. True nature experiences can be as influential as multi-sensory environments (e.g. Snoezelen rooms) at providing sensory stimulation. Nature settings hold great potential because nature is a familiar and traditional environment for older adults. The more home-like a long-term care residence appears, the more comfortable residents will feel. The current literature primarily address issues related to residents with dementia. A large proportion of residents in long-term care facilities have been diagnosed with Alzheimer’s or another form of dementia. The most
studied topics found in the literature are that of adverse behaviour reduction, attention restoration and stress reduction. Similarly, Diaz Moore (2007) found that stress was the most common variable studied while Whear et al. (2014) found that agitation was one of the most studied outcome measures. Behavioural issues and negative repercussions among residents with dementia influence staff ability to manage residents. It is clear why this topic has received significant study. Behavioural issues represent a visible negative outcome of an unmet need or desire and are one of the most challenging issues in long-term care settings.

The literature indicates that many health and well-being benefits can be attributed to the same repeated garden design strategies. Addressing one aspect of environmental design can influence numerous aspects of health and well-being. For instance, shelter provides the benefit of shade, comfort, and light-level adjustment. Shelter can therefore increase the potential to feel safe in the environment, provide a more comfortable microclimate, and offer an appropriate transition space to adjust and survey the outdoor space. In another example, both independence and safety can be fostered together. Safety is among the most transferable measures. It is also the most significant concern for residents with dementia and one of the primary reasons that garden access is restricted. Safety and independence can be achieved through physical, physiological and visual access, through sensory cues to cognitively simplify the environment, and by spatially placing the garden in proximity to central common areas. These areas of access are also achieved by ensuring that an environment safely restricts residents to a defined boundary to access outdoor space without supervision.

Several studies in the literature indicate that residents who obtained the greatest benefit when studied were those in negative affective states. It is conceivable that residents in greatest need of restoration would experience the most noticeable benefits, since they have the most to gain. Unfortunately, access to the outdoors is not possible for many residents. A significant barrier expressed throughout the literature is the inability to access outdoor space (Bengtsson & Carlsson, 2006; Cohen-Mansfield, 2007; Grant & Wineman, 2007; Kearney & Winterbottom, 2006). Access is restricted at three levels: at the micro-level physical environmental design, through the meso-level staff support, and at the macro-level by means of the organization. Physical access refers to common accessibility barriers, such as door design, transition areas, and pathway
layout. The physical accessibility of an environment includes design of features that may not directly ensure physical access, but enable greater independent use. For example, visual access, way-finding features, and proximity to common areas enable independent use.

Staff related factors are one of the greatest barriers to garden use. Staff are the true gatekeepers to reaching outdoor space. Staff-related barriers found within the literature include a lack of time to assist residents, fear for residents’ safety when in the garden, and insufficient training on use and benefit of nature environments. At the organizational level, leadership must recognize outdoor environments as essential to residents’ well-being. The facility management must ensure a safe and secure environment to reduce staff fears. In doing so, staff are more likely to facilitate regular garden use. Finally, the organization must consider nature programming a regular part of residents’ daily schedules. Part of releasing the fear of resident injury is recognizing that injury can occur anywhere in a long-term care facility. Overprotection precipitates a medical model-of-care that restricts normative living environments. The fear for resident safety is reflected by Cutler and Kane (2006) who state that among other factors, use of outdoor space depends on “the ever-present conflict between resident preferences and perceptions of responsibility for resident safety” (p. 46). A living environment that maintains an institutional feel and restricts home-like, familiar environments impedes progress. With the appropriate design to develop a garden that meets residents’ safety needs, residents can independently and comfortably use outdoor space with the same risk of injury as in the interior environment.

While resident safety and surveillance on site is frequently discussed, the need for surveillance is not clearly established in the literature. Surveillance and accompaniment of residents presents a barrier to resident use of outdoor space in long-term care settings. For residents, monitoring ensures that staff can quickly respond in an emergency. For staff, monitoring provides peace of mind when leaving residents outdoors. Staff schedules typically do not permit the flexibility to monitor residents outside. Unfortunately, a lack of monitoring reduces the frequency with which doors are unlocked. However, several studies in this review discussed the need for more monitoring. Several literature sources suggested surveillance aids such as video cameras and window visibility. Others recommended that volunteers and staff watch
residents. Additional suggestions include independent resident-enabling features to decrease safety concerns such as fence camouflage and way-finding elements. The need for monitoring has not yet been established. A well-designed outdoor space may enable residents to frequent the outdoors without surveillance. The literature does indicate that safety is a significant issue onsite. Resident safety and use will remain compromised without improvements to either site design or resident monitoring. More empirical study must evaluate whether safety measures—in the form of design or personnel—can influence safety onsite to enable more unrestricted access.

The most discussed commonalities in the literature describe outdoor benefits and design approaches, and provide new direction to influence the future of long-term care facility outdoor space. There are numerous garden benefits that have received particular attention for residents with dementia, namely because these benefits can significantly impact resident well-being and health. Literature has found that residents in negative affective states have obtained the greatest outcome from the outdoors. The design of nature environments can address numerous benefit areas at once. Resident surveillance is one of the greatest barriers restricting garden use at many levels of influence. The study of outdoor environments in long-term care facilities must address whether the need for monitoring can be mitigated with site design.

5.4. Limitations

There are a few concerns in the literature that have affected the ability to provide an accurate and detailed literature review on this topic. The main limitations found within the literature involve the research design and proper identification of the subjects and venues. The most pervasive limitation in the literature is small sample size. According to Tang and Brown (2006), a small sample size is common among literature focusing on older adults. While many studies found promising results, several findings were unusable because they did not meet valid significance levels attributed to sample size. A few pilot studies obtained compelling findings, but require additional study. In addition to sample size, several studies lacked control groups for comparison purposes. As this field of study is relatively new, future study with control groups would help determine whether experimental study findings could be explained by other variables. Finally, numerous
study results either conflicted with previous studies or could not be explained. This necessitates more focus on pre-test and post-test two-group experimental designs. Unfortunately, control groups are difficult to implement in long-term care settings, as expressed by Ottosson and Grahn (2006), because this population demonstrates a wide range of socio-demographic variables and health conditions. The participant groups would need to have similar characteristics to make accurate comparisons. One approach is to separate residents into two groups under two conditions and subsequently exchange their exposure, as did Ottosson and Grahn (2006) in an intervention study. Additional study approaches include pre-test and post-test designs with follow-up to determine whether there are long-term benefits of exposure to nature.

There were consistent issues in the literature with respect to the definition of terms and the specific focus of studies. A few studies mentioned that they were geared towards long-term care settings from the outset; however, assisted-living sites were determined to be the focus. The terms ‘long-term care’ and ‘assisted living’ are occasionally used interchangeably. The residential focus should be defined from the outset. Many housing environments for older adults do not have standard definitions. Each term represents different housing types and service provisions. Even between U.S. states, the terms represent different scopes of care. Such terms include nursing homes, skilled nursing facilities, assisted living, aged-care, chronic care, complex care, and independent living. It is difficult to discern which population of older adults and housing environment is being addressed in each study. This invites ambiguity when generalizing knowledge obtained from studies. More precise descriptions and more uniting terms would benefit future literature.

The literature does not consistently describe the health conditions and level of dementia in studies. Within cognitive impairment, there is a wide spectrum of affect based on dementia progression. Residents with limited cognitive abilities were typically participants in studies that observed resident behaviour. Several articles in this review did not clearly identify whether participants had dementia. Studies that did indicate that participants had dementia did not always specify the level of cognitive impairment. In some cases, authors indicated that participants with advanced dementia participated in interviews. It is unlikely that persons with significant dementia could have effectively participated in interviews. It is clear then that the degree of cognitive impairment is
interpretable. Studies should consistently employ a tool to measure cognitive impairment. This is especially consequential if gardens are to be customized for different levels of dementia and physical abilities. It is difficult to develop recommendations and guidelines to suit different levels of resident abilities when the empirical support does not clearly define the participants.

It is important to discern between profit and non-profit long-term care facilities. Many large studies evaluated the availability and contents of gardens within numerous long-term care facilities. Most did not specify whether the facilities were privately run, part of large chain organizations, publically funded, or were a mixture of funding types. These conditions would likely influence the quality and quantity of the gardens available since for-profit homes—and especially large chain organizations—would have more funding available and may even have a department dedicated to establishing outdoor space. Future studies should consider differentiating between profit and non-profit homes to compare garden availability and contents.

The scope of this review did not extend to certain topics pertinent to the understanding and study of long-term care facility outdoor space. Horticultural therapy relates to this topic, but its vast potential was not discussed in depth in this review. Likewise, the field of neuroscience has, in recent years, addressed neurological effects associated with horticultural activities among humans. This was not an area identified in this literature review search, but is an interesting addition to the understanding of the interaction between humans and nature that merits future study.

The limitations within the literature indicate a need for more focused empirical study by identifying the level of participant dementia and defining the residential environment. This includes discerning between profit and non-profit housing environments. These design considerations will develop a more complete understanding of nature benefits for different housing types and resident variables. To improve the strength of the research design, future studies require a larger sample size and experiments with control groups, comparison groups, and with post-test evaluation. These research designs will strengthen the support for health and well-being findings in the outdoor environment.
5.5. Critical Discussion on Descriptive Literature

The descriptive literature was derived from academic journal articles, case study reports, and book chapters. These sources encompassed a wide variety of garden designs and specific findings for long-term care settings. The following paragraphs describe the origin of the design guidelines, the strengths and weaknesses found within the descriptive literature, and areas for future improvement.

The design specifics discussed in the guidelines section were primarily derived from evidence-based design findings. Many of the descriptive pieces gave justification for design recommendations based on case studies or empirical evidence. In many instances, the recommendations were broad enough to advise the design of long-term care spaces. There was inadequate empirical support for specific micro-level details (e.g. sensory features, home-like elements) apart from their potential as features that promote sensory stimulation, reminiscence, etc.

Literature sources with various research designs led to the formulation of design determinations. Both qualitative and quantitative studies produced design recommendations, which helped develop a complete representation of evidence-based design. Many sources in this review evaluated resident behaviour, which led to recommendations to curtail adverse behaviour. A few studies surveyed resident perception on use and benefit. Others entailed pre-test and post-test methodology to inform the design of space. A few sources examined case studies that evaluated exemplary outdoor environments. Case studies provide a detailed description of a single environment. In many cases, the design recommendations expressed were generalizable because the studies were connected by the common theme of garden environments in long-term care settings. To that point, a variety of findings are beneficial to support distinctive residential gardens. Each environment and group of garden users is different. The more detail used to inform the design of a space, the more the designer can plan and modify gardens to fit the needs of its users.

Many empirical and descriptive sources used case studies to inform design recommendations. It is difficult to compile design recommendations due to the multitude of garden areas addressed. One of the most successful resources to connect design
ideas is Rodiek’s (2009) Access to Nature series. The series of user-friendly videos teaches designers and facility management to develop and modify useable outdoor space using real-world examples and virtual renderings. The videos do not include empirical support for their findings. This is suitable, however, because the videos are not intended for scholarly review, but are instead used for practical application.

Overall, the descriptive literature thoroughly addressed a wide range of design considerations for outdoor space. The physical, psycho-physiological, psychological, social, and cognitive needs must be taken into account when designing an environment for a wide range of garden users. The literature addressed the outdoor physical environment, residents’ experience within it, and the adjoining areas to the garden space. Also addressed were the areas that connect the indoors to the outdoors to facilitate greater visibility and a more successful transition into the space. Accessible design strategies, such as door access, seating, and strategic spatial garden placement, are some of the most described design topics in the literature. Despite a thorough and seemingly complete chapter of design guidelines, there are a few areas where more attention is needed. The first design consideration not fully explored is design of the exterior environment as an extension of the interior environment. The second is to incorporate outdoor environments in traditional residential infrastructure. The third is to study the impact of various micro-level design elements as well as study other health conditions in the resident population. The fourth is to grant staff greater access to outdoor space.

The transition area between the indoors and the outdoors is described in the literature and contains characteristics to entice use and foster a comfortable transition. The design of these bridging areas to foster use of outdoor space requires more empirical study. The outdoor environment can become a part of the interior environment—where the bridge between the indoors and outdoors is less visually defined. There is substantial room for more responsive design solutions within these areas and significant benefits to be attained if designed optimally for resident use. It is critical to entice residents to visit the space as part of a regular routine, as suggested within the literature to encourage more regular independent use. The design must provide solutions to make the space customary and routine. Residents could be taken outdoors routinely to participate in everyday tasks, such as nail painting, physical
therapy, and afternoon coffee. Adjacent spaces, such as back patios and front porches create a familiar connection between the indoors and outdoors (Zeisel, 2007). The path network could extend from the interior environment as expressed by Zeisel and Tyson (1999). Using a continuous path colour would produce a less distinct barrier. Zeisel and Tyson (1999) also describe connecting the interior to the exterior environment with outdoor vegetable plants visible from the indoor kitchen.

If the climate does not permit year-round garden use, indoor environments can be designed to provide many of the same benefits as outdoor environments. This includes views of seasonal variation by means of indoor plants and well-placed windows. Windows that let in bright light can improve residents’ sleep and circadian rhythm. Residents can participate actively in indoor horticultural therapy and interact with plant materials brought inside by staff. Holiday decorations can inform residents of the time of year and dimming of lights can indicate the time of day. The interior environment can facilitate many of the positive health and well-being benefits as the exterior. By connecting the two environments and providing more nature elements indoors, the residential care environment can better support residents.

In the paradigm shift from the medical model-of-care to the person-centered model-of-care, the emphasis of interior design has shifted towards a home-like environment. Traditional long-term care facilities do not easily adapt to a home-like and familiar living environment for older adults. Ideally, the design of a long-term care facility would enable residents to inhabit as much of the exterior environment as the interior environment. However, more research is needed to determine whether the design of a traditional long-term care facility could be adapted to facilitate garden use and access. The traditional long and double-loaded corridors that may not have direct access to outdoor space present a significant barrier to possible design solutions. Even if there is an outdoor environment adjacent to residents, it may not be adjacent to common rooms. In many long-term care settings a complete facility overhaul is not possible, especially in an old-style building. Many long-term care facilities do not have the financial means, the available space, and the indoor/outdoor layout to facilitate accessible outdoor environments for their residents. In some cases, design guidelines cannot be replicated, such as proximity of garden space to resident rooms. Current long-term care garden design describes primarily ideal outdoor environments. Future studies should explore
innovative ways of incorporating nature environments in traditional long-term care facilities.

The descriptive literature focuses on select resident groups as well as specific design features within gardens, but neglects others. Specific sensory elements, such as types of home-like features, reminiscence cues, and sensory stimulation features, are not typically empirically evaluated for their impact on residents. Design recommendations simply provide numerous types of sensory features to suit residents’ needs. More specific evidence that validates garden features is necessary to understand the effect on older adults in long-term care facilities. The literature primarily differentiates between two types of resident characteristics within long-term care environments. Sources focus on residents who have been diagnosed with dementia or residents who do not have dementia. The literature also differentiates between residents who are ambulatory and residents who are non-ambulatory. Unfortunately, few studies have discussed other chronic health conditions that residents may have in long-term care settings, such as visual impairment, multiple sclerosis, arthritis, or the outcome of a stroke. There is sparse mention of design adaptations for different health conditions. Future studies must address residents with other health issues in long-term care facilities.

Staff access to outdoor space can benefit residents. A few studies within the literature collected staff opinions of outdoor space. The studies sometimes indicated that staff did not use the outdoor space themselves or that staff use was not permitted. By using the garden more regularly, staff may develop a more positive attitude towards the space and as a result share the environment with residents. The literature indicated that staff sometimes resented visiting the garden with residents because of a lack of time in their schedules. In addition, staff reported difficulty interacting with residents outside. If staff use the space more regularly, they may be less reluctant to take residents outside because it is an environment that they find familiar and enjoy. Residents and staff can find common ground in their appreciation and enjoyment of outdoor space.

The descriptive literature spans a wide range of design topics and uses primarily empirical findings to support recommendations. There were a few descriptive design areas that require further empirical study to determine their most effective design. It
would be beneficial to develop more design recommendations to connect the interior environment to the exterior environment. This would enable residents to participate in normative activities outdoors and develop a more familiar and habitual environment. This is especially relevant for long-term care facilities that were built under the medical model-of-care and do not facilitate ideal access to outdoor space. With additional study of focal features to adorn outdoor space, the environment can ensure the greatest possible benefit for residents.

5.6. Conclusion

With an aging population and inadequate community-based care and services, an increasing number of older adults require long-term care facility placement. Historically, long-term care environments have resembled sterile institutions based on the medical model-of-care. As a result, many older adults do not consider long-term care facilities as desirable living environments. The shift towards the person-centered model-of-care entails focusing on resident welfare in a holistic way and providing a facility that resembles a home-like environment. It is widely understood that humans have an innate connection to nature, and outdoor environments are familiar and home-like for older adults. Therefore, it would be unnatural to restrict the living habitat of older adults to the interior environment.

Residents in long-term care facilities experience challenges conducting daily activities as a result of declining health conditions and age-related sensory changes. Residents also frequently experience reduced well-being, such as social isolation and sleep disturbances. In long-term care settings, residents are frequently unable to realize their full health, functional, and well-being potential. To address these issues, the facility’s physical environment and its staff must equally support residents in achieving these goals. This includes designing living environments that are familiar and comfortable for residents.

Nature settings offer a unique environment that contains familiar elements for all residents and incorporates an abundance of unobtrusive stimuli that prevent overwhelming or over-stimulating residents. Outdoor settings can stimulate positive
outcomes for residents with and without dementia. As baby-boomers age, a larger portion of older adults will transition into residential care settings than from previous decades. A large proportion of long-term care facility residents will have a diagnosis of dementia. It is prudent to provide an environment that reduces the symptoms associated with dementia, such as agitation and wandering behaviour. Decreasing symptomatic episodes not only impacts residents, but also improves the work environment for staff and contributes to peace-of-mind for family and friends.

Nature environments are powerful, influential settings for residents in long-term care facilities. Nature addresses a plethora of health and well-being measures for residents, yet the extent to which nature impacts these measures is still in its early stages. This review synthesizes existing literature on nature environments in long-term care facilities. The identified empirical findings and design guidelines contribute toward the creation of evidence-based design for planning outdoor environments to support residents’ optimal health and well-being. Well-being findings for residents include improved mood, sleep, and attention restoration. Health benefits include dementia symptom reduction, pain alleviation and depression reduction. Nature can transform a residents’ emotional and psychological state and address their physical, physiological and social needs. Relevant theories and conceptual frameworks encompass only a few of the many benefits unveiled through empirical study of nature environments in long-term care settings. Overall, the literature lacks conceptual basis due to inadequate explanatory relationships. Future studies should use control conditions to establish direct causal relationships for benefits found in nature. Nature environments are primarily studied in the form of outdoor gardens—and infrequently—indoor horticultural activities. However, this does not reflect an abundance of well-used outdoor space in long-term care settings. Long-term care facilities infrequently offer accessible outdoor spaces for residents. When available, outdoor settings are often difficult to reach due to access barriers that restrict use at the organizational, staff, and physical levels of influence.

There is an opportunity to substantially improve the long-term care facility environment by incorporating positive natural environments. Nature offers numerous and diverse benefits to suit residents with and without dementia. This review presents existing conceptual work and reveals future directions for the study of nature
environments and for practical application in long-term care settings. This work clarifies barriers to access and indicates design strategies to obtain maximum use and benefit. This review seeks to unveil the multi-faceted benefits of nature environments. The attention towards outdoor space in long-term care facilities will bring attention to this untapped resource and should precipitate regulations that necessitate outdoor environments and provide standards for its design. Evidence-based standards for outdoor environments can mitigate risk and optimize resident benefits. With proper access to well-designed outdoor environments, a long-term care facility can support residents in attaining positive health and well-being.
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Appendix.

Summary Review Table

Table A1. Empirical Summary Review of the Literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Measurement</th>
<th>Sample Size/Design</th>
<th>DVs</th>
<th>IVs</th>
<th>Result</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Ancoli-Israel et al., 2002</td>
<td>• Bright light therapy on resident sleep outcomes</td>
<td>• 77 US residents from 2 LTC homes in a randomized controlled trial</td>
<td>• Sleep quality at night</td>
<td>• Bright light at night</td>
<td>• Circadian rhythm improved with morning light</td>
<td>• Morning bright light in gardens may impact the robustness of the circadian rhythm and of wake-time</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Daytime alertness</td>
<td>• Bright light in morning</td>
<td>• Activity level and timing during the day improved with morning light</td>
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<td></td>
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<td>• Circadian rhythm</td>
<td>• Dim light at night</td>
<td>• Sleep quality at night and daytime alertness did not improve in any condition</td>
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<td>• No sleeping during the day</td>
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<tr>
<td>Anderson et al., 2011</td>
<td>• Pilot study comparing behavioural benefits of multi-sensory environment</td>
<td>• 12 LTC residents with dementia from a home in Australia</td>
<td>• Observed physical and facial behaviour</td>
<td>• Location</td>
<td>• Residents exhibited better behaviour (immediate) from Snoezelen and garden</td>
<td>• Results were similar yet Snoezelen costly to implement</td>
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<td></td>
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<td>• Time</td>
<td>• Residents preferred one environment or the other</td>
<td>• Staff need time, training and mindset to use therapy</td>
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<td>• Focus group with staff following study</td>
<td>• Staff undervalued social and psychological well-being</td>
<td>• Garden more of a “normal social activity” because unlike Snoezelen it is a normative environment</td>
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<td>to determine whether space was still used</td>
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<td>Baillon et al., 2004</td>
<td>• Comparing reminiscence and Snoezelen multi-</td>
<td>• 20 residents with dementia exhibiting agitated behaviour in a</td>
<td>• Agitation</td>
<td>• Snoezelen and Reminiscence therapies</td>
<td>• Both therapies reduced agitation</td>
<td>• Both therapies may beneficially influence resident agitation and well-being</td>
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<td>Bengtsson &amp; Carlsson, 2006</td>
<td>• Resident usage and interaction with the outdoors</td>
<td>LTC home in the UK</td>
<td>• Staff views of residents’ use and experience of outdoors</td>
<td>• Facility location</td>
<td>• Major themes: being comfortable in the outdoor environment through safety and familiar non-threatening features</td>
<td>• Important that all residents can access and participate outdoors</td>
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<td></td>
<td>• Focus group methodology</td>
<td>• 14 nursing staff members took part from 3 different LTC homes</td>
<td>• Design variation</td>
<td>• Content</td>
<td>• Access to surrounding life with stimulation and creating an escape</td>
<td>• Residents need to be both protected and inspired</td>
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<td></td>
<td>• Staff views of residents’ use and experience of outdoors</td>
<td>• Facility location</td>
<td>• Spatial location</td>
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<tr>
<td>Burton &amp; Sheehan, 2010</td>
<td>• Physical environment features in LTC that affect resident well-being and quality of life</td>
<td>• 81 people with mild to moderate dementia interviewed from 20 UK LTC homes</td>
<td>• Well-being</td>
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<td></td>
<td>• 81 people with mild to moderate dementia interviewed from 20 UK LTC homes</td>
<td>• Opinions of exterior and interior of buildings, rooms, and access to garden and design of garden</td>
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<td>• Views of nature, access to nature, exposure to natural light, comfort, and a home-like character were valued</td>
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<td></td>
<td>• Semi-structured qualitative interviews</td>
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<tr>
<td>Calkins, Szmereko vsky &amp; Biddle, 2007</td>
<td>• Time spent outdoors on sleep and agitation outcomes</td>
<td>• 17 residents with dementia from three LTC facilities</td>
<td>• Sleep</td>
<td>• Time spent outside</td>
<td>• Outside activity improved sleep and indeterminable benefit on agitation</td>
<td>• Results indicate the features within outdoor environments that influence resident well-being</td>
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<td></td>
<td>• Repeated</td>
<td>• Agitation</td>
<td>• No activity (winter)</td>
<td>• Suggestions nature is less costly solution to sleep and</td>
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<td>• Significant findings among residents suggest focusing on garden aesthetics, easy access and views into outdoor space</td>
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<tr>
<td>Chapman, Hazen &amp; Noell-Waggoner, 2007</td>
<td>• Evaluating staff response to education on outdoor environments for residents with dementia</td>
<td>• 28 staff from 20 LTC facilities in the US participated in 22 hours of training</td>
<td>• Garden use, plant use in activity programs, and an advocate for garden use</td>
<td>• Staff members in training program • Organizations staff belonged to</td>
<td>behaviour issues</td>
<td>• Advocacy was successful where the organizations supported change • Creating appropriate outdoor environments from the start is imperative as organizations find it difficult to commit to changing numerous barriers (i.e. glare, shelter)</td>
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<tr>
<td>Cohen-Mansfield, 2007</td>
<td>• Features, use, and benefit of outdoor space for special care unit residents</td>
<td>• National survey • 320 special care unit facilities from the US responded to questionnaires</td>
<td>• Outdoor environments for residents with dementia</td>
<td>• Existence • Availability • Design • Features • Size</td>
<td>• ~60% of problems related to safety • 85% of gardens were used for eating and BBQs • 37% of gardens catered to non-ambulatory residents • 85% catered to cognitive impairment • 77% catered to wanderers • 12% catered to all impairments • 97% said in summer, Gardens must be design for specific needs of residents • Gardens are an overwhelmingly positive feature • Residents with multiple impairments may not have a space that is accessible to them • Space was overwhelmingly useful despite great variation in contents</td>
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<td>Cohen-Mansfield &amp; Werner, 1998</td>
<td>• Benefit of garden visits on wandering and pacing behaviour</td>
<td>• 12 residents with dementia with wandering/pacing behaviour</td>
<td>• Exit-seeking behaviour</td>
<td>• Baseline • Outdoor visits</td>
<td>gardens used weekly • 46% said in winter, gardens rarely used • 24% said residents not used to visiting outside, but that garden space prompted staff (81%) and family (72%) to bring residents out</td>
<td>Residents who have access to outdoor space may exhibit less wandering and exit seeking behaviour if they have ability to spend time in outdoor space</td>
</tr>
<tr>
<td>Connell, Sanford &amp; Lewis, 2007</td>
<td>• Compare the behaviour and sleep outcomes of indoor and outdoor activity</td>
<td>• 20 residents with dementia in LTC • Two-group two phase design pilot study</td>
<td>• Sleep • Behaviour</td>
<td>• Structured activity program (indoor) • Structured activity program (outdoor)</td>
<td>• Outdoor group experienced significantly reduced verbal agitation • Outdoor and indoor group experienced significant improvements to sleep time • Sample had low behavioural issues at baseline</td>
<td>Behaviour may improve with an outdoor programming to a greater extent than indoor programming and sleep may be helped by both • Residents seemed more keen to participate in outdoor programming</td>
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<tr>
<td>Cox, Burns &amp; Savage, 2004</td>
<td>• Compared Snoezelen, garden and living room environment on resident response</td>
<td>• 24 Australian residents with dementia in LTC&lt;br&gt;• Interviews with 6 caregivers and 6 visitors&lt;br&gt;• Mixed-methods group comparison design</td>
<td>• Well-being&lt;br&gt;• Visitor and staff opinion</td>
<td>• Snoezelen room with caregiver&lt;br&gt;• Living room with caregiver&lt;br&gt;• Garden environment with caregiver</td>
<td>• Residents entered the garden independently, but not Snoezelen environment&lt;br&gt;• Well-being increased in both outdoor and Snoezelen environments&lt;br&gt;• Having a caregiver present in all environments increased well-being&lt;br&gt;• Residents instinctively started performing gardening activities&lt;br&gt;• Interviews determined that Snoezelen was more relaxing and outdoors was more engaging&lt;br&gt;• Residents were hesitant with technology in Snoezelen environment</td>
<td>• The qualitative findings indicate that the Snoezelen and outdoor environment may produce different benefits for residents&lt;br&gt;• Having a companion with residents may greatly influence their well-being in a space&lt;br&gt;• Well-being increased as a result of outdoor and Snoezelen environments</td>
</tr>
<tr>
<td>Cutler &amp; Kane, 2006</td>
<td>• Evaluation and availability of outdoor space in nursing homes within the</td>
<td>• 1988 residents and 1780 families from 40 LTC homes in 5 states were surveyed as were staff members</td>
<td>• Facility variability&lt;br&gt;• Quality of life</td>
<td>• Resident perception&lt;br&gt;• Access&lt;br&gt;• Amenities&lt;br&gt;• Use&lt;br&gt;• Program availability</td>
<td>• Staff reported that almost half were never included in outdoor activities&lt;br&gt;• Of residents and family, almost 40% stated the resident would like to be outdoors more</td>
<td>• Residents cannot independently use outdoor space if they cannot access because of locks or distance&lt;br&gt;• Residents and family indicate that residents want to be outside more</td>
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| US              |                                                                              |                                                                                  |                                          |                                          | • Majority of spaces were locked  
• Formal activities were rare  
• 53% had raised garden planters, 65% were secured, 83% had a covered patio and seating space | • There is a significant amount of variability between different facilities |
| Detweiler et al., 2008 | • Walled garden on behaviour and agitation scores of residents with dementia  | • 34 male residents from a LTC home in an observational study with pretest and posttest design and staff/family survey questions | • Agitation/Behaviour  
• PRN use  
• Incidence reports  
• Quality of life | • High garden use  
• Low garden use | • Nothing noticeable in Incident reports  
• Garden design and study design major limitations to study  
• Survey respondents positively reviewed use for residents  
• Physical behaviours increased  
• Frequent users had better behaviour scores and reduced PRN use | • Family and staff noticed benefit  
• More regular users had improved agitation scores  
• There were conflicting results that could be attributed to study design and site design |
| Detweiler et al., 2009 | • Evaluation of a new wander garden on medication use and the frequency and severity of falls for male  | • 28 male residents from a LTC home in an observational study pretest and posttest design using convenience | • Falls (number)  
• Falls severity  
• Agitation/Medication use (PRN) | • Levels of ambulation among:  
• High (garden) user group  
• Low (garden) user group | • High user group required less PRN use  
• Garden use reduced falls and fall severity for all users  
• Ambulatory residents had more reduction in agitation than those in wheelchairs  
• Greater reduction in falls and fall severity for less | • Some benefits were more significant with increased use, but overall garden use produced benefits to falls and PRN medication use |
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<tr>
<td>residents with dementia</td>
<td>sampling</td>
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<td>ambulatory, but no difference in PRN use. Garden design may not have supported ambulatory residents</td>
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<tr>
<td>Diaz Moore, 2007</td>
<td>• Defining design features that correspond to Kaplan’s 4 Attention Restoration Theory properties</td>
<td>• 12 panel experts in the applicable fields • Qualitative review of data from experts on the design features of 5 dementia gardens</td>
<td>• The design features that correspond to the 4 properties of Attention Restoration</td>
<td>• Review of commentary on exemplary gardens</td>
<td>• Being Away: the design and boundaries • Fascination: seasonal variation and details and sense of threshold • Extent: numerous forms of stimulation • Compatibility: physical environment, plants, sensory environment, comprehension, opportunities</td>
<td>• Sensory properties and stimulation play a significant part in restoration • Nature has natural qualities that contribute to the attention restoring ability of residents</td>
</tr>
<tr>
<td>Gibson et al., 2007</td>
<td>• Qualitative evaluation of enabling environments for residents in different housing settings</td>
<td>• 7 LTC residents with dementia, and 10 staff and 13 family • Semi-structured interviews and focus group sessions • Used residents of different</td>
<td>• Quality of life • Well-being • Barriers • Meaning</td>
<td>• Nature influence</td>
<td>• Residents reported enjoying nature-related activities, visiting the outdoors, and having a connection to nature • LTC residents could not access without help • Poor ambulation meant less access, poor well-being • Residents thought they went outside, but in reality many did not</td>
<td>• Residents’ perception of their use may not be accurate • Imagined use is beneficial • Ambulation affects access • Planned activities entice use</td>
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<tr>
<td>Grant &amp; Wineman, 2007</td>
<td>• Evaluation of garden sites in creation of a theoretical framework for improving use</td>
<td>• 5 excellent LTC garden sites in USA based on recommendations • Inventory, analysis, observations, surveys, behaviour mapping</td>
<td>• Use of outdoor space</td>
<td>• Organization • Policy • Garden Layout • Staff attitudes • Visual and physical access • Garden design</td>
<td>• Residents mainly went outside independently and traveled to far places if it was desirable • Residents went out twice as much when door was open • Door locks and alarms barriers to access deter use • Only one garden had strong use-influencing features • Policy stated the homes’ support of independence and outdoor activities, but this was not substantiated • Staff locked doors when no supervision • Shady spots valued for adjustment/transition • Seating places near and far from entrance valued</td>
<td>• Policy of the organization did not always correspond to the gardens’ use • Easier physical access increases use • Comfort more important than other features</td>
</tr>
<tr>
<td>Heath, 2004</td>
<td>• Design versus actual use and experience</td>
<td>• Post-occupancy evaluation on a garden space in</td>
<td>• Use of outdoor gardens</td>
<td>• Different users (e.g. staff, residents) • Design of gardens,</td>
<td>• Some features meant to help, such as handrails viewed as a hazard to safety • Non-ambulatory residents couldn’t access</td>
<td>• Accessibility of site restricts independent use • Important to evaluate sites to determine their true benefit, not just intended</td>
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<td>of garden space in LTC</td>
<td>Canada</td>
<td>Sample was 67 participants with dementia, 57 family members, 80 staff, 36 volunteers</td>
<td>opinion of their features</td>
<td>independently</td>
<td>• Garden did not provide gardening place for residents</td>
<td>• Participants had the impression that staff should be taking residents outside</td>
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<tr>
<td>Hernandez, 2007</td>
<td>• Influence of garden environments on quality of life</td>
<td>Post-occupancy evaluations</td>
<td>• Resident behaviour and preferences</td>
<td>• Family and staff indicated garden was valued</td>
<td>• Positive benefits were attributed to outdoor space. It provided residents with unique and new places to visit and establish new routines and activities</td>
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<td></td>
<td>Multi-method qualitative research</td>
<td>• Appreciation of space</td>
<td>• Sitting was most common activity</td>
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<td>Observations, behaviour mapping with staff and residents</td>
<td>• Design of the space</td>
<td>• Creation of rituals outside</td>
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<td>Interviews with 12 family, 5 design professionals, and 28 staff</td>
<td>• Garden use</td>
<td>• Outside provided destination with new scenery</td>
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<td></td>
<td>• Garden benefit</td>
<td>• Emotional response</td>
<td>• Emotions more positive</td>
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<td></td>
<td>• Quality of life</td>
<td>• Weather was prohibitive</td>
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<td>Jarrott &amp; Gigliotti, 2010</td>
<td>• Comparing traditional and garden planned activities on resident engagement and affective outcomes</td>
<td>• 129 residents with dementia in the US from 5 LTC homes and 3 adult day services • Relative comparison two-group experimental treatment design</td>
<td>• Engagement</td>
<td>• Observing facial expressions and emotions • Behaviour • Garden planned activities • Traditional activities</td>
<td>• Emotional expression was the same for both groups • Outdoor group had better engagement with active participation, passive engagement, and less maladaptive behaviour • Traditional activity may not have been challenging enough for participants, seen in maladaptive behaviour • Garden therapy may have been too challenging</td>
<td>• Environmental-pressure is important not only in physical environment, but also in the design of activities to suit residents • The garden activity was successful in producing better engagement and less negative behaviour</td>
</tr>
<tr>
<td>Kearney &amp; Winterbottom, 2006</td>
<td>• Quality of life and perceived psychological benefits of gardens and barriers to access</td>
<td>• 40 residents from 3 US LTC residences interviewed • No residents with dementia were included • Qualitative study</td>
<td>• Psychological benefits • Quality of life • Barriers to access</td>
<td>• Use • Garden importance • Contentment with garden • Positive and negative attributes • Perceived benefits and barriers • Frequency of visit • Window views • Need for</td>
<td>• 80% said they could not access as much as would like due to impairment and need for assistance • Plant selection most favoured feature, followed by change from indoors and fresh air • Passive enjoyment was through viewing nature, sitting, interacting with others • Many other benefits were to mood, psychological state, and appreciating something specific to nature (e.g.</td>
<td>• Outdoor enjoyment was primarily passive • Residents wished to visit more, but could not do so due to limitations</td>
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<td>Lyketsos et al., 1999</td>
<td>• Influence of bright light on agitation, sleep and mood</td>
<td>• 15 residents with dementia in LTC&lt;br&gt;• Random controlled crossover study</td>
<td>• Agitated behaviours&lt;br&gt;• Sleep and circadian rhythm&lt;br&gt;• Mood</td>
<td>• Bright light therapy</td>
<td>• Nighttime sleep improved, but may not be causal as it also improved for control group&lt;br&gt;• Behaviour and mood scores were not statistically significant</td>
<td>• For residents with dementia and without significant sleeping issues, this study did not show morning bright light to benefit mood or behaviour and sleep may have improved due to other factors</td>
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<tr>
<td>Martin et al., 2007</td>
<td>• Nonpharmacological approach to improving circadian rhythm and sleep among people with sleep issues</td>
<td>• Randomized controlled trial&lt;br&gt;• 100 residents in LTC</td>
<td>• Sleep&lt;br&gt;• Circadian rhythm</td>
<td>• Bright outdoor lighting&lt;br&gt;• Staying awake during day&lt;br&gt;• Organized physical activity&lt;br&gt;• Keeping a bedtime schedule&lt;br&gt;• Reduced lighting and sound at night</td>
<td>• The time of day that residents were exposed to bright light did not impact result&lt;br&gt;• Intervention group spent 19% less time in bed during the day&lt;br&gt;• The experimental groups’ circadian rhythm changed and residents’ rhythms advanced</td>
<td>• The results suggest that bright light exposure and considering lighting in general is important to helping adjust residents’ circadian rhythm</td>
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<tr>
<td>Mather, Nemecek &amp; Oliver, 1997</td>
<td>• Observing behavioural change with a walled garden</td>
<td>• 10 special care unit residents with dementia in Canada tested&lt;br&gt;• pretest and posttest</td>
<td>• Behaviour</td>
<td>• Indoor observation (pre-post) in winter&lt;br&gt;• Indoor observation (pre-post) in</td>
<td>• More use led to greater benefit for reducing negative behaviour and improving sleep&lt;br&gt;• Disruptive behaviour was not greatly impacted, but aggression spiked in</td>
<td>• Sleep and behaviour may be impacted with more frequent use of garden space&lt;br&gt;• Disruptive behaviour did not improve significantly</td>
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| McMinn & Hinton, 2000 | • Effect of confinement on residents' behaviour and medication use           | • 13 patients residing in a psychogeriatric unit with dementia or other mental disorder needing a special-care environment  
• Non-randomized quasi-experiment  
• Singular group test with post-test | • Verbal aggression  
• Physical aggression  
• Psychotropic medication | • Mandatory confinement | • Agitation reduced when residents were no longer trapped inside  
• Patients who from the outset had aggression issues showed greater reduction in physical and verbal aggression | • Lack of access to the outdoors may influence verbal and physical aggression among older adults in specialty units for behavioural issues associated with dementia or other conditions |
| Mooney & Nicell, 1992 | • Long-term reduction in aggression through outdoor                          | • Longitudinal study in Canada on 5 LTC special care units  
• Negative behaviour  
• Garden designs | • Observations  
• Incident reports | • Violence increased in non-garden facilities by 681% as did falls and incident reports  
• Violence did not increase among garden homes (−) | • Resident behaviour was better with garden use  
• The design of the garden space influences resident behaviour |
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<tr>
<td>Murphy et al., 2010</td>
<td>• Influence of wander gardens on agitation</td>
<td>• 34 LTC residents with dementia in a locked unit • Posttest observational study</td>
<td>• Agitation levels</td>
<td>• Ambulatory capabilities • Wander garden</td>
<td>• Decline in agitation was different for each person • Ambulation explained variation as residents who accessed garden more often received greatest benefit • If residents were outside during times when rec staff were not there, staff felt it disrupted their routine</td>
<td>• Agitation was greatly decreased through outside use, but residents who were not as ambulatory experienced far less benefit • Easy access and use for all residents despite physical impairment is critical</td>
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<tr>
<td>Ottosson &amp; Grahn, 2006</td>
<td>• Outdoor environment impact on concentration and stress</td>
<td>• Intervention with control group study on 17 LTC residents in Sweden</td>
<td>• Stress • Concentration</td>
<td>• Social balance • Psychophysiological balance • Physical balance</td>
<td>• Concentration improved with outdoor conditions • Pulse pressure and diastolic blood pressure improved with outdoor rest, especially for people with psycho-physiological imbalance • Pulse and blood pressure</td>
<td>• Outdoor rest was more beneficial on concentration and stress than indoor rest • Residents with lower level of psycho-physiological balance receive greater benefit from outdoor visits</td>
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<td>Reference</td>
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<td>Sample Size/Design</td>
<td>DVs</td>
<td>IVs</td>
<td>Result</td>
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<tr>
<td>Rappe &amp; Kivelä, 2005</td>
<td>• Garden influence on depressive symptoms of residents</td>
<td>• 30 residents in LTC, split into depressed and non-depressed</td>
<td>• Stress</td>
<td>• Reported perceived benefits</td>
<td>Gardens may provide short-term reprieve from negative emotions associated with stress and depression • Emotional well-being increased with garden use • 50% of people felt that the garden reduced their pain • Visiting garden was dependent on staff availability • Higher the depression symptoms, greater the benefit • More people with depression found it burdensome to visit the garden • Garden benefited mood, sleep and concentration</td>
<td>Garden users experiencing depression may find more benefit than those who do not • Benefits were short-term</td>
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<tr>
<td>Rappe &amp; Topo, 2007</td>
<td>• Impact of nature on well-being</td>
<td>• 65 staff in Finland from 10 LTC homes</td>
<td>• Well-being</td>
<td>• Plants</td>
<td>The garden did influence well-being • Helped resident remember memories, gain confidence, stimulate senses, maintain abilities and increase social</td>
<td>The garden provided both a relaxing and actively stimulating environment • Access was primarily achieved through taking residents out</td>
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| Raske, 2010 | • Enabling garden effect on quality of life | • Qualitative evaluation with open-ended interviews evaluation  
• Interviewed 16 residents, 6 family, 15 staff, 6 volunteers from LTC in USA  
• 123 people dementia observed from 8 care floors | • Resident quality of life | • Garden's influence on quality of life domains | • Garden positively influenced meaningful tasks, contentment, relationships, autonomy  
• Residents with dementia experienced increased communication and decreased agitation  
• Community connection increased through project  
• Staff and volunteers reported increased quality of life | • Residents, staff and volunteers all benefited from spending time outdoors  
• Garden may improve social interaction  
• Garden may reduce behavioural symptoms |
<table>
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<tr>
<td>Rodiek, 2002</td>
<td>• Comparing indoor and outdoor environments on stress and mood</td>
<td>• 17 residents (LTC and independent) in the US • Two-group posttest experimental pilot study</td>
<td>• Mood (positive) • Mood (negative) • Stress • Salivary cortisol</td>
<td>• Indoor environments • Outdoor environments</td>
<td>• Cortisol levels changed substantially in the garden environment • Mood and stress did not change</td>
<td>• Stress improved in the garden condition through salivary cortisol level</td>
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<tr>
<td>Rodiek, 2006</td>
<td>• Design features perceived as influencing use</td>
<td>• 14 assisted living facilities in Texas • 108 residents took part in surveys and focus groups • Cluster multi-stage sample</td>
<td>• Usage</td>
<td>• Built environment • Natural elements • Accessibility issues • Strengths • Weaknesses</td>
<td>• Furniture and shelter important to resident comfort • Concerns of paving material, boring path network, too much hardscape, distance from residents’ room • Both physical and natural features enticed residents to visit • Residents concerned about the safety of the path while walking outdoors</td>
<td>• Comfort and safety were significant concerns • Natural and built elements help bring people into the space</td>
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<tr>
<td>Rodiek, 2008</td>
<td>• Residents’ perspective on outdoor garden space</td>
<td>• 1490 staff and residents from 68 assisted living facilities in USA • Surveys, interviews, and environmental assessment</td>
<td>• Usability • Contentment with outdoor space</td>
<td>• Location of gardens • Contents of gardens • Connectivity with interior</td>
<td>• 65% of residents (and 95% of staff) indicated the outdoors made them feel better • Those with more use reported higher health and physicality, walked, and had visitors who joined them • Those with less use were</td>
<td>• Residents felt better after being in the garden • Those who did not use the garden often may not have because the environment did not support their needs</td>
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<td>Tang &amp; Brown, 2006</td>
<td>• Window views on physiological outcomes in older women</td>
<td>• 5 female residents in retirement complex in Canada, unknown health and cognitive condition • Quasi-experimental design</td>
<td>• Blood pressure • Heart rate</td>
<td>• Nature view • Built-environment view</td>
<td>Both views reduced blood pressure and heart rate • Nature settings produced greatest reductions • After 5 minutes, benefits were noticeable and after another 5 benefits were more substantial • The findings may be a result of initial blood pressure, history of gardening, and length of time in residential setting</td>
<td>A view of nature from indoors can impact health and well-being of residents</td>
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<tr>
<td>Tse, 2010</td>
<td>• Garden environment impact on resident outcomes</td>
<td>• 26 residents in experiment group’s garden activities from</td>
<td>• Loneliness • Social isolation • Activities</td>
<td>• Gardening program • Traditional program</td>
<td>Both groups had high loneliness and social isolation pretest • Posttest, garden group had increased social, life</td>
<td>Garden environments may be versatile to benefit a wide range of residents despite their socio-demographic differences</td>
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<td>Ulrich, 1984</td>
<td>Patient recovery post-surgery through view of nature</td>
<td>46 patients in hospital following surgery in a two-group experimental design</td>
<td>Recovery time, Anxiety and pain, Nursing reports, Complications, Medication</td>
<td>Nature views, Brick wall views</td>
<td>Patients with a nature view experienced a shorter stay, The nature group had more positive nursing reporting, Nature views had fewer complications, Those with nature view took lower doses of pain meds</td>
<td>Though these findings are hospital related, this study is a seminal work, The influence of nature can be obtained through as little as a view of nature</td>
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